THE PREDICTIVE EFFECT OF ADOLESCENT EMOTIONAL INTELLIGENCE, IQ AND GENDER FOR ACADEMIC ACHIEVEMENT: A STUDY OF THE VICTORIAN CERTIFICATE OF EDUCATION

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Abstract

**Objective:** This study examined the relationship between emotional intelligence (EI) and academic achievement in the adolescent population. The term adolescent emotional intelligence (AEI) was introduced to delineate the unique biopsychosocial development and growth that occurs in adolescence as it may impact on the construct of emotional intelligence (EI), which is developmentally differentiated from that of childhood and adulthood. Few researcher studies have analysed the individual differences in the effect of AEI in academic achievement in secondary school students. Hence, this study sought to investigate the simultaneous predictive effect of AEI, IQ and gender in adolescents completing their final year of secondary school.

**Methodology:** Australia, as a member country of the Organization for Economic Co-operation and Development (OECD), was selected for this study. Four secondary schools located in Victoria took part in the study. The Year 12 students in the study ($n = 224_{males}, n = 145_{females}$) were 16 to 18 years of age ($N = 369$). The Swinburne University Emotional Intelligence Test (Adolescent Version) provided a trait EI measure of AEI. The Raven’s Standard Progressive Matrices provided a measure of fluid intelligence, which was operationalised as the Intelligence Quotient (IQ). The Victorian Certificate of Education (VCE) percentile rank score stipulated a national standardised measure of academic achievement. The simultaneous predictive effects of AEI, IQ and gender for VCE academic achievement were investigated using a saturated regression model.

**Results:** Analysis of AEI and the four AEI traits resulted in five regression models, predicting 26 to 29% of VCE academic achievement. The positive predictive effect of AEI in academic achievement accounted for a VCE percentile rank score of 4.13 points per standard deviation. Further, analysis of the AEI trait regression models identified a main effect for the interaction between gender and emotions direct cognition. Decomposition of the regression equations in IQ and gender combination groups found the effects of AEI and AEI traits for VCE academic achievement were heterogeneous, subject to developmental differences in the IQ and gender combination groups. Therefore, the predictive effect of AEI was dynamically and adaptively utilised by Year 12 students in their VCE academic achievement, subject to individual differences in adolescent AEI, IQ and gender.
Declaration

This declaration is to certify that:

- This thesis does not contain material that has been accepted for any other degree in any university;
- To the best of my knowledge and belief, this thesis contains no material previously published or written by any other person, except where due reference is given in the text; and
- This thesis is less than 130,000 words in length, exclusive of front matter, tables, figures, references and appendices.

Maree J. E. Ryan
Dedication

This thesis is dedicated to my family. I would like to express my gratitude to my parents Delia and Roosmore, my brothers Mark, Paul, Peter, Luke and Christopher Hanlon and their families. In addition, I would like to sincerely acknowledge Kevin and our sons Ross, Trent, Nathan and Spencer Ryan, who are a source of inspiration. Finally, I would also like to thank Professor Malcolm Simons for his friendship and encouragement in the pursuit of knowledge.
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<th>Description</th>
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<tbody>
<tr>
<td>ABS</td>
<td>Australian Bureau of Statistics</td>
</tr>
<tr>
<td>AEI</td>
<td>Adolescent Emotional Intelligence</td>
</tr>
<tr>
<td>ATAR</td>
<td>Australian Tertiary Admission Rank</td>
</tr>
<tr>
<td>CEI</td>
<td>Childhood Emotional Intelligence</td>
</tr>
<tr>
<td>COAG</td>
<td>Council of Australian Governments</td>
</tr>
<tr>
<td>EI</td>
<td>Emotional Intelligence</td>
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<tr>
<td>ENTER</td>
<td>Equivalent National Tertiary Entrance Rank</td>
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<tr>
<td>gc</td>
<td>Crystallised Intelligence</td>
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<td>GDP</td>
<td>Gross Domestic Product</td>
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<tr>
<td>gf</td>
<td>Fluid Intelligence</td>
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<tr>
<td>IEI</td>
<td>Infant Emotional Intelligence</td>
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<tr>
<td>IQ</td>
<td>Intellectual Quotient</td>
</tr>
<tr>
<td>OECD</td>
<td>Organization for Economic Co-operation and Development</td>
</tr>
<tr>
<td>SEM</td>
<td>Standard Error of Measurement</td>
</tr>
<tr>
<td>SUEIT</td>
<td>Swinburne University Emotional Intelligence Test</td>
</tr>
<tr>
<td>SUEIT: A</td>
<td>Swinburne University Emotional Intelligence Test: Adolescent Version</td>
</tr>
<tr>
<td>UNESCO</td>
<td>United Nations Educational, Scientific and Cultural Organization</td>
</tr>
<tr>
<td>UNICEF</td>
<td>United Nations Children’s Fund</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
<tr>
<td>VCAA</td>
<td>Victorian Curriculum and Assessment Authority</td>
</tr>
<tr>
<td>VCAL</td>
<td>Victorian Certificate of Applied Learning</td>
</tr>
<tr>
<td>VCE</td>
<td>Victorian Certificate of Education</td>
</tr>
<tr>
<td>VTAC</td>
<td>Victorian Tertiary Admissions Centre</td>
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CHAPTER ONE

Introduction

This study conducts an investigation into an increasingly significant, yet historically overlooked factor in adolescent academic achievement—emotional intelligence (Goleman, 1995; Greenspan, 1989; Leuner, 1966; Payne, 1985; Salovey & Mayer, 1990). Since the Frenchmen Binet and Simon (1905) published their seminal psychometric test of intelligence early in the 20th century, intelligence has accounted for approximately 25% of the variance in academic achievement and in so doing, has remained the strongest predictor of academic achievement to date (Neisser et al., 1996; Nisbett et al., 2012). An intelligence test produces a standardised global measure of intelligence referred to as an intelligence quotient (IQ) (Jensen, 1998). In addition, an intelligence test presents range of subscores that can provide further insight into how a student processes cognitive information that may affect their academic achievement (Herrnstein & Murray, 1994; Jensen, 1998; Nisbett et al., 2012). While educators and researchers acknowledge the formative role of intelligence in academic achievement, they have also continued to question what other variables could account for the remaining 75% of the variance in academic achievement (Jensen, 1998).

Similarly, Binet (1907) also acknowledged the formative importance of IQ and questioned if there were additional factors, such as emotional factors, which accounted for the variance in intelligent behaviour. Binet (1907) suggested that by focusing only on intellectual functioning, other important components of an individual’s psychological being were being ignored, such as the affective factors that provided the motivation to direct and drive one’s cognition. Hence, our “intelligence would cease to work and would have no more utility than a machine without motive power. Our motive power is the will, the feeling, or the tendency. Let us not separate the will from intelligence…” (Binet, 1907, p. 166). Subsequently, Leuner (1966) also suggested that human development could be more effectively understood through considering the impact of both abstract intelligence and emotional intelligence. Further, both Payne (1985) and Greenspan (1989) asserted that emotional intelligence was a traditionally disregarded, but nonetheless formative factor, in academic achievement.
Salovey and Mayer (1990) seminally defined emotional intelligence (EI) as, “the subset of social intelligence that involves the *ability to monitor one’s own and others’ feelings and emotions, to discriminate among them and to use this information to guide one’s thinking and actions*” [sic italics added in original] (p. 189). Subsequently, Bar-On (1997b) conceptualised those who were emotionally intelligent as having the skills to understand and express themselves, to understand and relate well to others, while also being able to cope well with the demands of life as they encounter it on a daily basis.

To date, research examining the relationship between EI and academic achievement has provided variable results (Mayer, Roberts, & Barsade, 2008). Research evidence has confirmed the developmental gender differences in the EI of youth and illustrated the importance of EI skills in their psychosocial development and academic achievement (Rivers et al., 2012). Further, a positive relationship between EI and academic achievement has been identified in the adolescent population (Downey, Mountstephen, Lloyd, Hansen, & Stough, 2008). At the same time, research findings by Petrides, Frederickson, and Furnham (2004) demonstrated the complex predictive relationship between EI and IQ for academic achievement in adolescents whereby a bilinear interactional relationship between EI and IQ was predictive of adolescent academic achievement. The findings confirmed EI had a stronger positive predictive effect on IQ for academic achievement in adolescents with fewer intellectual resources (Petrides et al., 2004). Conversely, however, the findings also provided evidence that EI was not a significant factor in academic achievement for those with greater intellectual resources (Petrides et al., 2004).

Collectively, these findings provide evidence to illustrate the complex nature of the relationship between EI and academic achievement in the adolescent population, thereby highlighting the need for further research to determine the nature of this relationship. Specifically, the need to determine the individual differences in the relationship between EI and adolescent academic achievement, in light of the simultaneous effects of IQ and gender in this relationship.

However, conducting research into the role of EI, IQ and gender in adolescent academic achievement was considered particularly complex due to the formative developmental changes that may differentiate the development of EI (Goleman, 1995;
Greenspan, 1989; Matthews, Zeidner, & Roberts, 2004) in the three stages of adolescent development (Sawyer et al., 2012). Biological maturity precedes psychosocial maturity (Gluckman, Beedle, & Hanson, 2009). Therefore, it is necessary to have an understanding of the biological changes that occurs in adolescence, as these are associated with the subsequent psychosocial developmental changes found in adolescents (Steinberg, 2011a), which may impact on developmental aspects of EI (Matthews, Zeidner, et al., 2004). Further, Giedd, Raznahan, Mills, and Lenroot (2012) reviewed the magnetic resonance imaging of male and female adolescent brains. The results of their review confirmed there were developmental differences in the amygdala, hippocampus and cerebellum in adolescent males and females and the total brain size was an average of approximately 10% larger in males. In addition, Giedd et al. (2012) noted the regional cortical gray matter was found to follow a developmental trajectory described as an inverted U shape in childhood and adolescence, whereby females reached their peak size one to three years earlier than males. Hence, the biological and psychosocial developmental changes in adolescents are formative factors that may influence the development of EI in the adolescent population (Zeidner, Matthews, Roberts, & MacCann, 2003).

The two elements or factors of EI—emotion and intelligence (Mayer, Caruso, & Salovey, 1999; Mayer & Salovey, 1997), are uniquely influenced by the neurological structural and functional changes that occur throughout the adolescent stage of development (Blakemore, 2010, 2012; Blakemore & Robbins, 2012; Spear, 2013; Steinberg, 2008, 2010). In particular, it is argued in the current thesis that EI in the adolescent stage of development is differentiated by the asynchronous neurological maturation of the emotional and cognitive system (Steinberg, 2011b). Steinberg (2010) found that reward seeking and impulsivity developed on different timelines in individuals between the age of 10 and 30 years of age (N = 935), which partially accounted for the heightened risk-taking identified during the adolescent stage of development. Furthermore, Steinberg (2010) discovered the age differences in risk-taking followed a curvilinear pattern, which increased between preadolescence (12–13 years) and mid-adolescence (16–17 years), then waned thereafter (16–30 years). In contrast, Steinberg (2010) found that impulsivity declined steadily from age 10 years to 30 years of age,
therefore the age differences in impulsivity were found to follow a linear pattern. Consequently, it was concluded that heightened vulnerability to risk-taking in middle adolescence (16–17 years) could be related to the dual effects of adolescents’ relatively high inclinations to seek rewards and their less mature capabilities for self-control (Steinberg, 2010). Hence, the asynchronous neurological development of the adolescent emotional and cognitive systems differed from the commencement to the completion of the adolescent stage of development (Steinberg, 2010, 2011b).

The seminal research presented by Steinberg (2010), has been affirmed (Steinberg, 2011b), refined (Blakemore & Robbins, 2012) and extended (Spear, 2013) with subsequent research that has further illustrated the asynchronous development of the emotional system and the cognitive system to uniquely influence adolescent thinking, feeling, and behaviour. Blakemore and Robbins (2012) explained that adolescent development was characterised by an increase in risk-taking behaviour, which was partially influenced by the maturation of the prefrontal cortex and other related neurological structures that influence affective and social development:

Evidence points to a dissociation between the relatively slow, linear development of impulse control and response inhibition during adolescence versus the nonlinear development of the reward system, which is often hyper-responsive to rewards in adolescence. This suggests that decision making in adolescence may be particularly modulated by emotion and social factors, for example, when adolescents are with peers or in other affective (‘hot’) contexts. (Blakemore & Robbins, 2012, p. 1184)

Therein, the disparity between the developmental timeline of the relatively rapid maturation and heightened sensitivity of the adolescent socio-emotional system and the comparatively slower maturation and protracted development of the adolescent cognitive-control system (Steinberg, 2010) can be understood with reference to the following points:

(a) The maturation of the adolescent socio-emotional system is more closely associated with the onset of puberty (Steinberg, 2010). The adolescent socio-emotional system is influenced by hormonal and chemical changes
that are associated with the onset of puberty (Steinberg, 2010) and has a non-linear developmental trajectory (Goddings, Burnett Heyes, Bird, Viner, & Blakemore, 2012). Therefore, in some situations such as when adolescents are in the presence of their peers, adolescents’ emotions can be hypersensitive, focused on immediate rewards and periodically override their cognitive-control system, to influence adolescent risk-taking behaviours (Pfeifer & Blakemore, 2012).

(b) In contrast, the maturation of the adolescent cognitive-control system is more closely associated with adolescents’ chronological age (Wolf, Bazargani, Kilford, Dumontheil, & Blakemore, 2015). Therefore, adolescents’ cognitive-control system is comparatively slower to mature than their socio-emotional system and has a protracted and linear developmental trajectory (Steinberg, 2010). The cognitive-control system is associated to the maturation a range of executive functions, such as impulse control and self-regulation that are elements of metacognition (Pfeifer & Blakemore, 2012), which may not reach maturity until later in adolescent development. Therefore, the immature adolescent inhibitory system may periodically be overwhelmed within the context of emotional, exciting or stressful stimulus; as the adolescent brain has a predisposition to have an elevated level of emotional sensitivity to rewards, to seek novelty and to have a diminished inhibitory control responses to “aversive stimuli” (Spear, 2013). Hence, it is plausible that these research findings have a number of implications for the development of EI in the adolescent population.

Hence, it is argued that the construct of EI has the potential to be developmentally differentiated, subject to the structural and functional neurological changes that occur from the commencement to the completion of adolescence (Weil et al., 2013). These structural and functional neurological changes in adolescent development are speculated to have unique biological effects on the development and maturation of the formative elements in the construct of EI—emotion and cognition, which are subject to significant asynchronous maturational changes from the commencement to the completion of the
adolescent stage of development (Blakemore & Robbins, 2012; Goddings et al., 2012; Steinberg, 2010). In addition, there are specific gender differences in the neurological development of adolescent males and females that influence a range of gender differences in childhood and adolescence (Giedd et al., 2012), which may also differentiate the development of EI in the adolescent population. Therefore, EI in the male and female adolescent population is argued to be biologically and developmental differentiated from the development of EI in the childhood and adult populations (Matthews, Zeidner, et al., 2004). Hence, in the current study the term adolescent emotional intelligence (AEI) is introduced to acknowledge the unique adolescent developmental changes that may differentiate the development of EI from the commencement to the completion of the adolescent stage of development.

The current study seeks to address the limited research to identify the relationship between AEI and academic achievement, particularly in light of the simultaneous role of IQ and gender on this relationship. Thereby, the current research study will extend the previous research by Petrides et al. (2004), Downey, Mountstephen, et al. (2008) and Rivers et al. (2012) by investigating the relationship between AEI and adolescent academic achievement in secondary school students from Australia. The current study seeks to investigate the simultaneous predictive effect of AEI, IQ and gender in Year 12 students’ academic achievement, as measured by the Victorian Certificate of Education (VCE). Students in Year 12 are in the late stage of adolescent development (Sawyer et al., 2012). The research findings were designed to contribute to the current literature investigating the individual differences in the relationship between AEI and academic achievement. The research findings also have the potential to optimise adolescent academic achievement, by informing future psychoeducational practice and policy. The structure of the current study is outlined in Chapters Two to Seven and the terminology for this study is presented in Appendix A.

Hence, Chapter One provides an introduction to the study by presenting:

1.1 Study Importance and Context
1.2 Study Problem Statement
1.3 Study Aim
1.4 Study Scope
1.5 Study Significance

1.6 Conclusion: Chapter One

1.1 Study Importance and Context

The importance of EI in academic achievement, and specifically AEI, IQ and gender in academic achievement, is considered from a historic, theoretical, global, national and individual perspective. The individual’s AEI (Luebbers, Downey, & Stough, 2007) is understood in light of their biological maturation (Spear, 2013), adolescent stage of development (Sawyer et al., 2012) and the current environmental pressures to attain adequate levels of academic achievement as a prequisite for tertiary study and employment in a technological and globalised economy (Blum, Bastos, Kabiru, & Le, 2012). AEI is also considered to be adaptively and dynamically used by adolescents as they progressively make accommodations and adaptations (Bronfenbrenner, 1977) to meet their adolescent psychosocial developmental needs (Steinberg, 2011a) and the environmental demands of secondary school academic achievement, in a rapidly changing globalised economy (Blum et al., 2012). Therefore, in the current study AEI is contextualised with reference to the ecological model of human development developed by Bronfenbrenner (1977), as outlined in Figure 1.1.
Emotional Intelligence (EI) Historical, Theoretical and Developmental Importance:
To Date, Research Examining the Role of EI in Academic Achievement has Presented Positive But Variable. However, Few Researchers Have Sort to Gain Further Insight into the Variability in the Predictive Effect of EI in Academic Achievement by Differentiating the Construct of EI Developmentally. Therein, this Thesis Questions: How Is Emotional Intelligence Developmentally Defined in the Adolescent Population? Further, Is Adolescent Emotional Intelligence Predictive of Academic Achievement?

OECD Global Importance:
It is Argued that Adolescent Emotional Intelligence is a Construct which is Increasingly Important in Academic Achievement for Contemporary Adolescents living in a Globalised Economy. Particularly in Light of the Increasing International Rates of Adolescent Emotional Problems, such as Anxiety and Depression. Further, Adolescent Educational Achievement is an Key predictor for Adult Employment in a Technologically Advancing Globalised Economy. Therefore, Optimising Adolescent Academic Achievement is a Major Goal for All OECD Member Countires.

Australian National Importance:
Australia is an OECD Member Country. Australian Levels of Academic Achievement are a Key Predictor of the Australian GDP. Therefore, Developing Educational Policy Based on Research Evidence to Improve Academic Achievement Is a Major Goal. In Order To Inform Future Educational Policy the Current Thesis Questions: Does Adolescent Emotional Intelligence Predict VCE Academic Achievement?

Individual Importance:
Are there individual Differences in How Adolescent Emotional Intelligence predicts VCE Academic Achievement? If so, What are the Implications of These Findings for Future Educational Pedagogy?

Figure 1.1 Study Importance and Context: AEI and Academic Achievement
As illustrated in Figure 1.1, first the importance of EI in academic achievement will be introduced from a historical perspective. Second, EI will be theoretically and developmentally framed with reference to three waves of research referred to in this study as the psychodynamic model of EI, ability model of EI, and the trait model of EI. Third, the increasing importance of understanding the effect of EI on academic achievement for adolescent students in the 21st century will be analysed from a global perspective. The data pertaining to the Organization for Economic Co-operation and Development (OECD) member countries will provide a framework on which to build an understanding of the impact of economic globalisation on the employment, educational, psychosocial and emotional health of adolescents. Fourth, the importance of EI to educational reforms from a national perspective is discussed with reference to Australia, which is a member country of the OCED. Fifth, the importance of the construct of AEI is considered from an individual biopsychosocial developmental perspective.

The developmental complexity and changes in the construct of AEI are understood in relation to the stages of adolescent development (Sawyer et al., 2012). Adolescent development in the current study is categorised into three stages: Early adolescence, which encompassed individuals 10 to 14 years; late adolescence, which encompassed individuals 15 to 19 years; and young adulthood, which encompassed individuals 20 to 24 years of age (Sawyer et al., 2012). The individual differences in the predictive variance of AEI for academic achievement are considered from a dynamic ecological developmental perspective (Bronfenbrenner & Evans, 2000). This developmental perspective acknowledged the impact of adolescent biopsychosocial maturation (Gemelli, 2013) on the formative elements of AEI—cognition and emotion—in male and female adolescents. In addition, the individual differences in the predictive effect of AEI for VCE academic achievement are further contextualised in relation to the individual’s ability to learn within their Zone of Proximal Development (ZPD) (Vygotsky, 1978).

1.1.1 Historical Importance: EI in Academic Achievement

Intelligence, as measured by a psychometric test such as the Wechsler Intelligence Test for Children (Wechsler, 1949, 1991, 2003), has historically been established as the strongest predictor of academic achievement (Nisbett et al., 2012). However, both before
and after the publication of the Wechsler Intelligence Test for Children, Wechsler (1943, 1950a) theorised that in addition to cognitive factors, affective and conative factors were foundations of intelligent behaviour:

The main question is whether non-intellective, that is affective and conative abilities, are admissible as factors of general intelligence. (My contention) has been that such factors are not only admissible but necessary. I have tried to show that in addition to intellective there are also definite non-intellective factors that determine intelligent behaviour. If the foregoing observations are correct, it follows that we cannot expect to measure total intelligence until our tests also include some measures of the non-intellective factors. (Wechsler, 1943, p. 103)

Therein, Wechsler (1943) asserted that affective and conative factors, such as one’s purpose, will, and desire, had been overlooked in comparison to the cognitive factors commonly accepted in intelligence, yet were crucial elements for determining intelligent behaviour. Subsequently, Wechsler (1950b) also discussed the problem of how intellectual development and emotional maturity contributed to an individual’s psychological maturity, suggesting that aspects of maturity were influenced by both innate “substrate abilities” and learned “behavioural abilities”. In addition, Wechsler explained that children and adolescents aged from 5 to 15 years: (1) matured at variable rates; (2) maturation occurred in some skills before others; and (3) individual differences were found in the skill levels reached in both intellectual and emotional development. Wechsler (1950b) noted that, in contrast to the progress made in the task of defining, operationalising, measuring and analysing intellectual abilities and maturity in children, appraising emotional abilities relative to emotional maturity could only be considered in a broad sense. Wechsler believed that this was due to the limited understanding of the individual differences in developmental levels and rates of emotional maturation, which were necessary for demonstrating emotionally mature substrates and behaviours (Wechsler, 1950b).

Subsequently, Leuner (1966) addressed the problems outlined by Wechsler (1950b), publishing a seminal journal article that described the construct of emotional intelligence. Leuner (1966) based her theory of EI on the psychodynamic model of
development (A. Freud, 1958), and developmentally described emotional abilities relative to the individual’s emotional maturation. In addition, Leuner (1966) conceptualised EI as formative to the development of abstract (cognitive) intelligence. Both EI and abstract intelligence were considered as theoretically separate factors, which were interactive and intrinsic to an individual’s intelligent behaviour and the attainment of emancipated development (Leuner, 1966). Forty-nine years have passed since Leuner (1966) led the first wave of academic research into EI based on the psychodynamic model. Whereby the EI model presented by Leuner (1966), empirically asserted the importance of integrating EI with abstract intelligence, in order to provide a more comprehensive measure of intelligent behaviour.

Salovey and Mayer (1990) led the second wave of EI research based on the ability model, which incorporated the idea that EI could be psychometrically defined and measured. The theory of EI was also influenced by a third wave of EI research based on the trait model, outlined by Goleman (1995). Petrides and Furnham (2000b) theorised that the ability model of EI was a cognitive model, while the trait model of EI was based on the personality model.

Hence, identifying, measuring, and understanding the role of EI, particularly in light of the individual’s level of maturation and other important developmental factors, such as cognitive intelligence and gender, has remained an important and longstanding challenge. Nevertheless, it has been argued that by analysing EI, cognitive intelligence, and gender in human development, a more complex and effective model of human intelligence can be provided (Leuner, 1966). In addition, the EI model presented by Leuner (1966) was followed by further theoretical EI models by Payne (1985) and Greenspan (1989), which collectively provided seminal theoretical models of EI and began to consider how EI affected human psychological development, learning and academic achievement.

In summary, historically educators have widely accepted the importance of developing cognitive intelligence and cognitive reasoning skills in students to optimise their academic achievement. For instance, historically educators have considered learning i.e., learning to read, write and arithmetic as a largely non-emotive process that primarily utilised an individuals’ cognitive reasoning skills (Greenspan, 1989). Therein, the
common factor of general intelligence “g”, identified by Spearman (1923), has been extensively researched over the past century and is traditionally confirmed as the strongest predictor of academic achievement (Deary, Strand, Smith, & Fernandes, 2007; Jensen, 1998; Neisser et al., 1996). However, it may also be possible that the traditional approach of primarily focusing on the role of cognition and reasoning in the learning process, has overlooked the additional contribution of emotion and the importance of emotional reasoning in the learning process (Greenspan, 1989). From a psychometric perspective, it is plausible that the inclusion of assessments for both cognitive intelligence and emotional intelligence may provide a more comprehensive assessment of how a student learns and therefore provide psychometric information to guide educational pedagogy to optimise academic achievement.

However, historically educators have not widely accepted the importance of developing emotional intelligence and emotional reasoning skills in students to optimise their academic achievement (Goleman, 1995). Further, the psychometric construct of EI is comparatively new to the field of psychology (Salovey & Mayer, 1990). Hence, in comparison to the extensive field of research findings pertaining to the relationship between IQ and academic achievement (Neisser et al., 1996), less is understood about the predictive effect of EI on academic achievement (Mayer & Salovey, 1997). Further, EI has also been considered to be differentiated from a developmental perspective (Zeidner et al., 2003). The biological, psychological and social developmental changes in male and female adolescence, particularly the developmental changes in adolescent cognition and emotional systems are argued to uniquely impact on the development of EI. Therefore, the term Adolescent Emotional Intelligence (AEI) is coined in order to developmentally differentiate EI in the adolescent population from EI in childhood and adulthood. However, currently few researchers have considered EI from a biopsychosocial developmental perspective (Gemelli, 2013) and there is a scarcity of research examining the relationship between AEI and academic achievement in secondary school students. Collectively, these limitations in the research have created the need for a review of the current research analysing the individual differences in the relationship between AEI and academic achievement. Specifically, prior research investigating the relationship between AEI, IQ and gender with academic achievement is limited because few research studies...
have considered the effects of these factors simultaneously, thereby analysing the predictive effect of AEI on academic achievement from a holistic learning perspective.

1.1.2 Theoretical Importance: How is EI Theoretically Defined?

The theoretical importance of EI is evident in its Greek philosophical origins in the 14th century (Lewes, 1857). The construct of EI is also theoretically associated with the psychological theories of emotion (Darwin, 1872), social intelligence (R. L. Thorndike, 1936; R. L. Thorndike & Stein, 1937) and non-intellective factors in general intelligence (Wechsler, 1943). The earliest academic publications directly referring to the term EI were presented by Leuner (1966), Payne (1985) and Greenspan (1989), who utilised a qualitative psychoanalytic developmental research approach to conceptualise EI. Contemporary theories of EI incorporating psychometric measures are classified into two groups as theorised by Petrides and Furnham (2000b), the ability model of EI and the trait model of EI.

Salovey and Mayer (1990) and Mayer, DiPaolo, and Salovey (1990) referred to the ability model of EI as an emotional task-based theory and subsequently developed assessments of EI that incorporated a range of tasks and problem solving. Whereas, theorists such as Goleman (1995) contributed to the developed the trait model of EI, which was typically measured by self-report assessments of EI. Other EI theorist and researchers who have made significant contributions to the EI trait model include Schutte et al. (1998), Bar-On and Parker (2000), Tett, Fox, and Wang (2005), Petrides and Furnham (2001) and Luebbers et al. (2007). The following section considers the theoretical importance of EI from a psychodynamic developmental perspective, in light of the seminal publications presented by three theorists (Greenspan, 1989; Leuner, 1966; Payne, 1985) for the current study.

1.1.2.1 Psychodynamic Model of EI

Leuner (1966) seminally publicised the term “emotional intelligence”. Leuner (1966) presented a psychodynamic model of EI that charted its development throughout the human lifespan, with a specific focus on the individual child developing within the family unit and broader social structures. Leuner asserted that the infant’s sensory connections, which were developed and nurtured through the mother-infant relationship, were formative to pre-verbally disrupted or undisturbed emotionality. This emotionality
was considered the foundation of an individual’s ability to develop and utilise EI and abstract intelligence to reach an emancipated stage of development. Hence, Leuner (1966) conceptualised EI as dynamically structured, developmental and grounded in the properties of the surrounding environment, in the form of social norms that required the individual to adapt and assimilate into a well-functioning group. She added that EI incorporated properties inherent in the individual, such as their ability to focus on their personal developmental needs/drives. Leuner (1966) proposed that their EI skills or properties be subject to the individual's developmental stage of maturation, abstract intelligence and gender, alongside their prior experiences of disrupted or undisrupted emotionality.

Leuner (1966) suggested that the family had “the fundamental function of fostering and differentiating emotional intelligence” (p. 196). According to Leuner (1966), EI referred to the dynamic and adaptive processing of emotional information, which also required abstract reasoning. Leuner’s (1966) psychodynamic model of EI highlighted the importance of understanding the predictive effects of EI from a developmental perspective within an ecological framework. This theoretical approach was consistent with aspects of the ecological model of human development that was subsequently outlined by Bronfenbrenner (1977). Leuner (1966) also perceived the individual's EI as being dynamically influenced by epigenetic factors and the person's stage of development.

Subsequently, Payne (1985) presented an extensive thesis entitled *A study of emotion: Developing emotional intelligence; self-integration; relating to fear, pain and desire.* Payne (1985) introduced EI in his thesis as a previously overlooked faculty of consciousness. Payne (1985) also presented an outline of how an individual could relate to their emotions by using self-integration to solve, rather than create, emotional problems. In addition, Payne (1985) presented a theoretical framework of EI, based on an individual’s personality and their subjective reality from a physical, emotional, intellectual and visual perspective. Further, Payne (1985) also suggested that emotional problem solving was influenced by an individual’s awareness, memory, imagination, and intelligence. In addition, he proposed considering EI in three stages: (1) the stimulating event; (2) the evaluation; and (3) the response. Payne (1985) conceptualised EI as a
dynamic construct, asserting it was possible to develop EI through educating one’s self and others; consequently, he suggested EI should be incorporated into the school curriculum. Payne (1985) also noted that Western civilization had largely dismissed the importance of emotions, which led to ignorance about the formative role EI played in human development, daily functioning and the importance of EI in academic achievement.

Greenspan (1989) also noted that education presumed emotions were largely irrelevant to the learning process and traditionally focused on cognition in the learning process and therefore considered learning within a limited, impersonal context. For example, the process of learning in the curriculum had been considered as rational and impersonal. In contrast, Greenspan (1989) suggested that emotional life and intellectual life could not be separated in the learning process, as emotion and cognition were integral domains that both required “intelligent thinking”. Greenspan (1989) also proposed that an efficient model of EI should be based on both the psychoanalytic perspective on human development and the Piagetian perspective on human development, as outlined in his previous research published in 1979. Greenspan (1979) also suggested an individual’s adaptive functioning reflected and incorporated both (a) their internal drives and (b) the simultaneous environmental demands they encountered.

Hence, Leuner (1966), Payne (1985) and Greenspan (1989) were the first wave of researchers to present the term “emotional intelligence” in academic publications and theoretically frame EI on a psychodynamic developmental model. A review of the psychodynamic model of EI found the individual’s EI was understood as they developed and interacted with their environment, which is consistent with the ecological developmental perspective presented by Bronfenbrenner (1977). Contemporary research published by Zeidner et al. (2003), entitled the Development of Emotional Intelligence: Towards a Multi-level Investment Model also conceptualises EI developmentally and is particularly relevant to the current study of EI in the adolescent population.

Consequently, the EI theoretical and developmental concepts presented in the psychodynamic models of EI (Greenspan, 1989; Leuner, 1966; Payne, 1985) are formative to the current research study, which aims to cultivate a developmental understanding of EI and academic achievement in the adolescent population.
Nonetheless, the psychodynamic models of EI (Greenspan, 1989; Leuner, 1966; Payne, 1985) did not incorporate a theoretical model of EI with an operational definition of EI or psychometric assessments of EI. Hence, the lack of an operational definition of EI and a psychometric assessment of EI limited the practical utility of the psychodynamic models of EI in the current study. Conversely, the ability model of EI by Salovey and Mayer (1990) did incorporate an operational definition of EI that was theoretically framed and supported by quantitative psychometric assessments of EI. Therefore, the ability EI model is introduced, outlining the model's theoretical strengths and limitations in reference to the current study.

1.1.2.2 Ability Model of EI

A second group or wave of researchers, initially led by Mayer, DiPaolo and Salovey (1990) have worked over the past 25 years to develop an EI theoretical framework, operational definitions and psychometric assessments of EI entitled the ability model of EI (Petrides & Furnham, 2000b). In 1990, Mayer et al. (1990) published a landmark journal article introducing EI as a construct that theoretically combined emotions and intelligence. Subsequently, later in the same year Salovey and Mayer (1990) published a second seminal journal article, extending and clarifying the EI framework and theoretical scope. Salovey and Mayer (1990) provided evidence to illustrate emotions were abilities with the potential for development; thereby, their research challenged the prevailing conceptualisation of emotions as attitudes. The ability model of EI also presented an operational definition, a hierarchical conceptual framework, and psychometric assessment of EI. Mayer and Salovey defined EI as:

The ability to perceive emotions, to access and generate emotions so as to assist thought, to understand emotions, to access and generate emotions so as to assist thought, to understand emotions and emotional knowledge, and to promote emotional and intellectual growth. (Mayer & Salovey, 1997, p. 5)

In 1999, the EI ability model framework was accompanied by a test of IE: the Multifactorial Emotional Intelligence Scale (MEIS), which presented results that confirmed EI met the criteria as a standardised intelligence (Mayer, Caruso, et al., 1999).
Further, EI was associated with formative factors in human development, such as coping (Salovey, Bedell, Detweiler, & Mayer, 1999), psychological wellbeing (De Lazzari, 2000), and academic achievement (Chong Abdullah, Elias, Mahyuddin, & Uli, 2004).

Therefore, the ability model of EI provided a valid and reliable theoretical framework and a psychometric assessment of individuals’ objective emotional abilities in EI. However, the individual’s subjective emotional experiences in EI were not included in the theoretical framework or the assessment measures encompassed in the ability model of EI. The EI ability model has been criticised for assessing individuals’ maximal performance responses to emotional problems, which may arguably differ from their typical or actual performance response (Matthews, Zeidner, et al., 2004). Therein, while an individual may know what they should do to manage their own and others emotions intelligently; it is another matter to determine if they actually behave in an emotionally intelligent manner, when actually engaged in a range of emotional relationships, interactions and problems. In contrast, the trait model of EI theoretically conceptualises and psychometrically measures EI from a subjective emotional perspective or how the individual perceives they or others would feel, think, and behave in response to the emotional problems they actually encounter. The psychometric assessments based on the trait model of EI are commonly self-reports presented in a Likert Scale. Hence, the EI trait model is introduced with an outline of the theoretical framework, definitions and psychometric assessments of EI, which are considered in light of the current study.

1.1.2.3 Trait Model of EI

A third group or wave of researchers, initially led by Goleman (1995), developed a subjective quantitative analysis of the individual’s EI, which was subsequently referred to as the trait model of EI (Petrides & Furnham, 2000b). An extensive body of researchers have developed and refined trait models of EI (Bar-On & Parker, 2000; Boyatzis & Goleman, 2007; Boyatzis, Goleman, & Rhee, 1999; Palmer & Stough, 2001a; Petrides, Pérez-González, & Furnham, 2007; Schutte et al., 1998; Tett & Fox, 2006; Tett, Wang, Thomas, Griebler, & Martinez, 1997). Goleman (1995) defined EI as the ability to have self-control, zeal, persistence, and self-motivation. He explained that EI skills were formative to one’s wellbeing, which was increasingly important for the current generation of children and adolescents who have displayed higher levels of emotional problems.
Further, Goleman asserted EI was an important factor in academic achievement and could be taught to children. Goleman’s (1995) influential book entitled, *Emotional Intelligence: Why it Can Matter More Than IQ*, both provoked intense debate and popularised the concept of EI with its link to important constructs in life such as academic achievement (Mayer & Cobb, 2000).

The trait model provided a theoretical framework for conceptualising the subjective experience of EI within the domain of personality and with self-report measures (Petrides & Furnham, 2000b). For example, the Bar-On model defined emotional-social intelligence as a “cross-section of interrelated emotional and social competencies, skills and facilitators that determine how effectively we understand and express ourselves, understand others and relate with them, and cope with daily demands” (Bar-On, 2006). While it is possible to “fake the answers” in an EI self-report assessment, the self-report assessment has been peer reviewed and validated as a reliable predictor of EI (Bar-On, 2006). Ciarrochi, Chan, and Bajgar (2001) also investigated a trait model of EI and found EI could be reliably and validly measured in adolescents with a self-report assessment. Therefore, the trait model of EI was selected for this study as a psychometrically valid assessment utilising a self-report measure entitled the SUEIT: A, which was normed for adolescents (Luebbers et al., 2007).

Hence, in the current study the three waves of research reviewed are foundational to theoretical models of EI entitled: The psychodynamic model of EI, the ability model of EI, and the trait model of EI. Since the development of these formative theoretical models and psychometric measures, research into EI has grown (Stough, Saklofske, & Parker, 2009). In the 1990s, theorists developed psychometric measures of EI for adults (Bar-On, 1997a; Mayer & Geher, 1996; Salovey, Mayer, Goldman, Turvey, & Palfai, 1995) and, in 2000, added a range of AEI measures (Bar-On & Parker, 2000; Mayer, Salovey, & Caruso, 2005; Palmer & Stough, 2001b; Salguero, Fernández-Berrocal, Balluerka, & Aritzeta, 2010). Consequently, contemporary researchers continue to question the role played by AEI in adolescent academic achievement. However, few studies have specifically addressed the unique developmental changes in cognition and emotion that formatively influence AEI by focusing on a specific stage of adolescent development. Therefore, in the current study the relationship between AEI and academic achievement
is examined in light of the formative changes in adolescent biopsychosocial development and the increasing international importance of academic achievement for adult employment in a globalised economy, which are now outlined.

1.1.3 Global Importance: AEI in Academic Achievement

Academic achievement is a key predictor of human capital and national economic growth in a technological, globalised economy (OECD, 2010). Therefore, optimising the academic achievement of the current generation of adolescents, numbering 1.1 billion people aged 10 to 24 years of age (United Nations (UN), 2013), has become an international priority for the United Nations Children’s Fund (UNICEF) (2011). In 2011, the OECD reviewed the relationship between academic achievement and employment (OECD, 2013a). The results confirmed that an average of 18.1% of adults aged 25 to 34 years old without a secondary education, were unemployed. This finding contrasted sharply with the much lower figure of 8.8% for older adults aged between 55 and 64 years of age, who were without a secondary education that were also unemployed (OECD, 2013a). Collectively, these findings provided evidence of the increasing importance of academic achievement as a prerequisite for adult employment in a technological, globalised economy. In addition, an increase of 10% in unemployment for young adults without a secondary education was identified, which further confirmed the increasingly strong positive predictive effect of secondary school academic achievement for adult employment in the current globalised economy (OECD, 2013a). In OECD countries (OECD, 2013a), during the global economic recession an average of 16% of individuals aged 15 to 29 years of age were not employed or engaged in educational training. This high rate of youth unemployment coupled with the increasing importance of academic achievement as a key predictor of employability for youth in a globalised society (OECD, 2013a) has confirmed the importance of developing educational innovations to optimise academic achievement in our youth. Hence, optimising the current academic achievement levels of the adolescent population is an international concern and major goal for the OECD member countries (OECD, 2013a). Low academic achievement has also been linked to higher rates of depression, which contemporary adolescents aged 15 to 19 years have increasingly experienced (UNICEF, 2011).
The epidemiological transition during economic globalisation has affected adolescent health, as shown by the increasing rate of non-communicable diseases such as anxiety and depression (Gore et al., 2011; Sawyer et al., 2012). The World Health Organization (WHO) found that neuropsychiatric disorders accounted for 45% of disability-adjusted-life-years (DALY) in adolescents aged between 10 and 24 years old (Gore et al., 2011). Thapar, Collishaw, Pine, and Thapar (2012), found that unipolar depressive disorder, with a one-year prevalence effect, affected 4% to 5% of adolescents in the mid-adolescent to late-adolescent stage of development. They proposed that unipolar depression negatively affected adolescent psychosocial health and academic development (Thapar et al., 2012). Further, rising rates of mental health problems were shown to affect 10% to 20% of children and adolescents worldwide (Kieling et al., 2011). The prevalence of mental health disorders in adolescents, which are indicative of an individual’s state of emotional and social wellbeing, has increased over the past 20 to 30 years (UNICEF, 2011). Consistent with this trend for mental health disorders being identified in adolescents, UNICEF also estimated that approximately 20% of the world’s adolescents had mental health or behavioural problems, with depression the single largest factor behind disease in adolescents (UNICEF, 2011). Further, adolescent mental health problems are negatively predictive of adolescent psychological wellbeing and academic achievement (Gore et al., 2011; Thapar et al., 2012; UNICEF, 2011).

The worldwide escalation in adolescent emotional problems, particularly anxiety and depression (Gore et al., 2011), has negatively impacted on both adolescent psychological wellbeing and academic achievement (Thapar et al., 2012). Therefore, it is increasingly important to understand the complex role of AEI in academic achievement, in order to more effectively address the changing developmental needs of the contemporary adolescent population, which represents approximately 30% of the world’s total population (Patton et al., 2009). In addition, the increasingly strong trend for academic achievement to be a key predictor for adult employment, adult health, and national economic growth in a globalised economy (OECD, 2013a), has placed extra pressure on educators and governments to develop educational innovations that will improve current educational pedagogy and the current educational levels of the adolescent population. Previous research has found students’ social and emotional
learning is a significant factor in their psychological wellbeing, behaviour and academic achievement and a factor that can be improved with educational interventions (Durlak & Weissberg, 2010; Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011; Payton et al., 2008). Therefore, further research is required in order to determine the nature of AEI and the role of AEI in academic achievement, as AEI is a factor that may be developed and therein have the potential to further improve the educational outcomes of contemporary adolescents in a globalised society.

1.1.4 National Importance of AEI in Australian Education: AEI in Year 12

Academic Achievement

Academic achievement has become an increasingly important indicator of adult employability in the OECD member countries (OECD, 2013a). Consequently, the current study will examine the relationship between AEI and academic achievement in one OECD member country, Australia (2009). Australia has identified educational participation, academic achievement and the development of social and emotional skills as crucial elements of intergovernmental educational reform policies designed to manage the changes associated with economic globalisation. The National Education Agreement, developed by the Council of Australian Governments (COAG) Reform Council in 2011, was based on the objective that: “…all Australian school students acquire knowledge and skills to participate effectively in society and employment in a globalised economy” (p. 1).

In 2012, Australian schools had enrolled 3,567,065 students (ABS, 2013). In association with the Reform Council objective, COAG aimed to increase the national percentage of people aged 20 to 24 years old, who had completed Year 12, to 90% by 2020 (COAG, 2011). In 2012, the Australian Bureau of Statistics (ABS) confirmed there were 222,037 Year 12 students enrolled in Australian schools (ABS, 2013). In Australia, the 2012 retention rate for the total cohort of Year 12 students was 79.9%, so an improvement of 10.1% would be required to reach a 90% completion rate by 2020. The Year 12 female retention rate was 84.3%, which was 8.5% higher than the adolescent male retention of 75.8% (ABS, 2013). Therefore, with reference to the COAG goal, the higher dropout rate indicated that adolescent males were educationally at risk.
As a result, educators have faced increasing pressure to develop educational reforms designed to improve academic achievement (Masters, 2013). In addition, the World Health Organization (WHO) acknowledges educators have been increasingly challenged to ensure that students have attained the knowledge and skills to assimilate, adapt, and cope with changes associated with educational, technological, social, and economic growth (WHO, 2012). Therefore, the current study will focus on the investigation of the effect of AEI on the academic achievement of Year 12 students in the final year of their secondary education, who are primarily classified as being in the late stage of adolescent development (Sawyer et al., 2012).

1.1.5 Individual Student Importance: AEI Psychologically Defined

A formative to the effective analysis of the relationship between EI and adolescent academic achievement was the question: “How is emotional intelligence psychologically defined in the adolescent population?” The quest to answer this question led the researcher to the review the seminal EI developmental model created by Zeidner et al. (2003). The developmental model of EI presented by Zeidner et al. (2003) provided a theoretical framework to support an integrated investment model of EI, which outlined the theoretical potential for individual developmental differences in children’s maturation to differentiate the construct of EI as they grew through the stages of childhood. Therein, in the current study EI is acknowledged as being developmentally differentiated across the human lifespan. As defined in Appendix A, the current study introduced the following terms and developmental stages of EI development: infant emotional intelligence (IEI); childhood emotional intelligence (CEI); adolescent emotional intelligence (AEI); and emotional intelligence (EI). In the current thesis the term emotional intelligence (EI) refers to EI in the adult population and also referred to the general concept of EI in a range of developmental and theoretical contexts. Within the developmental framework and scope of EI being subject to biopsychosocial developmental changes (Gemelli, 2013) throughout the lifespan, the primary focus of the current study was on the developmental conceptualisation of AEI from the commencement to the completion of the adolescent stage of development.

There has been a global shift to re-classify the stages of adolescent development in light of the universal trend for the earlier onset of puberty and the protracted
completion of the adolescent stage of development (Sawyer et al., 2012). The stages of adolescent development outlined by Sawyer et al. (2012) and Gore et al. (2011) reflect the global classification of adolescent development into three stages that are entitled: early adolescence (10 to 14 years old); late adolescence (15 to 19 years old); and young adulthood (20 to 24 years old). Consequently, in the current study the development of AEI is referenced according to the three stages of adolescent development outlined by Sawyer et al. (2012) and Gore et al. (2011). Gemelli (2013) suggested that adolescence was a critical period of biopsychosocial development and maturation. Further, adolescent biopsychosocial maturation was influenced by epigenetic development, which developed when an individual interacted with the biological, social, and psychological stimuli in their environment (Gemelli, 2013). Hence, in the current study the development of AEI and the role of AEI in academic achievement needs to be understood from an ecological perspective (Bronfenbrenner, 1977), with reference to the adolescents’ genetic disposition, stage of development and environmental context. From a biological perspective, the regional-specific neurological growth that occurs throughout adolescence has been associated with structural and functional changes, which can influence decision making (Blakemore & Robbins, 2012).

The regional-specific maturation, hormonal changes, and biological growth during adolescence were linked to a disparity in the earlier maturation of emotional functions. These were relative to the protracted maturation of cognitive functions and influenced developmental changes in how adolescents think, feel, and behave (Spear, 2013; Steinberg, 2010). Burnett, Thompson, Bird, and Blakemore (2011) argued that adolescent neurological developmental changes in the emotional system were influenced by hormonal changes associated with the onset of puberty. This contributed to an increased sensitivity towards novelty, rewards, peers, and emotional stimuli such as stress (Blakemore & Robbins, 2012). They also proposed that, in contrast, the region associated with the adolescent cognitive system was influenced by the relatively protracted development of the executive functions connected to the prefrontal cortex. This protracted development would partially influence the slower maturation in adolescent self-regulation, impulse control, decision making, goal direct behaviour, and risk aversion (Blakemore & Robbins, 2012). Metacognition in adolescents, defined as the capacity to
reflect one’s thoughts and behaviours, has been shown to improve with age throughout adolescence (Weil et al., 2013). The highest level of metacognitive skills in adolescents was identified in the late stage of adolescent development, therefore personal self-awareness in adolescents is also subject to protracted adolescent neurological development (Weil et al., 2013).

It has been suggested that this disparity in earlier maturation of the adolescent emotional system and later maturation of the adolescent cognitive system contributes to heightened emotional sensitivity in the adolescent stage of development. This heightened emotional sensitivity characteristically includes hyper-responsiveness to rewards and risk-taking behaviours, which is typically increased when adolescents mix with their peers, are placed in emotionally stimulating or stressful contexts (Steinberg, 2004). Consequently, some theorists have argued that adolescence is a period marked by increased risk-taking behaviours, over-confidence, and heightened emotional sensitivity, with adolescent decision making potentially influencing their health, wellbeing, and academic achievement (Blakemore, 2010; Burnett et al., 2011). Therefore, for the purposes of this study, it was deemed important to determine the effect of AEI on academic achievement in the adolescent population who are considered to be at increased risk when compared to the childhood and adult populations.

For the purposes of this study, AEI refers to adolescents’ capacity to self-perceptions in regard to their capacity to recognise emotions in themselves and express one’s emotions to others; to understand emotion in others; to utilise emotional information to direct in cognition; and to manage and control emotions when solving problems (Adapted from Palmer, Stough, & Luebbers, 2003). It has been speculated that the demographic characteristics of AEI (Harrod & Scheer, 2005) and the behaviours of adolescents (Charbonneau & Nicol, 2002b) could be differentiated by the changing neurological structure and the asynchronous development and functioning of the cognitive and emotional systems throughout the early, mid, and, late stages of adolescence (Pfeifer & Blakemore, 2012; Weinberger, Elvevåg, & Giedd, 2005). Therefore, the asynchronous development of the adolescent cognitive system and emotional system was theorised to developmentally differentiate the construct of AEI from the onset of adolescence to the completion of the adolescent stage of developmental.
Due to the possible confounding effects (Tabachnick & Fidell, 2007) of adolescent age on both cognitive and emotional development, this study design focused on a single year level and a single stage of adolescent development. Therefore, this research design aimed to limit or control for the variance in adolescents’ chronological age, as an indicator of their adolescent stage of development, and therein their stage of development in AEI. By restricting the developmental differences in adolescent maturation to impact on students’ AEI abilities/skills/competencies or traits, it was anticipated that the study could more effectively identify the actual individual differences in AEI skills. Hence, by limiting or control for the wide developmental variance in AEI from early adolescence (10 years of age) to the final stage of adolescent development entitled young adulthood (24 years of age) (Sawyer et al., 2012), it was anticipated that the study would be more effective in identifying the actual individual differences in how Year 12 students utilised their AEI resources in academic achievement.

1.2 Study Problem Statement

1.2.1 What are the Predictive Effects of AEI for Academic Achievement?

Research examining the relationship between AEI and academic achievement found varied results. Downey, Mountstephen, et al. (2008) analysed the relationship between EI and academic achievement in Australian secondary students ($N = 209$) from Year 7 to Year 11. The results indicated that higher levels of EI were positively correlated with higher levels of academic achievement. Conversely, lower levels of EI were associated with lower levels of adolescent academic achievement. The correlation between the overall grade and total EI was $r = .15, p < .05$. These results were consistent with a growing body of research describing a positive association between EI and academic achievement (Di Fabio & Palazzeschi, 2009; Ferrando et al., 2011; Parker, Summerfeldt, Hogan, & Majeski, 2004). However, the exact nature of the association between AEI and academic achievement in the adolescent population, and the interaction of AEI with important variables such as IQ and gender, have remained unclear.

Stottlemyer (2002) also found a significant relationship between EI skills and adolescent academic achievement. However, the results suggested that EI might have been influenced by gender differences in academic achievement, with females
consistently outperforming males. In addition, gender differences have been identified in the adolescent population, with females typically having a higher level of EI than males (Sánchez-Núñez, Fernández-Berrocal, Montanñés, & Latorre, 2008). Research examining the relationship of EI and academic achievement, including the effect of IQ, has generated mixed results.

Research by Petrides et al. (2004) found that EI positively moderated the predictive effect of cognition for academic achievement up to an IQ level of between IQ 128 and IQ 130. However, the positive moderating effect of EI for intelligence reversed after IQ 130, suggesting a negative moderating effect on cognition (Petrides et al., 2004). Research by Woitaszewski (2000) also found that EI was not significantly predictive of academic achievement in gifted adolescents with an intellectual quotient score above IQ 130. The research findings by both Petrides et al. (2004) and Woitaszewski (2000) suggested that conceptualising the role of AEI on academic achievement as an average predictive effect for the total cohort, or as a unidimensional construct, overlooked the qualitative differences in the effect of AEI on academic achievement. Rather, these findings offer some support to the assertion that AEI would be more effectively conceptualised from a multi-level investment model as seminally outlined by Zeidner et al. (2003).

Based on previous research findings by Petrides et al. (2004), it has been argued that gaining an understanding of differentiated effects of AEI on academic achievement needed a developmental approach. This involved simultaneously analysing a range of intellectual abilities in adolescent male and female students subjected to similar academic demands, and who were at a similar developmental stage of adolescent development in a secondary school environment. Petrides et al. (2004) identified a bilinear interaction between AEI and IQ in British adolescents, which could prove fundamental to understanding individual differences in academic achievement.

1.2.2 When are there Individual Differences in the Predictive Effects of AEI, IQ and Gender for Academic Achievement?

Parker, Saklofske, Wood, and Collin (2009) suggested that EI may have indirectly and directly contributed to the variance in academic achievement. Parker and colleagues
speculated that AEI might have indirectly affected academic achievement through supporting the adolescents’ normative psychological wellbeing and therefore their ability to engage in the learning opportunities presented in the classroom. AEI has been positively associated with psychological wellbeing as both physical and psychological health (Zeidner, Matthews, & Roberts, 2012) and happiness (Chamorro-Premuzic, Bennett, & Furnham, 2007). In addition, AEI has also been negatively associated with depression and anxiety (Fernández-Berrocal, Alcaide, Extremera, & Pizarro, 2006). Summerfeldt, Kloosterman, Anthony, and Parker (2006) found EI in undergraduates was strongly related to social interaction anxiety \((r = -.81)\) and less strongly associated with performance anxiety \((r = .03)\) \((N = 2,629)\). Therefore, in the current study it is possible that AEI may indirectly impact on adolescents’ ability to learn in a secondary school classroom and the wider psychosocial school environment with their peers, in comparison to the anxiety directly related to their academic performance.

In addition, few studies have targeted specific developmental periods in adolescents (Sawyer et al., 2012), which would account for the formative changes in cognitive and emotive systems evident throughout the adolescent period of growth (Steinberg, 2011b). Hobföll (2002) suggested that adolescents utilised internal resources for adapting to their own internal demands and external environmental demands. It has become important to understand the changing relationship between the internal and external demands of VCE academic achievement and the adolescents’ use of individual intellectual ability, gender, and AEI to meet those demands. In light of the ecological model of human development (Bronfenbrenner, 1977), these complex dynamic relationships were formative in understanding the central role of AEI in learning and, therefore, academic achievement.

The findings outlined by Petrides et al. (2004) illustrated that as an adolescent’s IQ scores increased, the predictive effect of EI decreased. The EI of the students in the intellectually gifted range, above IQ 130, had no statistically significant effect on academic performance. Based on this finding, Parker et al. (2009) questioned if gifted students were actually more or less emotionally intelligent than their peers with lower intellectual skills. Based on the research findings outlined by Petrides et al. (2004), it seemed plausible that there may have been individual differences in the relationship
between AEI and academic achievement, subject to intellectual developmental
differences in male and female adolescents. However, it has been unclear if and how the
simultaneous predictive effects of AEI, IQ, and gender accounted for the variance in
academic achievement during Year 12 VCE studies.

To date, few studies have examined the predictive effect of AEI for academic
achievement alongside the predicative effect of IQ and gender during the late stage of
adolescent development. This study design sets out to provide further insight into the
processes that may contribute to the individual developmental differences in AEI. This
included analysing the simultaneous individual differences in adolescents’ developmental
resources (AEI, IQ and gender). Furthermore, few studies attempted to target a specific
stage of adolescent development, due to the asynchronous structural and functional
neurological maturation in adolescent cognitive and emotional development (Steinberg,
2010). By targeting one stage of adolescent development the inherent developmental
variance in cognitive and emotional skills identified in at the commencement and
completion of adolescence development may be limited or reduced. Therefore, the
student cohort in this study is limited to a single year level—Year 12.

1.2.3 How are Individual Differences in the Predictive Effect of AEI for
Academic Achievement Centered on Personal Meaning?

The cognitive-motivational-relational theory of emotions theory, presented by
Lazarus (1993b), included an individual’s personal appraisal of academic demands, and
whether they were seen as harmful, threatening, or challenging. These personal appraisals
influenced how adolescents used their EI to cope with their emotions. This in turn would
influence their ability to engage in learning and optimise their academic achievement.
Consequently, it was possible that individual differences in gender (male and female),
intelligence (low IQ to high IQ) and AEI (low to high) could act as risk or protective
factors (Henderson, 1998; Holmbeck, Friedman, Abad, & Jandasek, 2006) for adolescent
academic achievement. In light of the cognitive-motivational-relational theory of
emotions theory presented by Lazarus (1993b), individual differences in AEI could be
considered with reference to the stimulus-organism-response model.
In addition, the individual’s appraisal (Arnold, 1960a, 1960b) of their chances of coping (Lazarus, 1993a) with academic demands, potentially led to the conclusion that the academic demands were helpful, harmful, threatening, or challenging. As explained by Lazarus (1993b), the students’ appraisal of their situation could result in variable levels of distress or eustress. Fredrickson (2005) suggested that the emotions stemming from one’s appraisal could provoke further negative or positive emotions in students, which could consequentially influence students’ learning processes. For instance, in comparison to a neutral state of emotions, positive emotions were found to broaden the scope of attention and thought-action repertoires (Fredrickson, 2005). While negative emotions were found to narrow the thought-action repertoires (Fredrickson, 2005). High levels of stress has also been found to inhibit the retrieval of information from working memory (Gathercole et al., 2008). Further, LeDoux (2012) conceptualised the emotional brain as being integrated with humans’ survival circuitry, thereby providing a meaningful connection between emotions and key phenomena such as arousal, appraisal, motivation and reinforcement. Therein, emotions are considered as being adaptive and formative to understanding how humans detect and respond to diverse stimuli that effects their ability to survive or thrive when faced with the challenges and the opportunities in their life (LeDoux, 2012). For instance, the fear of academic failure or poor performance is anticipated to be a threat to most students’ wellbeing and educational survival (Zins, Weissberg, Wang, & Walber, 2004).

Vygotsky’s (1978) Zone of Proximal Development (ZPD) theorised that if the academic demands were within the students’ ZPD, they were more likely to become engaged. However, when academic demands were too far above the students’ ZPD, they became overwhelmed, cognitively overloaded and stressed. Furthermore, if the academic demands were below the students’ ZPD, the adolescents may become bored, disengaged, frustrated, and potentially angry. Therefore, the individual’s level of cognitive acumen could be considered as a resource that they could draw upon. This incorporated varying levels of stress associated with the academic load they perceived and their experience in coping with it (Henderson, 1998).

Bronfenbrenner (1977) theorised that research into human development could be based on an ecological developmental model. Whereby the individual’s human
development was conceptualised with a focus on their progressive accommodation to meet both their individual developmental drives and the environmental demands they encounter. By taking an ecological approach to human development, Bronfenbrenner (1977) acknowledged that the changing relationship between the growing individual’s developmental capacity to meet their own needs and their environmental demands may be dynamic and therefore was more effectively understood by considering the developing individual as being embedded in a range of environmental systems.

Consequently, this study examines the simultaneous predictive effect of adolescent academic achievement, IQ, and, gender for academic achievement, and focuses on individual differences in the predictive the effects of AEI in academic achievement from an ecological developmental perspective (Bronfenbrenner, 1977). The effects of academic demands on an adolescent were anticipated to vary, based upon the individual’s biopsychosocial stage of development, AEI, gender, and cognitive resources, which could be used as resources for meeting the academic demands associated with completing the VCE. It was plausible that the individual’s resources may have acted as a base level of psychological wellbeing or functioning, which indirectly influenced the predictive effect of AEI in academic achievement. The individual’s AEI may have acted as: (a) an antecedent, a factor in their normative developmental state; (b) an appraisal of their chances of success or failure; (c) leading to a response in their AEI, which directly affected their ability to learn (i.e. their perception, focus, engagement, and working memory); and (d) a consequence in further building AEI skills or abilities and therefore, their academic achievement. It was assumed that individual differences in the predictive effects of AEI for academic achievement might be influenced by a range of factors. For instance, the individual’s genetic disposition, past experiences, current adolescent psychosocial drives, and their ability or inability to work in their ZPD in the classroom, were potential factors that could influence an individual’s appraisal of their chances of effectively surviving or thriving when faced with the academic demands in secondary school. Therefore, individual differences in the predictive effect of AEI for academic achievement may be influenced by the individual’s appraisal of their chances of successfully utilising their personal resources (AEI, IQ and gender) to adaptively cope
with the environmental demands of academic achievement in a secondary school environment.

1.3 Study Aim
This study aims to identify the individual differences in the simultaneous predictive effect of AEI, IQ and gender for academic achievement.

1.3.1 Research Questions
The following research questions directed this study:
- Was AEI differentiated by gender?
- Was IQ associated with AEI?
- Was AEI associated with academic achievement?
- When IQ was included, was AEI associated with academic achievement?
- Were AEI, IQ and gender simultaneously predictive of academic achievement?
- Were there individual differences in the simultaneous predictive effects of AEI, IQ and gender for academic achievement?

1.3.2 Null Hypotheses
The following Null Hypotheses formed the basis of the study:

*Null Hypothesis One:* The combined effects of adolescent emotional intelligence, IQ, gender and their interactions were not predictive of academic achievement.

*Null Hypothesis Two*: The combined effects of each of the subscales of adolescent emotional intelligence traits: emotional recognition and expression, understanding emotions, emotions direct cognition and emotional management and control, with IQ and gender and their interactions, were not predictive of academic achievement.

1.3.3 Variables: Criterion and Predictor
For each analysis the criterion or dependent variable was the VCE academic achievement score, and the set of predictor or independent variables always included IQ
(low group and high group); and gender (male and female); with one of either AEI total; emotional recognition and expression; understanding emotions; emotions direct cognition; or the emotional management and control score.

1.4 Study Scope

In order to determine the predictive effective of AEI, IQ, and gender for academic achievement, the scope and focus of this study design was limited to an evidence-based theoretical and methodological perspective. References and research evidence for this study were collated through searches of PubMed, Psych Info, American Psychological Association (APA), Academic ASAP (Gale), Google Scholar, Springer Online and the author’s personal files and references. Key terms used in the search were “emotional intelligence”, “academic achievement”, “academic success”, “learning”, “adolescence”, “wellbeing”, “secondary school” and “high school”. The articles collated from the searches and the relevant references cited in those articles were reviewed. Research findings pertaining to adolescents in secondary school were utilised as primary evidence in this study, while research evidence pertaining to children attending junior school and adolescents attending tertiary educational institutions were considered as secondary evidence.

The seminal publications by Leuner (1966), Payne (1985) and Greenspan (1989) have been frequently cited in the EI literature (Mayer, Caruso, et al., 1999; Mayer & Cobb, 2000; Mayer, Salovey, & Caruso, 2000c). However, these three publications have been infrequently reviewed in detail. In order to ensure the scope of research evidence for this study was comprehensive and balanced, these seminal articles were sought and reviewed. The journal article by Leuner (1966) was not accessible through electronic searches, however, a hard copy was found in France. Subsequently, the author arranged for the research article to be translated from German to English. The extensive thesis developed by Payne (1985) was available electronically. Finally, the chapter written by Greenspan (1989) was not accessible through electronic searches; however, a hard copy was located in an American bookstore. The psychodynamic theory of EI conceptualised by Leuner (1966), Payne (1985) and Greenspan (1989) were formative to an understanding of the developmental scope of AEI incorporated in this study.
1.4.1 Theoretical Scope of the Study

The theoretical scope of the study is framed according to an analysis of the three models of EI, entitled the psychodynamic model of EI, the ability model of EI and the trait model of EI. As previously discussed, the EI literature typically referred to two principle theories entitled the ability model of EI (Salovey & Mayer, 1990) and the trait model of EI (or mixed model) (Schutte et al., 1998). These were differentiated according to their psychometric properties, as categorised and previously outlined by Petrides and Furnham (2000b). The three EI models are considered in the theoretical scope of this study, with the trait model of EI selected as the psychometric assessment measure for this study design. Furthermore, the developmental model of EI presented by Zeidner et al. (2003) and the psychodynamic model of EI, as discussed by Leuner (1966), Payne (1985), and Greenspan (1989) inform the developmental scope of this study.

A review of the psychodynamic model conceptualised EI as a dynamic developmental construct. Leuner (1966) focused on the biopsychosocial developmental aspects of EI, which dynamically developed within the context of an individual’s genetic development as they influenced, and were influenced by, their environment. Payne (1985) also asserted that individuals differed in their EI. These differences were based on their stage of development and their individual skill level, which the individual dynamically utilised in response to internal and external stimuli. Greenspan (1989) conceptualised EI as both a developmental antecedent and consequence or response, which was influenced by the individual’s genetic disposition, previous experiences, current stage of development, and environmental demands. Therein, the psychodynamic concepts of EI presented by Leuner (1966), Payne (1985), and Greenspan (1989) shape the developmental scope of this study.

As previously explained, the term AEI was introduced to differentiate the formative biological, psychological, and social development that occurs from the commencement to the completion of the adolescent stage of development. Further, during the adolescent stage of development formative asynchronous maturation occurs in the cognitive system and the emotional system, which was developmentally differentiated in adolescent males and females. This research focused on AEI in the adolescent stage of development, which was distinguished from the developmental stages of infancy,
childhood, and adulthood. The term AEI framed the scope of the study and differentiated the developmental analysis of EI throughout the lifespan (IEI; CEI; AEI; and EI). This study acknowledges the formative developmental changes that occur from the onset of puberty, through to the conclusion of adolescence marked by the adoption of an independent adult role in society (Gluckman et al., 2009; Steinberg, 2010, 2011b). Therefore, the current study was framed with reference to three stages of adolescent development, entitled early adolescence (10 to 14 years of age), late adolescence (15 to 19 years of age), and young adulthood (20 to 24 years of age) (Pfeifer & Blakemore, 2012; Sawyer et al., 2012).

1.4.2 Methodological Scope of the Study
Following the review of the literature, the scope of the variable, AEI, was conceptualised and framed within the theoretical structure of the trait model of EI (Petrides & Furnham, 2000b). AEI was measured by The Swinburne University Emotional Intelligence Test: Adolescent Version (SUEIT: A) (Luebbers et al., 2007) and provided a measure of AEI. The trait model has been theoretically linked to personality factors, and commonly utilises self-report inventories to measure typical traits to determine an individual’s EI (Petrides & Furnham, 2000b). Using the trait model, AEI referred to an individual’s subjective experience as measured by the SUEIT: A. The SUEIT: A also provided a standardised score for AEI and the AEI traits: understanding emotions, emotional recognition and expression, emotions direct cognition, and emotional management and control (Luebbers et al., 2007).

In the current study, the variable intelligence was based on Spearman’s model of the general common factor of intelligence, referred to as “g” (Spearman, 1904). A psychometric measure of fluid intelligence “gf” (Spearman, 1923), was conducted with the Raven’s Standard Progressive Matrices (J. C. Raven, 1995). The Raven’s Standard Progressive Matrices standardised scores (J. C. Raven, 1995) were used as a measure of the adolescent’s Intellectual Quotient (IQ). Intelligence has been identified as a major predictor of academic performance (Jensen, 1980, 1998; Neisser et al., 1996). Based on the students’ Raven’s Progressive Matrices’ standardised scores, the students were classified into two groups. Previous research indicated that the variables IQ and EI were
uncorrelated in the adolescent population (Chan, 2003; Gil-Olarte, Palomera, & Brackett, 2006; Mavroveli, Petrides, Sangareau, & Furnham, 2009).

The current study also categorised the cohort by gender as formative developmental differences in adolescent males and females have been identified from the onset of adolescence to the completion of adolescence (Ladouceur, Peper, Crone, & Dahl, 2012). Gender differences in academic performance have been identified, with adolescent females attaining higher levels of academic achievement than adolescent males (ABS, 2011; Commonwealth of Australia, 2002; Van de gaer, Leuven, Pustjens, Van Damme, & De Munter, 2009). Similarly, females have frequently been found to have a higher average level of EI than males (Petrides & Furnham, 2000a; Tapia & Marsh, 2006). Consequently, the cohort was also categorised by gender, to enable an analysis of the potential individual differences in male and female AEI, IQ, and academic achievement.

The commencement of the adolescent period at approximately 10 years of age for females and 12 years for males, and the completion of adolescence occurs at approximately 25 years of age (Sawyer et al., 2012). The scope of the current study was limited to a single stage of adolescent development, specifically adolescents aged 15 to 19 years of age, classed as the late stage of adolescent development (Sawyer et al., 2012). This limitation was incorporated to act as a control for the growth and development inherent in the maturation of adolescent cognition and emotional development (Spear, 2013), which are formative elements of AEI. The rapid growth, maturation and development in the adolescent period of the human lifecycle was speculated to have developmentally differentiated the students’ AEI.

The adolescent period of development included regional-specific structural and functional neurological maturation in adolescent cognitive and emotional systems (Blakemore & Robbins, 2012; Spear, 2013; Steinberg, 2004). As Blakemore and Robbins (2012) noted, the relatively protracted linear structural development of the adolescent prefrontal cortex reflected the slower functional development of adolescent impulse control and self-regulation in decision making, reached maturity in a person’s mid-twenties. In contrast, the onset of puberty was associated with the nonlinear development of the adolescent limbic or emotional system (Blakemore & Robbins, 2012). The limbic system was also found to be stimulated by adolescent hormonal changes at the onset of
adolescence, and these hormonal changes were partially associated with structural changes in adolescent neurological growth (Blakemore & Robbins, 2012). The changes in the adolescent limbic system were also associated with functional changes in adolescent development, such as an increase in hyper-responsiveness to rewards, stress and novelty stimuli; for instance, when peers were present an adolescent’s emotional arousal was heightened (Blakemore & Robbins, 2012).

The neurological structural and functional changes in cognitive and emotional systems that occur from the commencement of adolescence at approximately 10-12 years of age, to the completion of the adolescent period at approximately 24-25 years of age, encompassed formative changes that uniquely influenced adolescent problem solving, decision making and risk-taking behaviours (Blakemore & Robbins, 2012; Spear, 2013; Steinberg, 2004, 2010). It is plausible that these developmental changes in the adolescent cognitive and emotional systems also impact on the maturation of their AEI from the commencement to the completion of the adolescent period of development (10-25 years of age). The current study aims to identify the predictive effect of AEI on academic achievement. Therefore, it is important to reduce the impact of improved AEI skills that are associated to adolescent maturation from 10 -25 years of age, which may confound (Field, 2009) the identification of individual differences in AEI skills when calculating the predictive effect of AEI on academic achievement.

Therefore, the methodological design of this study aimed to limit the wide range of developmental variance in cognitive and emotional maturation that occurs from the commencement to the completion of the adolescent stage of development (10-25 years of age) (Blakemore & Robbins, 2012; Spear, 2013; Steinberg, 2004, 2010). Consequently, the scope of the current study focused on a single year level only – Year 12 students. By designing the scope of the study to limit the variance in the adolescent chronological age range and targeting the scope of the study to focus on Year 12, the study methodology sort to reduce the variance in the maturation of the adolescent cognitive and emotional systems, which was anticipated to effect the maturation of their AEI skills. The scope of the study also focuses on the late adolescent stage of development (Sawyer et al., 2012), because this period typically coincides with the completion of secondary school. In Australian education, Year 12 has been acknowledged as an important transitional year
with the students’ level of academic achievement being a key predictor for entry into tertiary study or employment in a Western globalised economy (OECD, 2013a).

1.4.3 Practical Scope of the Study

The practical scope of this study was also limited to the resources available to a part time PhD student. In addition, the practical scope of the study was designed to minimise the potential interruption of this research study to the potential VCE student participants, their families and the staff in the participating secondary schools. Further, the scope of academic achievement in this study is also limited by restricting the study cohort to a single year level, Year 12, which is the final year of secondary school in Australia. Further, the Year 12 study cohort was limited to Year 12 students completing their Victorian Certificate of Education (VCE). The VCE is a standardised measure of academic performance that is acknowledged nationwide and by the State of Victoria (ABS, 2011). The VCE was administered in the four secondary schools that took part in this study. Any potential variance in the curriculum design, delivery, and assessment across the four schools was controlled by the standardised curriculum demands and assessment requirements.

Year 12 students’ final VCE scores have been acknowledged as a significant prerequisite for entry into tertiary education, and an important factor in securing employment in the Australian knowledge-based society (ABS, 2011). The VCE standardised scores have been utilised as a measure of academic achievement by the OECD (2014). Therefore, VCE scores provided a standardised assessment of academic achievement that is recognised at a state, national, and international level, which supported the potential replication of the study. This metric would also facilitate a comparison of the current Australian study with the British study of EI, IQ, and academic achievement presented by Petrides et al. (2004).

The study scope encompasses the relationship between AEI, fluid intelligence, and gender for academic achievement in Year 12 students completing their VCE (VTAC, 2010). The general linear model (GLM) simultaneous saturated regression model was selected for the study, because it allowed a full analysis of the variables’ main, shared, interactive or moderating predictive effects for academic achievement in the total cohort, and for the subgroups by focusing on the individual as the unit of analysis (Heiman,
To date, this research method has not been utilised to investigate the simultaneous predictive effects of AEI, IQ, and gender for the target adolescent population of Year 12 students. The study scope was also derived from the decomposition of the GLM simultaneous saturated regression equation, which resulted in five regression models (Tabachnick & Fidell, 2007). An analysis was conducted to determine the simultaneous predictive variance of AEI, IQ, and gender. The data for the total cohort was analysed with a GLM simultaneous saturated regression model, which supported further exploration of individual differences in the predictive effects of AEI for VCE academic achievement, subject to developmental differences in IQ and gender. The cohort was an adequate size \( N = 369 \) for statistical analysis (Field, 2009; Tabachnick & Fidell, 2007). The simultaneous saturated regression model provided a detailed assessment of all the possible relationships between the variables, and facilitated an analysis of individual differences in the four IQ and gender subgroups (Tabachnick & Fidell, 2007).

Based on the regression models, individual differences in the simultaneous predictive variance of AEI and academic achievement subject to developmental differences in IQ and gender, were analysed. The cohort was allocated into four subgroups based upon developmental differences in IQ scores and gender. The four subgroups were entitled the female high group, female low group, male high group, and male low group. Consequently, the sample was statistically controlled for analysis but not randomised. A sequence of Simple Slope Data Plot analyses was utilised to investigate the relationship of AEI for academic achievement in the gender and IQ group combinations. AEI, fluid intelligence, and gender were conceptualised from a biopsychosocial developmental perspective (Gemelli, 2013), which were in a stage of growth as the developing individual adolescent interacted on and in response to the demands of their changing environment (Bronfenbrenner, 1977).

**1.5 Study Significance**

The current study set out to contribute to the field of EI by conducting empirical research to determine the simultaneous predictive effects of AEI, IQ, and gender for academic achievement in VCE Year 12. The study outcome also intended to make a significant contribution to the field of educational psychology from three perspectives: First, from a theoretical perspective; second, due to the developmental research
methodology utilised; and third, due to the practical contribution of the findings to lead to recommendations to inform current psychoeducational policy and practice to improve academic achievement.

1.5.1 Theoretical Significance of the Study

First, the study findings were intended to frame AEI as a multi-level developmental investment model of AEI (Zeidner et al., 2003). The predictive effect of AEI on academic achievement is considered from a holistic, dynamic, developmental model, rather than analysing the predictive effects of AEI in isolation from the individual’s stage of development, intellectual abilities and gender. Based on the ecological developmental perspective developed by Bronfenbrenner (1979), individual differences in the predictive effect of AEI for academic achievement have been more effectively understood in holistic systemic terms. Hence, this study incorporates research that highlighted the importance of adolescence as a critical period of formative development in the human lifecycle, encompassing functional biological, cognitive, emotional, and psychosocial developmental changes (Blakemore, 2010; Gluckman et al., 2009; Shaw et al., 2006) that have the potential to effect the development of AEI (Zeidner et al., 2003).

The study findings are intended to developmentally differentiate the theoretical construct of EI in the infant, child, adolescent, and adult populations. The importance of developmentally delineating the formative changes EI throughout the human lifecycle was raised by Zeidner et al. (2003) and the often cited, but rarely reviewed, research by Leunier (1966), Payne (1985) and Greenspan (1989). The current study introduced the terms infant emotional intelligence (IEI), childhood emotional intelligence (CEI), and adolescent emotional intelligence (AEI). The developmental classification of EI acknowledged the consistent noumena of EI throughout the human lifecycle, while also acknowledging the need to delineate the developmental growth and changes that could influence the phenomena of EI throughout the lifespan.

With reference to the cognitive-motivational-relational theory of emotions developed by Lazarus (1993b) and the development of metacognition in adolescence by Weil et al. (2013), the holistic developmental approach to understanding the individual differences in the predictive effect of AEI for academic achievement was acknowledged
from a multi-dimensional perspective (antecedent–stimulus–individual–response–
metacognition) rather than considering the effect of AEI from a static uni-dimensional
perspective (stimulus–response). The latter has been the predominant research method
utilised to analyse the relationship between EI and academic achievement to date.
Consequently, the study research methodology is designed to investigate the predictive
effect of AEI in academic achievement from a dynamic developmental perspective.

1.5.2 Methodological Significance of the Study

Second, the study used an innovative research methodology to investigate the
individual differences in the relationship between AEI and academic achievement. The
individual adolescent’s resources (AEI, IQ, and gender) were analysed with univariate
and bivariate statistical analyses. The study research methodology utilised a general
linear model (GLM), and specifically a simultaneous saturated regression model
(Tabachnick & Fidell, 2007) to identify all relationships between the resources. This
research methodology focused on the individual adolescent as the core element in the
study design, which enabled a comprehensive and statistically rigorous analysis of the
independent, shared, and interactive predictive variance of the independent variables for
the dependent variable, VCE academic achievement. The simultaneous saturated
regression analysis provided a detailed holistic analysis of how the predictive effect of
AEI, IQ and gender could contribute dynamically to adolescent learning.

The study findings analysed individual differences in the simultaneous predictive
effect of AEI, IQ and gender, with four IQ and gender combination groups. These
findings provided a more detailed insight into the individual differences in how
adolescents utilised their AEI to enhance or inhibit their academic achievement. A series
of GLM saturated regressions determined which resources were simultaneously utilised
by the individual to directly affect VCE academic achievement. This facilitated the
identification of qualitative differences in the predictive effects of AEI for VCE academic
achievement. The research methodology provided findings that were refined enough to
identify individual differences in the predictive effect of AEI and extend the previous
research findings presented by Petrides et al. (2004).
1.5.3 Practical Significance of the Study

Third, the study findings had direct practical implications for Australian Year 12 students in the late stage of adolescent development who are completing their VCE. Based on the study’s findings, it is anticipated that recommendations will be developed to guide future psychoeducational practice and policy. The study’s findings will provide qualitative research evidence of the simultaneous predictive effect of AEI, IQ, and gender for Year 12 VCE academic achievement. The findings may inform future VCE Year 12 psychoeducational policy and practice by determining the effect of AEI on VCE academic achievement. The inclusion of AEI and IQ in the current study will broaden the current VCE educational assessment model, which primarily focuses on measuring VCE students cognitive reasoning in the GAT. Further, by investigating the simultaneous predictive effect of AEI, IQ and gender in VCE academic achievement for the total cohort, recommendations may be made for Year 12 students. Further, by investigating the individual differences in AEI in the four IQ and gender combination groups, recommendations may be made for subgroups of Year 12 students. Recommendations for the total cohort and for subgroups of the cohort may have implications for the improvement of the current level academic achievement. Therein, the knowledge provided by determining the predictive effects of AEI could have direct and indirect implications for supporting the goals articulated in the National Education Agreement (COAG, 2011; Ministerial Council on Education Employment Training and Youth Affairs, 2008). In addition, the study findings may have implications for the OECD Indicators of Educational Systems (2014): incorporating international educational assessment, curriculum development and educational pedagogy.

1.6 Conclusion: Chapter One

Chapter One provided an introduction for this investigation into the individual differences in the predictive effect of AEI for VCE academic achievement, subject to the simultaneous effect of IQ and gender. In this study, AEI as measured by the SUEIT: A (Luebbers et al., 2007); IQ as measured by fluid intelligence (gf) (Jensen, 1998; J. C. Raven, 1938; Spearman, 1923); and gender are analysed in terms of their potential capacity to be reliable predictors of academic achievement, as measured by the VCE
Individual differences in the predictive effect were investigated in four different IQ and gender combination groups. This study aspires to extend the seminal research findings presented by Petrides et al. (2004), and therein seeks to examine the simultaneous predictive effect of AEI, IQ and gender in VCE academic achievement in Year 12 students who were in the late adolescent stage of development.

Chapter Two will provide a review of the relevant literature and therefore, the rationale for an analysis of the predictive variance of AEI, IQ, and gender for VCE academic achievement. The theoretical fields of emotion (Darwin, 1874) and intelligence (Galton, 1869; Spearman, 1904) will be contextualised as theoretical precursors to the study of EI (Salovey & Mayer, 1990). The historical and contemporary theories of EI will be analysed, with reference to three waves of EI research entitled: the psychodynamic model of EI (Leuner, 1966), the ability model of EI (Mayer & Salovey, 1997), and the trait model of EI (Goleman, 1995). Models and measures of AEI specifically developed for the adolescent population (Palmer & Stough, 2001b) will be outlined with reference to the rapid and formative maturational changes in adolescent biopsychosocial development (Gemelli, 2013). Research outlining neurological maturation that occurs from the commencement to the completion of adolescence, which encompasses the asynchronous maturation of adolescent cognitive skills and social emotional skills in adolescent males and females (Goddings et al., 2012; Spear, 2013) will also be investigated to inform a developmental understanding of AEI.

The maturational changes that occur throughout the adolescent period of development together with adolescent psychosocial developmental drives are argued to have the potential to influence adolescent judgment, decision making and at-risk behaviours (Blakemore & Robbins, 2012; Burnett, Bault, Coricelli, & Blakemore, 2010; Cauffman & Steinberg, 2000; Steinberg & Cauffman, 1996). These adolescent maturational changes will be considered in relation to their implications for a developmental changes in AEI, specifically to inform an understanding of a multi-level investment model of AEI (Zeidner et al., 2003). Research that has investigated the relationship between AEI and academic achievement will be analysed (N = 25). Collectively, the findings from the literature reviewed in Chapter Two will inform the
research methodology outlined in Chapter Three, specifically the study design, cohort selection and statistical analysis.

Chapter Three will draw upon the EI theoretical models and operational definitions, outlined in the literature review, to develop an appropriate research methodology for the study. A research framework and assessment model will be developed to evaluate the predictive variance of AEI, IQ, and gender for VCE academic achievement. Further, the research methodology will support the evaluation of individual differences in the predictive effects of AEI for VCE academic achievement in four IQ and gender combination groups. The research model will be designed to ensure it is replicable at a state and national level of academic assessment. The research methodology will also be designed in light of the findings from a small research trial, which was conducted in order to assess the viability of the research model and to evaluate the practicality of using this assessment model and the assessment tools in a secondary school setting. The research trail confirmed that the research model, the assessment regime and processing time were not too intrusive and were achievable for participating VCE students, secondary school staff, researchers and parents. Chapter Three will also outline the research ethics; selection of participants; collection of data; demographic information; and the procedures used to conduct the research in four secondary schools.

Chapter Four will provide an analysis of the data collected for testing Hypotheses One and Two(a, b, c, d). The research results will be presented in four sections entitled univariate, bivariate, and multivariate statistics, followed by the post hoc assessments. A GLM simultaneous saturated regression equation will result in five models. The first model, Model E, will represent the main effects and interactions of all variables for the AEI total score. The four subsequent regression models will be representative of the AEI trait scores (emotional recognition and expression, understanding emotion, emotion direct cognition, and emotional management and control), with each model representing decomposition for IQ and gender. A series of simple slope data plots will identify the individual differences in the relationship of AEI for VCE academic achievement in the four IQ and gender combination groups. Subsequently, post hoc analyses will also be presented.
Chapter Five will discuss the major findings for Hypothesis One. The findings for Hypothesis One are analysed in relation to the research questions, post hoc analyses, EI theory, adolescent developmental literature, and previous research findings. First, the major findings for the total cohort will be discussed with reference to a multi-level investment model of AEI (Zeidner et al., 2003). Second, an analysis of individual differences in the predictive variance of AEI for academic achievement across the IQ and gender combination groups will be presented also with reference to a multi-level investment model of AEI (Zeidner et al., 2003). The individual differences in the predictive effects of AEI will also discussed in light of the interaction between adolescent resources (AEI, IQ, and gender) to meet the academic demands of VCE, with reference to an ecological developmental framework as theorised by Bronfenbrenner (1977). Further, the individual differences in the predictive effects of AEI for VCE academic achievement in the IQ and gender combination groups will be considered in light of each group’s ZPD (Vygotsky, 1978).

Chapter Six will consider the findings for Hypothesis Two(a, b, c, d), which will specifically focus on the pattern of AEI traits that influenced adolescent academic achievement in VCE. Common or similar findings that were previously identified and discussed in Chapter Five will also be acknowledged, but not reiterated in Chapter Six. The individual differences in the AEI traits for VCE academic achievement are discussed in light of Darwin’s (1874) theory of emotion and with reference to a multi-level investment model of AEI (Zeidner et al., 2003). The pattern of AEI traits that have practical significance for VCE academic achievement and retention, are understood with reference to previous studies by researchers such as Petrides et al. (2004), Downey, Mountstephen, et al. (2008), Qualter, Gardner, Pope, Hutchinson, and Whiteley (2012) and Rivers et al. (2012), which have focused on the relationship between AEI and adolescent academic achievement in school students.

Chapter Seven will present the conclusions to the study. The research findings will provide a contribution to the current research literature investigating the relationship between AEI, IQ and gender for VCE academic achievement in Year 12 students. The theoretical and psychoeducational implications of the study findings will be outlined, along with the limitations of the study. Recommendations will be developed for future
research, with suggestions of how the research findings could influence psychoeducational policy and practice with reference to The National Education Agreement 2011 objectives (COAG, 2011). A discussion of the feasibility of the study conclusions for the Education At A Glance: OECD Indicators (OECD, 2014) for educational systems’ international educational assessment, curriculum development and teacher training policy in an economically globalised society will also be outlined, which finalises the study.
CHAPTER TWO

Literature Review

Chapter two presents a critique of the EI theoretical and research literature to determine the valence of the relationship between AEI in academic achievement for secondary school students in the early and late stage of adolescent development. Further, it seeks to examine how developmental differences in traditionally acknowledged predictors of academic achievement, such as IQ and gender may influence individual differences in the relationship between AEI and academic achievement. Formative to this objective is a review of the literature in order to determine how AEI is biopsychosocially developmentally defined, operationalised, and directly or indirectly associated with academic achievement. Therein, this literature review aims to (a) introduce the construct of EI with reference to the fields of emotion and intelligence, from a historical and theoretical perspective; (b) outline three theoretical models of EI, which are referred to as the psychodynamic model of EI, the ability model of EI and the trait model of EI in the current study; (c) contextualise the construct of AEI from an adolescent developmental perspective; (d) review examples of the AEI developmental models and psychometric assessments developed for the adolescent population; (e) review the individual differences in the central research findings that have examined the relationship between AEI and academic achievement; and (f) identify the strengths and limitations in the current measures, methodological designs and research findings in order to inform and direct the current research study.

Therein, the literature review will focus on analysing research evidence to determine the valence of AEI as an innovative construct to inform psychoeducational policy and pedagogy. When relevant, this literature review will refer to the construct of AEI in relation to the Australian educational system. The construct of AEI will be examined to determine its valence and psychometric strength as a construct to inform educational pedagogy and optimise the current standards of academic achievement, hence in supporting the attainment of the Melbourne Declaration on Educational Goals for Young Australians (Ministerial Council on Education Employment Training and Youth Affairs, 2008) and the National Safe Schools Framework (Ministerial Council for
Education Early Childhood Development and Youth Affairs, 2011). Australia, as an OECD member country (OECD, 2014), was selected as a focus for this literature review. Therein, the key strengths and limitations of the previous theory and research related to the relationship between AEI and academic achievement will be considered in order to inform the design of the current study, which will be presented in Chapter Three. Hence, Chapter Two will present this literature review in three parts entitled:

**2.1 Part One: Aetiology of EI**
- 2.1.1 EI: Models of Emotion
- 2.1.2 EI: Models of Intelligence

**2.2 Part Two: EI Theoretical Models and Measures**
- 2.2.1 EI: Three Theoretical Models

**2.3 Part Three: AEI and Academic Achievement**
- 2.3.1 AEI Models and Psychometric Measures
- 2.3.2 AEI and Adolescent Development
- 2.3.3 AEI in Primary, Secondary and Tertiary Educational Systems
- 2.3.4 The Effect of AEI, IQ and Gender in Academic Achievement
- 2.3.5 AEI and Academic Achievement
- 2.3.6 AEI and Gender in Academic Achievement
- 2.3.7 AEI, IQ and Gender in Academic Achievement

**2.4 Implications for the Current Research Study: AEI, IQ and Gender in Academic Achievement**
- 2.5 Conclusion: Chapter Two

Part One and Part Two of the literature review are essential back ground theoretical literature, which are presented in Appendix B and Appendix C, respectively. The conceptual framework for the current literature review of AEI and academic achievement is provided in Figure 2.1. First, the horizontal arrows highlight the historical and theoretical foundations of the construct of EI, which stems from the fields of emotion and intelligence. Second, the horizontal arrows illustrate the developmental nature of EI with reference to the sequential maturation of EI throughout the childhood, adolescent and adult stages of development. The current study was focused on adolescent emotional intelligence (AEI) in the three stages of adolescent development, entitled (a) the early...
stage of adolescent development (±10–14 years), (b) the late stage of adolescent development (±15–19 years), and (c) young adulthood (±20–24 years) (Sawyer et al., 2012). The literature review aimed to investigate the nature of the relationship between AEI and academic achievement. Third, the vertical arrows represent the formative influence of environmental factors at a macro, organisational, and individual level (Bronfenbrenner, 1977) on the development of the individual’s AEI. Fourth, the intersection of the horizontal arrows and the vertical arrows highlight the intersection between (a) the adolescent’s internal developmental demands associated to their stage of AEI maturation; (b) the adolescent’s external environmental demands, which may influence the development of AEI; and subsequently (c) the degree that AEI was directly or indirectly utilised in academic achievement.

The focus of the current study is specifically on the intersection of the horizontal arrows identifying AEI in the early and late stage of adolescent development, with the vertical arrows marking the environmental factors influencing AEI in adolescent academic achievement. This intersection underscores the simultaneous internal adolescent biopsychosocial developmental changes (Gemelli, 2013) and external environmental changes, which have the potential to influence the individual differences in the (a) individual’s stage of developmental maturation of AEI; (b) the individual differences in the level of one’s AEI traits/skills or abilities; and (c) the degree that an individual utilised their AEI skills in academic achievement, which will be discussed in this Chapter.
Figure 2.1 AEI and Academic Achievement: Ecological Developmental Perspective
In Figure 2.1 the terms CEI = Childhood Emotional Intelligence, and AEI = Adolescent Emotional Intelligence. The adolescent stage of development is marked by the onset of puberty, which typically occurs approximately two years earlier in adolescent females than in adolescent males (Gemelli, 2013). In the current study, the adolescent stage of development is categorised into three stages: Early adolescence (≥ 10–14 years of age), late adolescence (≥ 15–19 years of age) and young adulthood (≥ 20–24 years of age) (Sawyer et al., 2012); as illustrated on the horizontal axis. Based on the ecological model of human development by Bronfenbrenner (1977) the Macro Level, Organisational Level and Individual Level refer to nested social environmental contexts that can impact on the individual; as illustrated on the vertical axis. The growing individual adolescent is nested within each of the Macro, Organisation and Individual social environments (Bronfenbrenner, 1977), which were theorised to have the potential to effect the development of the individual’s AEI (Leuner, 1966); illustrated by the intersection of the horizontal and vertical axis in Figure 2.1. Consequently, the individual’s stage of development and the demands of the Macro, Organisational and Individual levels in the environment, were theorised to partially influence individual differences in the degree that AEI was utilised in academic achievement (Greenspan, 1989; Payne, 1985).

2.1 Part One: Aetiology of EI

Historically, the two formative elements encompassed in the construct of EI have philosophical and theoretical links to the fields of emotion and intelligence, respectively (Leuner, 1966). Further, Mayer, Salovey, et al. (2000c) suggest EI is qualitatively differentiated from either the construct of emotion or cognition, operating independently; rather, EI is purported to be a unique construct, which predominately refers to emoting and reasoning operating synergistically. Therefore, a review of the literature in the study of emotion and intelligence is provided, in order to philosophically, historically and theoretically contextualise the origins and integration of emotion and intelligence in the construct of EI (Salovey & Mayer, 1990). The construct of EI is also considered from a multi-faceted developmental perspective (Zeidner et al., 2003). The developmental label or term AEI is specifically analysed in light of the unique asynchronous developmental changes that occur in adolescent emotion and cognition in adolescent development (Steinberg, 2010). Therein, the development of AEI and subsequently the relationship between AEI and academic achievement will be framed with reference to the models of emotion and models of intelligence as they have the potential to influence the AEI, which is the focus of the current study and outlined in Appendix B. Further, AEI refers to both ability EI and trait EI models and their psychometric measures.

2.2 Part Two: EI Theoretical Models and Measures

As previously introduced in Chapter One, historically and theoretically the psychological concepts presented in the construct of EI have evolved from the fields of
“emotion” and “intelligence” (Mayer, Salovey, et al., 2000c). Hence, the models of emotion (Section 2.1) and multifactorial models of intelligence (Section 2.2) have been reviewed and demonstrated their theoretical relationship to conceptualisation of “emotional intelligence”. The first published reference to EI was made by Van Ghent (1953) in her fictional novel entitled The English Novel: Form and Function, whereby, Van Ghent made reference to Jane Austin as displaying emotionally intelligent characteristics. From Van Ghent’s first fictional reference to emotional intelligence in 1953 to the current extensive body of EI research, the theoretical field of EI has gradually evolved and developed a wide range of EI theories, models and measures. The current thesis provides a review of the literature pertaining to three models of EI entitled the Psychodynamic Models of EI, the Ability Models of EI and the Trait Models of EI, which are outlined in Appendix C.

Based on the literature review of EI models and measures outlined in Appendix C, the SUEIT model and measure originally developed by Palmer and Stough (2001c) was selected as the EI model for the current study. This decision was made due to the theoretical validity, psychometric strength, and the utility of the SUEIT model (Stough, Palmer, Gardner, Papageorgiou, & Redman, 2002). The SUEIT EI model by Palmer and Stough (2001c) was also formative to the development of the Genos EI model (Palmer, Stough, Harmer, & Gignac, 2009), which continues to be refined and developed (Gignac, 2010a). In addition, a version of the SUEIT (Palmer & Stough, 2001c) was developed for the adolescent population by Luebbers et al. (2007). Consequently, the theoretical and psychometric structure of the SUEIT: Adolescent Version (Luebbers et al., 2007) and an overview of other EI measures for the childhood and adolescent populations, will be analysed in Part Three of this literature review.

Part Three of the literature review questions: What is the relationship between AEI and academic achievement? To commence the investigation, the literature review seeks to determine how AEI is biopsychosocially conceptualised and theoretically defined. For instance, the asynchronous neurological maturation and developmental changes in the adolescent emotional and cognitive systems that effect decision making (Blakemore & Robbins, 2012) are speculated to also influence the development of AEI. An overview of the current AEI models and psychometric measures are then analysed.
Second, research examining the relationship between AEI and academic achievement is examined. Further, individual differences in the relationship of AEI and academic achievement are considered with reference to the developmental differences in adolescent IQ and gender. Hence, Part Three of the literature review will explore the developmental, theoretical, psychometric and functional nature of AEI as it directly or indirectly relates to academic achievement.

2.3 Part Three: AEI and Academic Achievement

From a global perspective the importance of identifying the role of AEI in academic achievement is particularly important for contemporary adolescents. For example, the United Nations Secretary-General Ban Ki-moon (UN, 2015) recently asserted that the development of new innovative strategies to optimise adolescent mental health, wellbeing and academic achievement was an international priority. In addition, Ban Ki-moon (UN, 2015) also acknowledged that given adolescence was a formative and unique developmental stage in the human lifespan, innovative strategies should be developmentally targeted in order to be effective for the adolescent population. In light of the need to develop innovative strategies for the adolescent population to optimise their academic achievement, the valence of AEI in academic achievement is now considered.

Lower levels of AEI have been associated to adolescent depression, anxiety (Fernández-Berrocal et al., 2006), and a depressed mood at an adolescent class level (Balluerka, Aritzeta, Gorostiaga, Gartzia, & Soroa, 2013). In contrast, AEI has been positively predictive of adolescent mental health, beyond the predictive effects of cognitive ability and personality (S. K. Davis & Humphrey, 2012). Research has also demonstrated that AEI is a malleable construct (Castillo, Salguero, Fernández-Berrocal, & Balluerka, 2013). For example, adolescents who took part in a two-year training group showed improvements in self-reported aggression, anger, hostility, personal distress and fantasy in comparison to a control group (Castillo et al., 2013). A longitudinal study by Mueller et al. (2011) found adolescents’ self-regulation predicted positive youth development. In addition, participation in a youth development program in Year 8 positively predicted self-regulation skills in Year 9 and subsequently predicted Year 10 positive youth development and their contribution to self, family, community and society (Mueller et al., 2011). Previous research has also found an emotional literacy program
entitled the RULER program positively influenced classrooms to promote positive youth development (Rivers, Brackett, Reyes, Elbertson, & Salovey, 2013).

Research has also found that EI is positively and significantly predictive of happiness, accounting for over 50% of the variance in happiness (Furnham & Petrides, 2003). This finding was consistent with previous research, which has also affirmed the psychological and academic benefits of Socio-Emotional Learning (SEL) (Durlak et al., 2011). Durlak et al. (2011) conducted a meta-analysis of 213 school-based SEL programs and found the students who participated in the SEL programs displayed improved social and emotional skills, attitudes, behaviours and made an 11-percentile point improvement in their academic achievement, when compared to control groups (Durlak et al., 2011). Furthermore, AEI has been positively associated to academic achievement (Downey, Mountstephen, et al., 2008; Fannin, 2001; Parker, Creque, et al., 2004; Stottlemyer, 2002). Therefore, AEI is identified as an innovative variable, which is malleable and has the potential to optimise adolescent wellbeing and academic achievement.

Consequently, Part Three of this literature review now seeks to examine the nature of the relationship between AEI and academic achievement to determine if AEI is or is not a variable of psychometric and practical significance that could inform future innovative strategies to optimise adolescent academic achievement. Understanding the relationship between AEI and academic achievement was considered to be: (1) complex due to the formative biopsychosocial developmental changes in adolescence–specifically in the neurological development, cognitive development, emotional development and social development (Steinberg, 2005); (2) important for contemporary adolescents as levels of academic achievement are a key prerequisite for adult employment in a globalised economy (OECD, 2014); and (3) theoretically imperative as research into the relationship between AEI and academic achievement is considered to be at a formative stage, with an emerging research finding AEI predicted academic achievement above IQ and personality traits (Sanchez-Ruiz, Mavroveli, & Poullis, 2013).

First, contemporary adolescents are challenged to cope with the rapid and formative internal developmental changes encompassed in the three stages of adolescent development, which is not complete until approximately 25 years of age (Sawyer et al., 2012). In particular, adolescent development is characterised by the asynchronous
developmental trajectories in the maturation of the cognitive systems and the emotional systems (Spear, 2013); therein, the adolescent cognitive system undergoes a protracted maturational process that is manifested in an immature inhibitory control system, which may be overcome in some emotional conditions i.e. in the presence of peers; when adolescents may be particularly sensitive to reward stimuli that is associated to increased risk-taking behaviours (Spear, 2013; Steinberg et al., 2008). This asynchronous development of the adolescent cognitive and emotional system is speculated to have a unique impact on the development of AEI throughout the three stages of adolescent development (Sawyer et al., 2012).

Second, contemporary adolescents are also challenged by rapid environmental changes associated to a technological and globalised economy (Blum et al., 2012). For instance, contemporary adolescents are subject to increasing environmental pressure to attain higher levels of academic achievement in secondary school. Secondary school academic achievement is a key prerequisite for entry into tertiary education (Blum et al., 2012) and subsequently, adult employment in a technologically advancing globalised economy (OECD, 2014). Furthermore, the adolescent population is also challenged by decreasing rates of mental health and increasing rates of anxiety and depression (WHO, 2005). These findings highlight the increasing importance and potential intrinsic value in understanding the predictive effect of AEI in adolescent academic achievement for the contemporary adolescent population. Despite a growing body of research exploring the relationship between AEI and academic achievement in the adolescent population, the findings have been mixed (Mayer, Roberts, & Barsade, 2008).

Third, research into the relationship between AEI and academic achievement has presented mixed findings. For instance, AEI has been positively predictive of academic achievement in the adolescent population (Downey, Mountstephen, Lloyd, Hansen, & Stough, 2008). Further, research has found AEI in academic achievement for university students has accounted for incremental predictive variance beyond that accounted for by IQ and personality traits (Sanchez-Ruiz et al., 2013). However, previous research has also found AEI was a statistically insignificant variable in the academic achievement of intellectually gifted adolescent students (Woitaszewski & Aalsma, 2004). Therein, when research examining the relationship between AEI and academic achievement has
included other developmental factors, such as IQ, there were differences in the predictive effect of AEI for academic achievement. Furthermore, previous research found AEI modified the predictive effect of IQ for academic achievement in high school students (Petrides, Frederickson, & Furnham, 2004). In addition, previous research found gender differences in AEI (Siegling, Saklofske, Vesely, & Nordstokke, 2012), academic achievement and memory (Silveri, Tzilos, Pimentel, & Yurgelun-Todd, 2004).

Consequently, while higher skills in AEI were associated with higher academic achievement (Downey, Mountstephen, Lloyd, Hansen, & Stough, 2008), it was also plausible that developmental differences in AEI, IQ and gender may have partially influenced the individual differences found in the predictive variance of AEI in academic achievement. Hence, a more detailed developmental analysis of the current literature is required in order to gain further insight into the individual differences in AEI and academic achievement.

Therefore, this literature review aims to (a) critique a representative sample of AEI ability and trait models and psychometric measures \((N = 11)\); (b) analyse the research findings for studies that have investigated the relationship between AEI and academic achievement in secondary school students \((N = 25)\); (c) examine the relationship between AEI and academic achievement, particularly in light of how individual differences in AEI, IQ and gender may influence this relationship. The results of the literature review will be used to provide recommendations for the design of future research into the individual differences in the predictive effect of AEI for academic achievement, which will be presented in Chapter Three.

Therein, the literature review of AEI and academic achievement is presented in the following sections:

2.3.1 AEI Models and Psychometric Measures
2.3.2 AEI and Adolescent Development
2.3.3 AEI in Primary, Secondary and Tertiary Educational Systems
2.3.4 AEI, IQ and Gender in Academic Achievement
2.3.5 Implications for the current Research Study: AEI, IQ and Gender in Academic Achievement
2.3.6 Conclusion: Chapter Two
### 2.3.1 AEI Models and Psychometric Measures

Throughout the childhood and adolescent stage of development there are unique and formative biopsychosocial developmental changes as the individual matures (Gemelli, 2013). In particular, there are asynchronous developmental changes in the neurological form and function of the adolescent cognitive system and the emotional system (Blakemore & Robbins, 2012; Spear, 2013; Steinberg, 2005). These asynchronous developmental changes in the adolescent cognition and emotional systems (Spear, 2013) are considered in this literature review to have the potential to influence formative adolescent developmental changes in the construct of AEI (Zeidner et al., 2012). These adolescent developmental changes (Spear, 2013) also have implications for the designing AEI models and psychometric measures for the adolescent population (Brody, 2004; Matthews, Roberts, & Zeidner, 2004; Zeidner et al., 2003). Nonetheless, despite the complex nature of adolescent development significant progress has been made in the design of psychometrically robust measures of AEI in the adolescent populations based on both the ability EI and trait EI models (Bar-On & Parker, 2000; Ciarrochi et al., 2001; Peters, Kranzler, & Rossen, 2009). Further, the development of the current psychometric measures of AEI have enabled formative research in a range of fields, including theoretical research (Arsenio, 2003), clinical research (Fernández-Berrocal et al., 2006) and educational research (Austin, Evans, Goldwater, & Potter, 2005).

The AEI and CEI models and psychometric measures are classified as an ability model of EI (Brackett & Mayer, 2003; Mayer, Salovey, Caruso, & Sitarenios, 2001) or a trait model of EI (Petrides & Furnham, 2001, 2003). The differences in theoretical models and the methodology utilised in the design of the measure or assessment in the ability EI models and the trait EI models was considered essential in order to: effectively assess the developmental differentiation of the model for the childhood and adolescent populations; the psychometric validity and reliability of the assessment measures; the predictive effect of the study findings; and the functional or practical utility of the EI assessments in the childhood and adolescent population. Therefore, an overview of a range of key published psychometric models and measures or assessments of AEI and CEI ($N = 11$) are presented in Table 2.1. The psychometric measures of AEI and CEI are classified as ability ($n = 4$) and trait ($n = 7$) models of EI. The AEI and CEI measures
presented in Table 2.1 are also categorised with reference to the revised assessment versions or alternative versions of the same assessment. In addition, Table 2.1 also outlines some examples of research articles that have provided evidence of the reliability, validity and utility of a range of key AEI and CEI measures.
Table 2.1

CEI and AEI Models and Measures

<table>
<thead>
<tr>
<th>Year</th>
<th>Author</th>
<th>EI Model</th>
<th>CEI/AEI Model and Psychometric Measure (With Revised or Alternative Versions)</th>
<th>Target Population CEI/AEI</th>
<th>Examples of Research Utilising Psychometric Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>Mayer, Salovey &amp; Caruso</td>
<td>Ability</td>
<td>Adolescent Multifactor Emotional Intelligence Scale (AMEIS)</td>
<td>AEI</td>
<td>(Woitaszewski, 2000) (Fannin, 2001)</td>
</tr>
<tr>
<td>1998</td>
<td>Tapia &amp; Burry-Stock</td>
<td>Trait</td>
<td>The Emotional Intelligence Inventory</td>
<td>AEI</td>
<td>(Tapia, 1998)</td>
</tr>
<tr>
<td>Year</td>
<td>Author(s)</td>
<td>Emotion</td>
<td>Measure</td>
<td>Edition</td>
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<tr>
<td>1999</td>
<td>Sullivan</td>
<td>Ability</td>
<td>Emotional Intelligence Scale for Children (EISC)</td>
<td>CEI</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(Sullivan, 1999)</td>
<td></td>
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<tr>
<td>1999</td>
<td>Boyatzis, Goleman &amp; Rhee</td>
<td>Trait</td>
<td>Emotional Competence Inventory (ECI)</td>
<td>AEI</td>
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<td>(Click, 2002)</td>
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<td>2004</td>
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<td>(Peters et al., 2009)</td>
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<td>(Windingstad, McCallum, Mee Bell, &amp; Dunn, 2011)</td>
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<td>(Mayer, Salovey, et al., 2005)</td>
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<tr>
<td>Year</td>
<td>Authors</td>
<td>Type</td>
<td>Description</td>
<td>Participants (Age)</td>
<td>References</td>
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<tr>
<td>2001</td>
<td>Petrides &amp; Furnham</td>
<td>Trait</td>
<td>Trait Emotional Intelligence (TEIQue-AF)</td>
<td>Aged 13–17</td>
<td>(Petrides &amp; Furnham, 2001)</td>
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<td></td>
<td></td>
<td></td>
<td>TEIQue-ASF Aged 12–17</td>
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<td>(Petrides, Sangareau, Furnham, &amp; Frederickson, 2006)</td>
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<td>TEIQue-CSF Aged 8–12</td>
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<td>(Mavroveli, Petrides, Shove, &amp; Whitehead, 2008)</td>
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<td>(Menzie, 2005)</td>
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<td>(Windingstad et al., 2011)</td>
</tr>
<tr>
<td>2001</td>
<td>Stough &amp; Palmer</td>
<td>Trait</td>
<td>Swinburne University Emotional Intelligence Test (SUEIT: A) (Adolescent Version)</td>
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<td>(Luebbers et al., 2007)</td>
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<td>2003</td>
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<td>(Downey, Mountstephen, et al., 2007)</td>
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<td>2007</td>
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<td>Year</td>
<td>Authors</td>
<td>Tool/Scale</td>
<td>Notes</td>
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<tr>
<td>2014</td>
<td>Billings, Downey, Lomas, Lloyd &amp; Stough</td>
<td>Swinburne University Emotional Intelligence Test CEI (SUEIT) (Early Years Version)</td>
<td>(Billings, Downey, Lomas, Lloyd, &amp; Stough, 2014)</td>
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<td>(Downey, Johnston, Hansen, Birney, &amp; Stough, 2010)</td>
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<td>(Lomas, Stough, Hansen, &amp; Downey, 2011)</td>
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<td>(Lomas, Stough, Hansen, &amp; Downey, 2012)</td>
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<td>(Schokman et al., 2014)</td>
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<td>Year</td>
<td>Authors</td>
<td>Description</td>
<td>Language Version</td>
<td>AEI Reference</td>
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Each of the eleven models of CEI and AEI presented in Table 2.5 will now be discussed. First EI measures based on the ability models of CEI/AEI ($n = 4$) will be analysed. Second, the trait models and measures of CEI/AEI ($n = 7$) will also be analysed. Further, the similarities and differences in the ability models and trait models of CEI/AEI will be considered with reference to the findings presented by Windingstad et al. (2011). Third, limitations in the current range of definitions of the childhood stage of development in CEI trait EI and ability EI assessments and the adolescent stage of development in AEI trait EI and ability EI assessments will be discussed.

### 2.3.1.1 AEI Ability Measures

The empirical psychometric measurement of EI in the adolescent population was attributed to the Adolescent Multifactor Emotional Intelligence Scale (AMEIS) (Mayer, Caruso, et al., 1999). The AMEIS was based upon the adult model of the MEIS (Mayer, Caruso, et al., 1999). As previously outlined, the MEIS was validated in two separate studies, the first in an adult population and the second in an adolescent population. The adult and adolescent MEIS scores were compared in order to determine if the construct of EI was developmental and therefore increased with age. The findings confirmed that the adults’ scores were significantly higher than the adolescents’, therein providing evidence that supported the developmental nature of EI, as measured by the MEIS (Mayer, Caruso, et al., 1999). The AMEIS was moderately correlated to both verbal intelligence ($r = .45$) and empathy ($r = .30$) in the adolescent group. The correlational analysis confirmed that the AMEIS was related to other recognised psychological constructs (verbal intelligence and empathy); nonetheless, the AMEIS was also an independent construct (Mayer, Caruso, et al., 1999). Therefore, the AMEIS provided a reliable and valid measure of AEI.

Sullivan (1999) developed an empirical measure of CEI, entitled the Emotional Intelligence Scale for Children (EISC), which was based on research in child development and the adult and adolescent model of the MEIS. The MEIS model Sullivan referred to was presented in a manuscript submitted for publication in 1997, which was published two years later (Mayer, Caruso, et al., 1999). The EISC model and measure defined EI as: “the ability to perceive and express emotions accurately, to interpret
emotional content, and to regulate emotions” (Sullivan, 1999, p. 1). The cohort in the PhD study by Sullivan consisted of 100 participants (55 females and 45 males) 4.5 to 9 years of age, who attended North Carolina elementary and preschools.

Further, based on the factor analysis of the MEIS (1997) the EISC was divided into three factors or parts: (a) perceiving emotions; (b) understanding emotions; and (c) managing emotions (Sullivan, 1999). There were five subscales that were allocated to each factor or part of the EISC, as outlined:

- perceiving emotions: (a) faces, (b) music, and (c) stories;
- understanding emotions: (d) understanding brief vignettes; and
- managing emotions: (e) managing emotions contained in interactive story items.

The EISC also encompassed an empathy scale and a teacher/parent rating scale. Sullivan (1999) noted that collectively these factors provided a multifaceted measure of EISC, which included self-reports, ability tests, and teacher/parent ratings. Further, two standardised assessments entitled the Story Completion Test and the Matching Familiar Figures Test, which were also incorporated into the testing regime in order to provide comparative data that could be utilised in the analysis of the validity of the EISC.

The results of the psychometric analysis of the EISC by Sullivan (1999) confirmed the internal consistency of the subscales ranged from low to moderate. The internal consistency for the empathy subscale was moderate and the teacher/parent rating scales were high. An examination of the EISC and the two standardised tests (Story Completion and Matching Familiar Figures) provided support for the validity of the EISC. Hence, these findings confirmed the reliability and validity of the EISC to measure CEI. Sullivan (1999) concluded the data generated from the EISC could provide vital information to assist children in the development of their EI skills, which was essential for children’s socialisation and adaption.

Salguero et al. (2010) analysed the validity of the Trait Meta-Mood Scale (TMMS) (Salovey et al., 1995) in adolescents aged 12–17 years ($N = 1,497$) which was designed to determine the individual’s perception of their emotional competencies or their Perceived Emotional Intelligence (PEI). The TMMS measure was based on a self-
report assessment. The findings indicated that the three-factor structure presented in the TMMS adult scale, which included attention to feelings, clarity of feelings and mood repair, was also confirmed in the adolescent population with adequate levels of reliability and validity. A factor analysis of the adolescents according to age and sex, found The Big Five personality factors were not significantly associated with a modified version of the TMMS. Further, Palmer et al. (2002) conducted an examination of the predictive validity of the TMMS and life satisfaction (N = 107) in a cohort 16–64 years of age. Personality constructs (positive and negative affect) known to predict life satisfaction was also evaluated. The findings indicated the TMMS clarity sub-scale added approximately 5.5% of the predictive variance of life satisfaction over and above personality measured by positive and negative affect. These findings concurred with those of Extremera and Fernández-Berrocal (2005) who found the TMMS scale clarity of feelings was predictive in life satisfaction for undergraduate university students, independent from their mood state constructs and personality traits.

Windingstad et al. (2011) conducted a study in upper elementary children in Years 3–5 (N = 102), which investigated the concurrent validity of both trait and ability EI measures in the childhood population. The trait measure of EI was the Emotional Quotient Inventory: Youth Version (EQi: YV) (Bar-On & Parker, 2000). The ability measure of EI was the Mayer–Salovey–Caruso Emotional Intelligence Test: Youth Version (MSCEIT: YV) (Mayer, Salovey, et al., 2005). The EQi: YV was designed to measure personal and interpersonal functioning on non-cognitive skills such as personality dimensions and self-esteem. While, the MSVEIT: YV was designed to measure a set of abilities to perceive, assimilate, understand and manage emotion. The findings indicated the mean scores from both measures showed no significant difference. Further, only two scores on similar scales had a significant correlation, while the remaining other scales were not significantly correlated. The results indicated the ability and trait model EI instruments measured somewhat different constructs of CEI (Windingstad et al., 2011).
2.3.1.2 AEI Trait Measures

The Trait Emotional Intelligence Questionnaire-Adolescent Short Form (TEIQue-ASF) was derived from the adult version of the TEIQue, which used a factor analysis of selected EI models to provide the basis of the elements in the EI measure (Petrides & Furnham, 2001). Facets included in the adult trait EI measures were: adaptability, assertiveness, emotional perception in self and others, emotional expression, emotional management, emotional regulation, impulsiveness, relationships, self-esteem, self-motivation, social awareness, stress management, empathy, management, happiness and optimism (Petrides et al., 2006). Trait EI or trait emotional self-efficacy was defined as a construct including “emotion-related self-perceptions and dispositions comprising the affective aspects of personality” (Petrides et al., 2006, p. 538). The construct validity of the TEIQue-ASF, which was designed to recognise the inherent subjectivity of emotional experiences and its relationship to children’s peer relations at school, was examined in a study of Year Six children with a mean age of 10 years (N = 160). Their peers and teacher measured the children’s behaviour using the “Guess Who” Assessment Technique.

The analysis conducted by Petrides et al. (2006) found no differences in gender in the cohort. However, the MANOVA results found main effects for gender and trait EI, with the behavioural descriptors as dependent variables. A series of ANOVAs identified individual differences in Trait EI: (a) Children with high trait EI received more peer nominations for co-operation. Those with high trait EI also received fewer nominations for aggression and dependence, which was indicative of pro-social behaviour. (b) Girls attained more nominations for co-operation and fewer for disruption, aggression, dependency and intimidation. (c) A chi-square analysis found teachers rated high trait EI children as more co-operative and less aggressive than children with low trait EI. Hence, the research conducted by Petrides et al. (2006) provided evidence of an association between trait EI and behavioural descriptors that differed for males and females.

The Schutte Self-Report Measure of Emotional Intelligence (SSEI) (Schutte et al., 1998) was a measure of EI based on the Salovey and Mayer model (1990), which considered EI a subset of social intelligence as “a set of skills hypothesized to contribute
to the accurate appraisal and expression of emotion in oneself and in others, the effective regulation of emotion in self and others, and the use of feelings to motivate, plan, and achieve in one’s life” (Salovey & Mayer, 1990, p. 185). Within the context of the seminal EI model presented by Salovey and Mayer (1990), EI was considered to be theoretically associated to Gardner’s model of personal intelligence. Specifically, the component of personal intelligence entitled inter- and intra-personal intelligence that encompassed the ability to monitor others’ moods and temperaments and to use that knowledge in the process of predicting their future behaviour. This information was considered formative in the process of self-regulation, which required the use of knowledge pertaining to one’s own and others’ emotional states to solve problems and regulate behaviour (Schutte et al., 1998).

Schutte et al. (1998) conducted a factor analysis of EI based on a cohort of 346 participants with an average age of 29 years. The factor analysis informed the development of the SSEI measure, which had 33 items that were also representative of the Salovey and Mayer EI model. The SSEI measure had a reading level typical of students in Year Five. Higher SSEI scores were associated with less alexithymia, great attention to feelings, greater clarity of feeling, more mood repair, greater optimism, less pessimism, less depression and less impulsivity. The SSEI analysis revealed females scored significantly higher than males. In the research study cognitive ability was determined based on the SAT scores and was not related to the SSEI measure. In addition, the SSEI was associated to one factor, greater openness to experience on the NEO Personality Inventory, but was not associated to the other four factors in the NEO. Further, the SSEI was predictive of end-of-year GPA \( r(63) = 0.32, p < 0.01 \) in first year college students \((N = 64)\) with an average age of 18 years. Three years after the research presented by Schutte et al. (1998), Ciarrochi et al. (2001) investigated the nature of AEI as measured by the SSEI by Schutte et al. (1998) in a cohort of adolescents \((N = 131)\). Ciarrochi et al. (2001) also found that the SSEI was a reliable measure of EI in the adolescent cohort. Further, based on the SSEI data EI was higher in adolescent females than adolescent males, which remained the case even after controlling for self-esteem and trait anxiety (Ciarrochi et al., 2001).
As previously outlined, the Swinburne University Emotional Intelligence Test (SUEIT) was initially developed as an adult measure by Palmer and Stough (Palmer & Stough, 2001c) based on a five-factor model. The SUEIT was subsequently revised and is currently entitled the Genos EI that is based on a seven-factor EI model, which is used in both research and commercial contexts (Palmer et al., 2009). The Swinburne University Emotional Intelligence Test Adolescent Version (SUEIT: A) (Palmer & Stough, 2001b) was also based upon the adult version of the SUEIT, which was subsequently modified to address the developmental and literacy levels requirements of the adolescences.

Luebbers, Downey and Stough (2007) evaluated the reliability and validity of the SUEIT: A with two studies. The first study, identified the qualitative changes and rewording of some items to address the developmental needs of the adolescent population. The second study, used a sample of high school students ($N = 1002$) consisting of 274 males and 728 females, aged 11–18 years, and examined the revised version of the SUEIT: A with a factor analysis to examined if the five-factor adult SUEIT model was applicable to the adolescent population and was therefore analysed for reliability and validity.

Luebbers et al. (2007) conducted a factor analysis of SUEIT: A data that resulted in a four-factor model. The four-factor model explained 30% of the variance in the model, with moderate to high reliability in the subscales. The four subscales included: understanding and analysing emotions; perception and expression of emotion; emotional management and control; and emotions direct cognition. Females scored higher on the Total AEI score and two subscales entitled understanding and analysing emotions, and perception and expression of emotions. Males scored higher on the subscales entitled emotional management and control and emotions direct cognition. There was a negative correlation between emotions direct cognition and emotional management and control. Luebbers et al. (2007) postulated that the negative relationship was reflective of the protracted development of emotional management and control in the adolescent population, which would consequently negatively impact on the utilisation of emotions direct cognition. Further, with the exception of emotional management and control, AEI abilities were positively related to age of the adolescents. The SUEIT: A total and subscores means were below the norms for the adult population, supporting the assertion
by Mayer et al., (1999) that EI was a developmental construct. Consequently, Luebbers et al. (2007) concluded that the SUEIT: A was a reliable and valid measure of AEI.

In sum, the overview of the ability and trait models and measures of CEI and AEI developed over the past 20 years illustrates the considerable progress made in developing psychometric assessment measures of EI in the childhood and adolescent population. As demonstrated, there is not a single, coherent model and measure of EI over the childhood and adolescent stage of development. Rather, there are a range of measures in both the ability and trait models of CEI and AEI, which had attained psychometric standards for reliability and validity. Further, the trait and ability psychometric models and measures of CEI and their subscales showed some similarities and overlap; however, both measures assessed differentiated aspects of CEI (Windingstad et al., 2011).

2.3.1.3 Limitation in AEI Models and Psychometric Measures: Stages of Childhood and Adolescent Development

The developmental research into AEI and CEI as outlined in Table 2.3 is reflective of 20 years of research (Mayer & Geher, 1996), therefore is a relatively new and emerging field of research. Further, a review of the CEI and AEI research presented found inconsistencies in the developmental classification of children and adolescents. The age ranges utilised to delineate the childhood and adolescent stages of development were not always consistent between the EI assessment measures.

For example, Rivers et al. (2012) noted the purpose of their research article was to outline preliminary evidence of the new assessment tool for “measuring emotion skills among adolescents”. The assessment tool was the MSCEIT: Youth Version, which was normed as a performance test of EI with reference to the findings from two studies. Study one was based on a cohort of students in Years Five to Eight, who ranged from 10 to 13 years of age (N = 756). Study two was based on a subgroup of the total cohort from study one, based on students who were in Years Five and Six (N = 273). Therefore, it would be presumed that the student cohort Rivers et al. (2012) selected in order to norm the MSCEIT: Youth Version who were aged between 10 years and 13 years of age were developmentally classified as adolescents. In contrast, Mavroveli et al. (2009) conducted research that affirmed the validity of the Trait Emotional Intelligence Questionnaire—
Child Form (TEIQue–CF) in a student cohort aged between 8 and 12 years of age, who were classified as children ($N = 140$). In addition, research by Billings et al. (2014) normed the Swinburne University Emotional Intelligence Test–Early Years (SUEIT: EY) with students aged between 9 and 13 years, who were classified as pre-adolescents ($N = 407$). These differences in the developmental classification of children and adolescents based on their chronological age presents a methodological problem associated to the validity of comparing research findings from a range of studies, which are based on variable definitions of the childhood and adolescent stage of development.

At this stage there is not a universally agreed upon definition of childhood or adolescence in research studies developing EI measures for these populations. Similar measurement issues have been identified when conducting research into childhood and adolescent emotions (Zeman, Klimes-Dougan, Cassano, & Adrian, 2007). Nonetheless, this lack of a clear terminological, conceptual and developmental framework to delineate EI with reference to the childhood and adolescent stages of development as theorised by Zeidner et al. (2003), was a methodological weakness (Tabachnick & Fidell, 2007) that created some uncertainty about which stage of development the CEI and AEI research data was actually referring to. Further, the variable definitions of developmental stages also raised the possibility that the predictive effect of EI could have been confounded (Field, 2009) by developmental differences in EI skills reflecting the passage of time in childhood and adolescent development. Therefore, future developmental research studies in EI may benefit from the inclusion of a universally accepted developmental framework, delineating individuals’ chronological ages in order to provide more clarity in the stages of childhood and adolescent development, which is formative to developing reliable and valid assessments of AEI and CEI.

Nonetheless, despite this limitation, the development of psychometrically reliable and valid ability and trait measures of CEI and AEI to date has enabled researchers to conduct studies to investigate the relationship between CEI and AEI with other formative predictors of childhood and adolescent development. For instance, an emerging body of research has been conducted on the relationship between AEI and academic achievement, which is the focus of the current study. Therefore, the following section of the literature
review will examine the relationship between AEI and adolescent development, particularly when AEI is measure by trait and ability measures of AEI.

2.3.2 AEI and Adolescent Development

Formative to the investigation of individual differences in the relationship of AEI and academic achievement is an understanding of AEI and adolescent development. Therein, the nature of AEI and academic achievement will be discussed with reference to the following points and relevant research findings.

- The formative biopsychosocial developmental maturation (Gemelli, 2013) in the three stages of adolescent development (Sawyer et al., 2012), which may differentiate the development of AEI (Zeidner et al., 2003), such as, the asynchronous maturational changes in the adolescent cognitive and emotional systems (Steinberg, 2011b), which are argued to impact on the development of AEI from the commencement to the completion of adolescence.

- The development of individual differences in students’ AEI skills, traits, ability, competency or capacity to effect important developmental outcomes, such as adolescent social competence and academic achievement (Gil-Olarte et al., 2006);

- The macro, organisational, and individual environmental contexts (Bronfenbrenner, 1977), in which adolescents experience differentiated academic demands and psychosocial demands in their learning environment (Bronfenbrenner, 1977) that may also influence their academic achievement. For example, the differentiated academic and psychosocial demands associated to the primary, secondary and tertiary educational systems.

There are a range of plausible processes and mechanisms that may influence the individual differences in the predictive effect of AEI in academic achievement. For instance, the predictive effect of AEI in academic achievement may be influenced by the process of the adolescents’ appraisal (Arnold, 1960b) of their developmental resources (encompassing their adolescent developmental stage, gender, skills in AEI and IQ), to
successfully or unsuccessfully, meet the academic and psychosocial demands of their educational environment. Further, the students’ appraisal may be understood relative to their Zone of Proximal Development (ZPD) (Vygotsky, 1978) and personal goals. Therein, the process and outcome of adolescents’ appraisal may stimulate a range of emotions that range from distress–stress–eustress (Lazarus, 1993b), which then partially effect the individual differences in the degree that AEI is directly utilised in academic achievement.

Childhood and adolescent biological development precedes cognitive development, social/emotional development and psychosocial development (Gluckman, Low, & Franko, 2011b). Accordingly, understanding the biological changes in adolescent cognitive development (Giedd et al., 1999), social/emotional development (Pfeifer & Blakemore, 2012) and psychosocial development (Cauffman & Steinberg, 2000) was argued to be formative to understanding the developmental nature of AEI, and subsequently, the utilisation of AEI in academic achievement. Therefore, the nature of adolescent development is considered with reference to the formative research presented by a range of researchers, such as Giedd et al. (1999).

Giedd et al. (1999) conducted a longitudinal MRI neuroimaging study (N = 145) of brain development during childhood and adolescence. The participants included 89 males and 56 females, who range in age from 4.2 years to 21.6 years. The results found a linear increase in white matter (a component of the central nervous system, which encompasses glial cells and myelinated axons that assist with the transmission of signals from one region to another) with age in the brain. The white matter increase from 4 years to 22 years was 12.4% and white matter increased less in females than in males. The development of white matter with age did not significantly differ in various lobes of the brain. In contrast to previous research findings, Giedd et al. (1999) also identified nonlinear changes that were regional specific in the gray (or grey) matter (a component of the central nervous system, which encompasses numerous neuronal cell bodies in addition to neuropil, glial cells, synapses and capillaries) of the brain in children and adolescents. First, gray matter in the frontal lobe of pre-adolescents increased to attain a maximum size at 11.0 years for females and 12.1 years for males. Subsequently, in post-adolescence there was a decline in gray matter volume across the age span. Second, the
gray matter in the parietal lobe had a similar pattern of development, with an increase in development throughout the pre-adolescent stage of development, to reach a maximum size at 10.2 years for females and 11.8 years for males. This increase in volume in the parietal lobe was subsequently followed by a decline in gray matter volume during post-adolescence (Giedd et al., 1999). Third, the gray matter in the temporal lobe also followed a similar nonlinear pattern. However, the maximum size in the temporal lobe was not attained until much later: 16.7 years for females and 16.5 years for males, followed by a slight decline thereafter. Fourth, there was a linear increase in the gray matter of the occipital lobe with age.

In addition, Giedd et al. (1999) noted the collective size of gray matter was 10% larger in males, while females’ gray matter reached an earlier peak size than males, which was consistent with the earlier onset of puberty in females. These findings provided evidence of the heterochronous development of gray matter in the cerebral cortex throughout the childhood and adolescent stages of development. The pre-adolescent growth in gray matter volume with age and the post-adolescent decrease in the volume of gray matter with age, was evidence of neurological growth and synaptic elimination or “synaptic pruning” that was regional-specific and differentiated by gender (Giedd et al., 1999). Blakemore (2013) also suggested that synaptic pruning in the adolescent stage of development may be partially influenced by environmental factors. For instance, adolescent neuronal circuitry could be influenced by changes in synaptic growth.

Furthermore, Blakemore (2013) asserted that changes in synaptic connections were partially influenced by the degree that synaptic connections were utilised or not utilised by the individual. The synaptic connections that were used were more likely to be strengthened and the synaptic connections not used were more likely to be eliminated or “pruned”. Further, Blakemore (2013) also noted that adolescence was a critical period for development of the frontal cortex, which is utilised in executive functions that include decision making, impulse control, self-regulation, social understanding and self-awareness. Blakemore (2013) examined the effect of self-reported cannabis use and changes in cognition (N = 1037) and concluded that the cognitive decline was greater in those who used cannabis before 18 years of age, when compared to those who used cannabis after 18 years of age. These results implied that adolescence was a particularly
sensitive period of neurological development that was malleable to environmental influences, such as the use of cannabis in adolescence (Blakemore, 2013).

In addition, Shaw et al. (2006) conducted a longitudinal study that investigated the relationship between general intellectual ability and the neuroanatomical changes in the cortical development of children and adolescents (N = 307). Each participant (3.8–29 years of age) completed one MRI scan, in which the thickness of the cortex throughout the entire cerebrum was measured using a fully automated technique (Shaw et al., 2006). In order to investigate the developmental changes in cortical development, Shaw et al. (2006) divided the cohort into four age groups entitled: Early childhood (3.8–8.4 years); late childhood (8.6–11.7 years); adolescence (11.8–16.9 years); and young adulthood (17–29 years). General intelligence was considered a relatively stable construct throughout the lifespan and was measured with age-appropriate versions of the Wechsler intelligence scales to determine the individuals’ IQ. Participants were categorised into three IQ groups: superior intelligence (IQ 121–149); high intelligence (IQ 109–120; and average intelligence (IQ 83–108) (Shaw et al., 2006).

A Pearson’s correlational between IQ and cortical thickness for the total cohort identified a modest positive correlation in the frontal, parietal and occipital cortex. However, further developmental patterns were identified when the cohort was divided by age. In the early childhood group, a negative correlation was identified between IQ and cortical thickness; therefore, as IQ increased so too did their cortical thickness (Shaw et al., 2006). In contrast, in the late childhood group a positive correlation was identified between IQ and cortical thickness, which peaked in the late childhood stage. The positive correlation continued in the adolescent and young adult groups at an attenuated rate. These changes were particularly significant throughout the prefrontal cortex and the superior/middle temporal gyri (Shaw et al., 2006).

A regression analysis found a significant interaction effect between IQ and age in the prefrontal cortex, indicating that the relationship between IQ and cortical thickness varied with age. An examination of the three IQ groups found maximal cortical thickness differed for each group. The maximal cortical thickness peaked in the average group at 5.6 years, the high group at 8.5 years, and the superior group at 11.2 years. Shaw et al. (2006) also compared the development of cortical thickness in the average and superior
IQ groups with \( t \)-test statistics. As illustrated in Figure 2.7, Shaw et al. (2006, p. 678) found the superior group had a thinner prefrontal cortex in early childhood than the average group. The superior group then showed a gradual increase in cortical thickness, which peaked at 13 years of age, and subsequently decreased in late adolescence.

*Figure 2.2 Cortical Thicknesses Between the Superior and Average IQ Groups (7 to 16 years of age) by Shaw et al. (2006)*

Shaw et al. (2006, p. 678) provided images of the cortical thicknesses between the superior and average IQ groups, calculated by \( t \)-test statistics (\( t > 2.6 \)), as outlined in Figure 2.7. Hence, collectively the results presented by Shaw et al. (2006) provided evidence of the pattern of cortical growth over the childhood and adolescent stage of development, which was dynamically related to the interaction between age and the individual’s level of intelligence. Activation in the prefrontal cortex was highly correlated and intelligence. In the prefrontal cortex, there were significant changes in the cortical growth in the childhood and adolescent stages of development. Further, the prefrontal
cortex had a protracted rate of biological (structural and metabolic) maturation, which was further elongated in the superior IQ group (Shaw et al., 2006).

Cauffman and Steinberg (2000) suggested that both cognitive and psychosocial (involving both psychological, emotional and social) factors influence adolescent judgment and consequently, adolescent behaviour. Cauffman and Steinberg (2000) conducted research in a cohort ($N = 1000$) to determine the differences between adolescent and adult judgement, the participants in the study ranged in age from 12–48 years. Judgement was examined with reference to three sub-factors: responsibility, perspective, and temperance. Measures of psychosocial competence and hypothetical decision making problems, including risky and anti-social behaviour, were compared. The first finding by Cauffman and Steinberg (2000) confirmed adults made more socially responsible decisions than adolescents. However, the second finding confirmed that regardless of age, those with higher scores for responsibility, perspective and temperance displayed more mature decision making than those with lower scores. The third finding indicated that there were notable individual differences in adolescent decision making within each adolescent age group, reflecting stratifications in the maturation of the three psychosocial factors previously outlined, namely responsibility, perspective, and temperance (Cauffman & Steinberg, 2000).

The findings presented by Cauffman and Steinberg (2000) suggested that adolescent psychosocial developmental capacity, which was encompassed in judgment and decision making, did not reach maturity until the individual was approximately 19 to 20 years of age. Therefore, while the onset of puberty was associated with biological maturation, adolescents’ psychosocial development underwent a comparatively slower and protracted development and was relatively immature in comparison to adults. Hence, the findings suggested adolescents’ immature psychosocial development influenced their capacity to make decisions and judgments regarding at-risk or anti-social behaviour (Cauffman & Steinberg, 2000).

Steinberg (2011b) noted that adolescence was a transitional period of “physical, intellectual, emotional and social development”, whereby the brain was subject to structural (anatomical) and functional (metabolic) maturational changes that was differentiated from both the childhood and adult populations. The adolescent period of
development commenced with the onset of puberty, which was associated with hormonal and chemical changes that contributed to the stimulation of formative and regional specific neurological changes. For instance, the adolescent stage of development encompassed asynchronous regional specific neurological maturation in the cognitive and emotional systems, which was evident from the commencement to the completion of the adolescent stage of development. In addition, the interconnections between various regions of the adolescent brain, such as the cognitive and the emotional systems, also underwent formative maturational changes, such as a period of synaptic growth followed by a period of decreased synaptic density, throughout the adolescent stage of development (Steinberg, 2011b).

Blakemore and Robbins (2012) asserted that adolescence was a period of development that was distinguished by the propensity of youth to make risky decisions. Based on evidence from neurological imaging research, the ventromedial prefrontal cortex and other related regions in the brain played a key role in adolescent decision making. In particular, adolescent decision making was influenced by the asynchronous maturation of the adolescent emotional systems and cognitive systems. The maturation of adolescent emotional system was more associated to the onset of puberty and was non-linear. In contrast, the maturation of the adolescent cognitive system was more closely associated to chronological age and had a linear and protracted maturational rate. The non-linear development of the emotional system was also associated to the reward system, which could be hyper-responsive during periods of emotional stimulation, for example when the adolescent was with their peers. The dissociation between the maturation of the comparatively slower linear development of impulse control and heightened response to reward stimuli was partially attributed to period increases in risk-taking activity and reduced inhibition during the adolescent period. Therefore, adolescent decision making was acutely modulated by emotional and social factors (Blakemore & Robbins, 2012). The structural and functional impact of the asynchronous maturation of the neurological systems that effect adolescent cognition and emotions are argued to be one of the unique adolescent developmental factors that impacts on the development of AEI (Zeidner et al., 2003).
2.3.3 AEI in Primary, Secondary and Tertiary Educational Systems

Based on the multi-dimensional model of EI outlined by Zeidner et al. (2003) the biopsychosocial developmental changes in the adolescent stage of development (Gemelli, 2013) are theorised to be formative to the development of AEI. Adolescence is the period of development that commences with the onset of puberty, and encompasses biological, cognitive, emotional and psychological changes. Adolescence concludes when the individual attains a stable and independent adult role in their society, which may differ in communities and nations (Gluckman et al., 2009; Resnick, Catalano, Sawyer, Viner, & Patton, 2012). Further, based on the ecological model of human development as outlined by Bronfenbrenner (1977) the growing adolescent develops and matures through progressive accommodations and adaptations, which are stimulated from interactions between the growing individual and their changing environments. Therefore, it is theoretically plausible that the predictive effect of AEI in academic achievement may also be influenced by the changing relationship between the growing adolescent and their primary, secondary and tertiary educational environments (Bronfenbrenner, 1977).

Previous research that has investigated the relationship between AEI and academic achievement has somewhat differed in the terminology utilised to developmentally describe or classify adolescents. As previously discussed, a review of the EI theories and measures utilised a range of definitions and chronological ages to developmentally classify the stages of childhood and adolescent growth. Further, few EI theories or models have made reference to the potential environmental differences in the primary, secondary and tertiary educational systems to differentiate the academic and psychosocial demands on learning and, consequently to differentiate the relationship between AEI and academic achievement. In order to address these methodological limitations in previous research investigating the relationship between AEI and academic achievement, a framework for childhood and adolescent development is presented with reference to the related educational level in the kindergarten, primary, secondary and tertiary educational systems.

The current study defined childhood development (≈0–9 years) as encompassing four stages: Infancy (≈0–18 months), toddlerhood (≈18 months–3 years), early childhood
(≈3–5 years), and late childhood (≈6–9 years) (adapted from Gemelli, 2013). Further, in the current study adolescent development (≈10–24 years) was understood as encompassing three stages: Early adolescence (≈10–14 years), late adolescence (≈15–19 years) and young adulthood (≈20–24 years) (adapted from Gore et al., 2011; Sawyer et al., 2012). The changes in adolescent development were argued to have the potential to developmentally differentiate the construct of AEI (Zeidner et al., 2003). Furthermore, a review of the international educational models or systems designed for the childhood and adolescent populations in the OECD member countries included a range of educational models (OECD, 2014).

In reference to the current literature review, the educational model for children and adolescents that will now be discussed was based on in the Victorian educational system (OECD, 2013b; VCAA, 2010a). Moreover, Table 2.2 is provided in order to conceptualise the relationship between a model of: (a) childhood and adolescent development; and (b) an educational model that included kindergarten, primary school, secondary school and tertiary educational environments. The chronological age range associated with each educational level in the Victorian educational system is based on an average age range for that level of education (OECD, 2013b; VCAA, 2010a).

Table 2.2

Stages of Childhood and Adolescent Development and Australian Educational Levels: Framework for The Current Study

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<th>Childhood</th>
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<td>Childhood</td>
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<td></td>
<td>(9–10 yrs)</td>
</tr>
</tbody>
</table>

*Note.* Chronological ages and developmental stages in the childhood (adapted from Gemelli, 2013) and adolescence (adapted from Sawyer et al., 2012) populations are adapted for the scope of the current literature review and study. Further, the chronological ages associated to the educational framework were based on estimated average ranges from the Victorian, Australian Education System (OECD, 2013b; VCAA, 2010a). Terms: Adolescent Emotional Intelligence (AEI); Kindergarten (K); Kindergarten Three-Year-Old and Four-Year-Old; Primary School (Primary) Foundation Year to Year Six; Secondary School (Secondary) Year Seven to Twelve; and Tertiary Education (Tertiary) First Year to Seventh Year.

Therein, Table 2.2 outlines the childhood and adolescent stages of development referred to in the current study in relation to the kindergarten, primary, secondary and tertiary educational systems in Victoria, Australia. A review of Table 2.2 illustrates complexity in the overlap of the childhood (adapted from Gemelli, 2013) and adolescent developmental stages (adapted from Sawyer et al., 2012) and the primary, secondary and tertiary structure of the Victorian educational system (OECD, 2013b; VCAA, 2010a). Adolescent development currently spans over approximately 14 years, commencing at approximately 10 years of age and concluding at approximately 24 years of age (Gore et al., 2011; Sawyer et al., 2012). Therefore, adolescent development (Sawyer et al., 2012), which now commences earlier and is completed later than previous generations.
(Gluckman et al., 2009), spans across the primary, secondary and tertiary educational systems in Victoria, Australia. In addition, it is also acknowledged that: (a) there are a wide range of developmental models that define and categorise the adolescent stage of development; (b) the individual differences in the onset of puberty and completion of adolescence can vary widely; (c) the onset of puberty typically occurs one or two years earlier in females than in males; and (d) the hormonal and chemical changes associated with the onset of puberty are differentiated in males and females (Gemelli, 2013; Gluckman et al., 2009; Sawyer et al., 2012; UNICEF, 2012; WHO, 2014, 2015). Further, the onset of puberty was considered to be a more accurate indicator of the commencement of adolescence than an individual’s chronological age (Burnett, Thompson, Bird, & Blakemore, 2011; Gemelli, 2013). Nevertheless, in the current literature review of research investigating the relationship of AEI and academic achievement, few research studies have identified the onset of puberty. Rather, the majority of research studies have made reference to the participants’ age, stage of development or Year level.

As outlined in Table 2.2, there is a changing relationship between the three stages of adolescent development and the academic and psychosocial demands of the three educational systems in Victoria, Australia. Early adolescence starts in primary school at Year Five. During early adolescence the transition into secondary school also takes place, with secondary school commencing at Year Seven when the student is in the early stage of adolescent development. In Year 10, students are anticipated to commence the late stage of adolescent development. The stage of late adolescence includes a period associated with comparatively increased risk-taking behaviours (Steinberg & Cauffman, 1996). Students in Year 12 are scheduled to complete their final year of secondary school in Victoria, Australia. Therefore, Year 12 is referred to as a transitional year as students prepare to make their transition from their secondary school education into tertiary study, employment (OECD, 2013b) or to take a GAP Year (sabbatical year) in order to work or travel, prior to tertiary study. Therein, Year 12 academic achievement scores were one of the key prerequisites for entry into tertiary study and employment (OECD, 2013b). The third stage of adolescence, entitled young adulthood commenced at approximately 20 years of age when it was anticipated that a number of adolescents would be in their third
year of tertiary study or employment (OECD, 2013b). The adolescent stage of young adulthood was deemed to reach completion when the young adult was accepted into an adult role of employment in their society, which was estimated to be at approximately 25 years of age (Sawyer et al., 2012).

The academic and psychosocial demands associated to the primary, secondary and tertiary educational systems are acknowledged to gradually increase in academic rigor and also increase in the need for students to learn more independently and take more responsibility for their own learning (OECD, 2013b). Therefore, the adolescent developmental characteristics and the academic and psychosocial demands associated to the primary, secondary and tertiary educational environments as the individual matures from 10 years of age to 24 years of age, include formative developmental and environmental changes (Bronfenbrenner, 1977), which have the potential to differentiate the development of AEI and the degree that AEI is utilised in academic achievement (Zeidner et al., 2003). Hence, an examination of Table 2.2 led to the assertion that individual differences in the relationship of AEI and academic achievement may be more effectively researched and analysed with specific reference to the nature of AEI and academic achievement in the primary, secondary and tertiary educational systems (Bronfenbrenner, 1977).

Therefore, in order to further refine and direct the scope of the current literature review, research studies that have investigated the role of AEI in the academic achievement of adolescents who were in early adolescence (≈10–14 years) and late adolescence (≈15–19 years) (Sawyer et al., 2012), while attending secondary school (Year 7–12) will now be considered. By focusing on the relationship between AEI and academic achievement in one educational environment—the secondary school environment, it was anticipated the impact of environmental differences in the academic and psychosocial school demands on the students’ AEI would be reduced (Bronfenbrenner, 1977). This literature review will now examine and analyse the study findings generated from the previous research into the relationship between AEI and academic achievement.
2.3.4 Relationship Between AEI, IQ and Gender in Academic Achievement

A review of the literature pertaining to the relationship between AEI, IQ and gender for and academic achievement with a focus on secondary school students, will be outlined. The objective of this literature review was to provide information regarding the theoretical, developmental and psychometric nature of the relationship between AEI and academic achievement. First, this section of the literature review sought to determine if AEI was directly or indirectly related to academic achievement. Second, this section of the literature review sought to determine if and what gender differences were evident in AEI. Third, this section of the literature review sought to determine if AEI was positively predictive of academic achievement, beyond the effect of IQ. Fourth, the review sought to determine if there were individual differences in the nature of the relationship between AEI and academic achievement. Further, to determine if the relationship between AEI and academic achievement was influenced by developmental differences in adolescent IQ and gender. The major findings of this literature review will be analysed in order to identify the key research issues, areas of unique importance to the adolescent population, and limitations in the current research that warranted further research. This literature review will then inform the aims, methodology and research design of the current study, which seeks to determine the effect of AEI in academic achievement for secondary school students.

In order to achieve these goals the primary sources of information for this literature review were selected if they met the following criteria: (a) investigated the relationship between AEI and academic achievement; (b) were published in a peer-reviewed journal or an academic publication; (c) utilised a psychodynamic model, developmental model or psychometric measure of AEI; (d) targeted adolescents in the early or late stage of adolescent development (Sawyer et al., 2012); and (e) included adolescents that were attending secondary school. The secondary sources of information for this literature review included research that pertains to the childhood and adult populations. The research pertaining to EI in childhood development is considered to be formative to EI in adolescent development. Further, while adolescents in tertiary education face differentiated developmental and educational challenges to secondary
school students, the extensive body of research conducted in university students provides empirical research findings that also inform the current study of adolescents in secondary school.

For instance, research by Parker, Hogan, Eastabrook, Oke, and Wood (2006) examined the relationship between EI and academic retention in first year university students. The EI of a group of students who withdrew from university before their second year of study ($n = 213$) was compared to a matched group of students ($n = 213$) (based on the cohort’s gender, age and ethnicity), who continued with their studies in the second year of university. In the first year of the participants’ university studies, their EI was measured with the Emotional Intelligence Inventory – Short Form (EQ-i:Short) by Bar-On (2002). The results of the ANOVA analysis found the students who continued with their studies had a higher EI total score ($\eta^2 = .05$) when compared to those that withdrew. Further, those who continued their studies also had higher scores for the EI traits of: Intrapersonal ($\eta^2 = .01$), interpersonal ($\eta^2 = .02$), adaptability ($\eta^2 = .02$) and stress management ($\eta^2 = .04$). Therein, Parker et al. (2006) noted the students who continued with their studies had higher EI skills than those who withdrew and could plausibly cope more effectively with the stress associated to completing the first year of university studies. Hence, research investigating the relationship between EI, academic achievement and other measures of success (i.e. academic retention) in children, young adulthood and adults will also be discussed where relevant.

Therein, the systematic selection and the review of the research literature investigating AEI and academic achievement has been chronologically arranged in Table 2.3 ($N = 25$). The findings from the studies included in Table 2.3 will be analysed and discussed with reference to the developmental and educational framework previously outlined in Table 2.2. An overview of research exploring AEI, IQ and gender in academic achievement in secondary school students is presented in Table 2.3. The research outlined also encompasses a range of AEI models (trait and ability models), AEI measures (self-report, other-report, and ability measures), academic achievement measures (standardised and non-standardised), research methods, and the inclusion of other variables such as intelligence (single factor to multiple factor models) and gender. The Table 2.3 includes the following categories: the author and publication year; a description of the cohort; the
AEI measure(s) utilised, the measure of academic achievement and other variables utilised; and the study results with reference to the method of statistical analysis and significant findings. The information presented in Table 2.3 is not intended to provide a full summary of each study; rather, the most relevant information and key findings are highlighted with reference to the relationship of AEI and academic achievement.
Table 2.3

Representative Sample of Research Studies Investigating AEI, IQ and Gender in Academic Achievement: In Early/Late Adolescent Development

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>N</th>
<th>AEI Measure (Trait/Ability)</th>
<th>Academic Measure &amp; Other</th>
<th>Results: Major Statistical Analysis and Key Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Woitaszewski</td>
<td>2000</td>
<td>N = 39</td>
<td>MEIS - A (Ability)</td>
<td>GPA</td>
<td>Hierarchical Multiple Regression controlling for IQ $r$ = .0037; indicating GPA not predicted by the MEIS-A.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gifted Students</td>
<td>Year 11 &amp; 12 (15–18 yrs)</td>
<td>IQ</td>
<td></td>
</tr>
<tr>
<td>Fannin</td>
<td>2001</td>
<td>N = 115</td>
<td>AMEIS (Research Version) (Ability)</td>
<td>Terra Nova Academic Achievement Test</td>
<td>AEI had a low to moderate correlation with analytic intelligence or IQ.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(13–14 yrs)</td>
<td>IQ = Adolescent (Ability)</td>
<td>Multifactor Intelligence</td>
<td>AEI was found to significantly correlate with GPA and achievement test scores.</td>
</tr>
</tbody>
</table>
Analytic intelligence was a better predictor of GPA and test scores than AEI.

Stottlemyer  
2002  
*N = 200*  
Year 11 & 12  
Three Secondary Schools  
South Texas, USA.

Factor Analysis analysed AEI measure. Pearson correlation and multiple regression examined AEI and academic achievement. In the total group, AEI was predictive of academic achievement (reading & personal dissatisfaction \( r = -.13 \)).

Gender difference in AEI may influence differences in academic achievement. The results for each sub group differed according to gender, ethnicity & socioeconomic status.

Resilience of students who succeed despite environmental and economic deficiencies may also be related to AEI. Interpersonal communication skills were significantly related to academic achievement.

Parker, Creque,  
*N = 667*  
EQ-i: YV  
GPA

Latent Variable Path Model: AEI and academic
<table>
<thead>
<tr>
<th>Study</th>
<th>Sample Size</th>
<th>Year</th>
<th>Age Range</th>
<th>Location</th>
<th>Measure Type</th>
<th>Measure Details</th>
<th>Findings/Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barnhart, Harris, Majeski, Wood, Bond &amp; Hogan 2004</td>
<td>Years 9 to 12 (14–18 yrs)</td>
<td>Alabama, USA.</td>
<td></td>
<td>Trait</td>
<td></td>
<td>Total sample $r = .41$; Low to moderate correlations found for EQ-i variables intrapersonal: $r = .44$; interpersonal $r = .76$; stress management $r = .55$; and adaptability $r = .67$. Higher levels of AEI (interpersonal, adaptability and stress management) were associated with higher academic achievement.</td>
<td></td>
</tr>
<tr>
<td>Petrides, Frederickson &amp; Furnham 2004</td>
<td>$N = 650$</td>
<td>Year 11</td>
<td>Final compulsory year of British Secondary School $(M_{age} = 16.5)$</td>
<td>England, United</td>
<td>TEIQ</td>
<td>Standardised Score: General Certificate of Secondary Education (GCSE) and Key Stage 3 Assessment (KS3)</td>
<td>Structural equation model: IQ and AEI exogenous variables; KS3 and GCSE endogenous variables. Model found AEI had a negative path to KS3 and positive non-significant paths to GCSE: IQ accounted for 84% of the variance in KS3 and 76% in GCSE. Regression Analysis: IQ, AEI and academic performance. Maths and Science non-significant. Interaction IQ $\times$ AEI, English $R^2 = .66$ and GCSE $R^2 = .53$. ANOVA: Low IQ/Low AEI; High IQ/ Low AEI; Low</td>
</tr>
</tbody>
</table>
Kingdom. IQ/High AEI; High IQ/High AEI groups. High AEI was more important for Low IQ students.

Hierarchical Regression: AEI negatively associated with deviant school behaviours (unauthorised absences \( r = .17 \) or being expelled, 10 out of 12 of these students had low AEI).

<table>
<thead>
<tr>
<th>Author</th>
<th>N</th>
<th>Instrument</th>
<th>School Success:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chong Abdullah, Elias, Mahyuddin &amp; Uli</td>
<td>205</td>
<td>MEIS: A (Ability) Mid-term Examination Results Negative Academic Affect Scale (NAAS) Academic Competency Scale (ACS)</td>
<td>Linear negative relationship between students' level of Emotional Intelligence Quotient (EQ) and examination scores ( r = .18 ), and negative affect (NAAS) towards school tasks ( r = -.13 ). Correlations between negative academic affect and examination scores ( r = -.17 ). Results showed positive linear relationship between EQ and academic achievement, as well as the level of negative affect. Gender differences in EQ: Positive low correlation between genders with females scoring higher levels of EQ than males.</td>
</tr>
<tr>
<td>Gerber</td>
<td>51</td>
<td>EQ-i: YV</td>
<td>School Success: achievement scores, No conclusive evidence of a relationship between AEI and success in school. Students with average to above average</td>
</tr>
<tr>
<td>Year</td>
<td>N = 19</td>
<td>Females, n = 10</td>
<td>Males, n = 9</td>
</tr>
<tr>
<td>------</td>
<td>--------</td>
<td>----------------</td>
<td>--------------</td>
</tr>
<tr>
<td>2004</td>
<td>EQ-i</td>
<td>Multidimensional Anxiety Scale for Children (MASC)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Perceived Stress Scale</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wide Range Achievement Test: Reading, Spelling &amp; Arithmetic</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stroop Colour–Word Interference Test</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rey Auditory Verbal Learning Test</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>IQ = WAIS-R: Digit</td>
<td></td>
</tr>
</tbody>
</table>
Span & Digit Symbol displaying significantly higher adaptability scores than those with “no family history” of substance abuse.

Bar-On Total Emotional Quotient: A significant effect of time, $F(1,14) = 5.45, p < .05$, which interacted with sex, $F(1,14) = 7.24, p < .02$. Only females declined significantly with time.

| Menzie | N = 57 | EQ-i: YV (Trait) | GPA | Achenbach Youth Self-Report
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>(11–14 yrs)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Negative correlations between EQ-i: YV and the Achenbach Youth Version clinical scales.

Positive correlations between the EQ-i: YV and the academic and social competency scales of the Achenbach Youth Version clinical scales.

Findings indicated a relationship existed between school problems, school success, psychological wellbeing and AEI.

Stepwise Regression: Adaptability and stress management scales of the EQ-i: YV and the attention problems scale of the YSR, which may incorporate skills of self-management and impulse control, were predictive of academic
performance. Findings support the view that there was a relationship between social–emotional factors and academic performance, with the EQ-i: YV adding a dimension to understanding social competence not covered by the Achenbach scales.

<table>
<thead>
<tr>
<th>Study</th>
<th>Sample Size</th>
<th>Measures</th>
<th>Findings</th>
</tr>
</thead>
</table>
| Szuberla  
2006 | $N = 61$ | Intermediate Elementary Students (10–13 yrs) Alaska | MSCEIT: YV (Ability) Terra Nova Academic Achievement Test School success: Discipline referrals |
<p>| | | | Findings indicated a statistically significant relationship between AEI and school performance: Understanding emotions correlated with Reading (41%), Language (30%) and Mathematics (23%). Managing emotions correlated with Reading. Correlation between Terra Nova total and AEI. Multivariate Regression analysis did not have any significant interactions among the study variables. |
| Mestre, Guil, Lopes, Salovey &amp; Gil-Olarte | $N = 127$ | High School enrolled in two Spanish version (Designed for 17 years+) | GPA IQ: Inteligencia General Factorial (IGF) |
| | | | Findings provided partial support for the hypothesis that AEI abilities were associated with indicators of social and academic adaptation to school. MSCEIT four subscales aggregated into two areas entitled: |</p>
<table>
<thead>
<tr>
<th>Year</th>
<th>Duration</th>
<th>Location</th>
<th>Measure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>consecutive years (14–17 yrs)</td>
<td>Spain</td>
<td>SSREI Spanish adaptation 1999</td>
<td>of SSRI (Ability) and Trait (Trait)</td>
</tr>
<tr>
<td>2006</td>
<td>N = 77</td>
<td>High School</td>
<td>MSCEIT: V 2.0 Spanish version (Designed for 17 years+)</td>
<td>GPA and IQ</td>
</tr>
</tbody>
</table>
Spain

Tapia & Marsh 2006  
College Preparatory School (Ability)  
Bilingual Students (16–19 yrs)  

EII based on Salovey & Mayer EI model. Factor analysis identified four factors: Empathy, utilisation of feelings, handling relationships and self-control.

General linear analysis: Significant differences in empathy for gender, and self-control for GPA.

Interaction effect between gender and GPA was significant due to handling relationships for males but not for females.

Females scored higher than males in empathy.

Mexico

Downey, Moutstephen, Lloyd, Hansen & Stough 2008  
SUEIT: A (Trait)  
Australia (7–11 yrs)  

ANOVAs indicated academic success associated with Total EI $r = .15$ and emotional management and control $r = .15$.

Gender: Females scored higher than males on Total AEI, emotional recognition and expression and understanding emotions.
Mavroveli, Petrides, Shove & Whitehead 2008

Study One: TEIQue–CF

- N = 139
- ($M_{\text{age}} = 11.2$)

Study Two:

- N = 188
- ($M_{\text{age}} = 10.1$)

Regression Analysis: Emotional management and control for Maths $r = .06$ and Science $r = .04$; and understanding emotions for Art $r = .12$

Study One: Found no differences in male and female trait EI scores. Total cohort AEI correlated to Spelling $r = .28$. However, no significant relationship between trait AEI and academic performance in Mathematics, English or Reading identified. Further, the results of gender specific analyses indicated a positive relationship between AEI and scores in Mathematics and Spelling for males. However, when verbal intelligence was controlled for the correlation between AEI and Mathematics became insignificant; nonetheless, the scores for Spelling in the total cohort and the in the male cohort remained significant.

Study Two: Teacher rated behaviour scores were positively associated to positive behaviour in students. In addition, teacher rated behaviour scores were negatively associated to negative behaviours in students. Lower trait EI scores were associated to students with unauthorised absences or school exclusion.
| Peters, Kranzler & Rossen 2009 | N = 50 | MSCEIT: YV Ability | IQ = Woodcock Johnson Test of Cognitive Ability | An overview of some significant correlational analysis ($p < .05$) are listed: EI and SAT Reading $r = .62$; EI and discipline referrals after controlling for “g” $r = -.47$; EI and chronological age in months $r = .46$; EI and IQ $r = .35$; EI and task emotion coping $r = -.46$; MSCEIT: YV EI and Bar-On TEi: YV total scores $r = .42$. The research was based on a relatively small cohort and only used correlational analysis. Findings based on $n = 29$, indicated that emotion oriented coping was associated to EI, which offered support for the contention that EI was utilised in stressful situations. |
|---|---|---|---|---|---|
| $n = 29$ for coping correlations (for students 13 years of age and above) | Years 4–12 (10–18 yrs) | WJ-III Tests of Achievement: Broad Maths and Reading Subscales | Coping Inventory for Stressful Situations | Reported discipline issues | Chronological age | |
| Canada | | | | | | |
Hassan, Sulaiman & Ishak 2009

N = 223
Form 1 and 4 (Trait) (13–16 yrs)
Rural Malaysia

SSRI Trait GPA

AEI mean scores of females higher than males

Correlations: AEI and anxiety $r = -0.70$; AEI and academic achievement $r = 0.78$

Hogan 2009

Study One
N = 192
Study Two
N = 44
Study Two including 22 students with Learning Disability (LD)

Bar-On EQi: YV GPA = Year 10 IQ = Canadian Cognitive Abilities Test: Verbal IQ

Path analyses examined relationship between verbal IQ, AEI, peer social support and family social support with GPA. AEI partially mediated the relationship between IQ and GPA in male but not female adolescent students.

Series of hierarchical regressions: Examined the EQi: YV subscales and IQ on GPA.

Those with a Learning Disability (LD) had lower AEI scores than those without a LD. AEI was not a significant factor in the academic achievement of those with the LD. However, AEI was a significant factor in the academic achievement of the females.
<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>Sample Size</th>
<th>Measure 1</th>
<th>Measure 2</th>
<th>Measure 3</th>
<th>Measure 4</th>
<th>Methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Di Fabio &amp; Palazzeschi 2009</td>
<td>Year 10</td>
<td>$N = 124$</td>
<td>MSCEIT (Ability)</td>
<td>GPA</td>
<td>IQ = Raven’s Advanced Progressive Matrices</td>
<td>Bar-On EQ-i:S (Trait)</td>
<td>Hierarchical regression: First step $gf$ accounted for 10% of variance in scholastic success; Second step personality added 5% variability; Third step MSCEIT added 7% variability; Bar-On EQ-i:S added 6% variability.</td>
</tr>
<tr>
<td>Mavroveli &amp; Sánchez-Ruiz 2011</td>
<td>Year 10</td>
<td>$N = 565$</td>
<td>TEIQue-CF Trait</td>
<td>Student grouped:</td>
<td>With and without special education needs (SEN).</td>
<td>Relationship between EI and academic achievement $r = .26$</td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Relationship between EI and school outcomes: Reading, Writing, Mathematics, peer-rated behaviours, social competence and bullying. Investigated students with and without special education needs (SEN).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Relationship between EI and academic performance was modest in students.</td>
</tr>
<tr>
<td>Study</td>
<td>Sample Size</td>
<td>Year</td>
<td>School</td>
<td>Trait</td>
<td>GPA</td>
<td>Long-term Effects</td>
<td>Univariate and Bivariate Statistical Analysis</td>
</tr>
<tr>
<td>-------</td>
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<td>------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Joibari &amp; Mohammadtaheri (2011)</td>
<td>N = 380</td>
<td>2011</td>
<td>Tehran High School</td>
<td>Trait</td>
<td>GPA</td>
<td>Correlation of AEI and academic achievement $r = .88, p = 0.01$.</td>
<td>Aimed to assess the role of ability emotional intelligence, trait emotional intelligence, gender, personality and academic success in British secondary schools: A five-year longitudinal study.</td>
</tr>
<tr>
<td>Qualter, Gardner, Pope, Hutchinson &amp; Whiteley (2012)</td>
<td>N = 413 ($M_{age} = 15.10$ yrs)</td>
<td>2012</td>
<td></td>
<td>Ability AEI: MSCEIT: YV</td>
<td>IQ = Cognitive Ability Test (CAT) 3rd Edition</td>
<td>Gender differences found whereby adolescent females had higher scores than males in: ability AEI, two subsets of trait AEI (intrapersonal and interpersonal traits), GCSE for English Language and English Literature. Adolescent females also had significantly higher self-report neuroticism than adolescent males.</td>
<td>Gender differences found whereby adolescent females had higher scores than males in: ability AEI, two subsets of trait AEI (intrapersonal and interpersonal traits), GCSE for English Language and English Literature. Adolescent females also had significantly higher self-report neuroticism than adolescent males.</td>
</tr>
</tbody>
</table>
Ability AEI and Trait AEI were moderately correlated. Five correlations were found in the females and six correlations in the males, with statistically significant $r$'s ranging from $r = -0.15$ to $r = 0.29$.

SEM: In the male adolescent group Year 7 ability AEI had direct effect on academic achievement and moderated the effect of IQ on academic performance in Year 11. Trait AEI had a small direct effect on academic achievement and moderated the effect of ability AEI on cognitive ability and subsequently academic achievement.

SEM: In the female adolescent group Year 7 ability AEI had direct effect on academic achievement and moderated the effect of IQ on academic performance in Year 11. Trait AEI did not have a direct or moderating effect on academic achievement in the female cohort.

<p>| Lawler 2012 | $N = 120$ | Assessing Emotions Scale (Schutte et al., Emotional Self-Efficacy) | GPA = GCSE Exam Results | Bivariate and multivariate analyses. Correlation analysis found Openness, Conscientiousness, Emotional Self-Efficacy (ESE) and Academic Self-Efficacy (ASE) |</p>
<table>
<thead>
<tr>
<th>School</th>
<th>1998)</th>
<th>Scale (ESE)</th>
<th>positively associated with GPA.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Merseyside, England</td>
<td></td>
<td>Personality: IPIP Big</td>
<td>Hierarchical regression: best predictor of grades was Agreeableness.</td>
</tr>
<tr>
<td>Trait Meta-Mood Scale</td>
<td></td>
<td>Five - Fifty Items</td>
<td></td>
</tr>
<tr>
<td>(Salovey et al., 1995)</td>
<td></td>
<td>Academic Self-Efficacy</td>
<td></td>
</tr>
<tr>
<td></td>
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<td>(ASE)</td>
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<tr>
<td>Absenteeism</td>
<td></td>
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<tr>
<td>Costa &amp; Faria</td>
<td>N = 380</td>
<td>Self-Report:</td>
<td>Three-wave longitudinal study, conducted over a three-year period for students in Year 10, 11 and 12.</td>
</tr>
<tr>
<td>2015</td>
<td></td>
<td>Academic</td>
<td>Path analysis both measures of AEI predicted academic achievement, highest predictive effect of Year 10 secondary students.</td>
</tr>
<tr>
<td></td>
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<td>Achievement:</td>
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<tr>
<td></td>
<td></td>
<td>(a) GPA,</td>
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<tr>
<td></td>
<td></td>
<td>(b) Portuguese Language,</td>
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<td></td>
<td></td>
<td>(c) &amp; Mathematics.</td>
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<tr>
<td></td>
<td></td>
<td>Collected from school at end of each year.</td>
<td>Performance measure of AEI (VET) was a stronger predictor of academic achievement than the self-report measure of AEI (ESCQ).</td>
</tr>
<tr>
<td>Secondary School Years 10, 11 &amp; 12</td>
<td></td>
<td>Vocabulary of Emotions</td>
<td>Multi-group analyses found some paths between GPA and AEI differed by gender and paths between Maths and AEI.</td>
</tr>
<tr>
<td>Portuguese</td>
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Andrei, Mancini, Mazzoni, Russo & Baldaro 2015

<table>
<thead>
<tr>
<th>School Type</th>
<th>N</th>
<th>TEIQue–CF</th>
<th>GPA</th>
<th>Personality: BFQ–C</th>
<th>IQ</th>
<th>Cognitive Ability: Raven’s Coloured Progressive Matrices</th>
<th>Classroom Social Status–Self and Other report of Acceptance/Rejection</th>
<th>Acceptance/Rejection</th>
</tr>
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<td>595</td>
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<td>(M&lt;sub&gt;avg&lt;/sub&gt; = 9.3 yrs)</td>
<td>376</td>
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<td>Italy</td>
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<tr>
<td>Secondary School/Early Adolescence:</td>
<td>202</td>
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<tr>
<td>(M&lt;sub&gt;avg&lt;/sub&gt; = 12 yrs)</td>
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</table>

Correlations: TEQue-CF as measure of AEI for primary and secondary students found:

- **AEI and Gender:** primary \( r = .19, p < .001 \); secondary \( r = .21, p < .001 \);
- **AEI and Energy:** primary \( r = .41, p < .001 \), secondary \( r = .35, p < .001 \);
- **AEI and Emotional Instability:** primary \( r = -.44, p < .001 \), secondary \( r = -.40, p < .001 \);
- **AEI and Agreeableness:** primary \( r = .44, p < .001 \), secondary \( r = .52, p < .001 \);
- **AEI and Openness:** primary \( r = .36, p < .001 \), secondary \( r = .44, p < .001 \);
- **AEI and Conscientiousness:** primary \( r = .41, p < .001 \), secondary \( r = .52, p < .001 \);
AEI and Self-Perceived Social Acceptance: primary $r = .10$, $p < .05$, secondary $r = .16$, $p < .05$;

AEI and Social Acceptance: primary $r = .16$, $p < .05$;

AEI and Social Rejection: primary $r = .14$, $p < .05$;

AEI and Maths: secondary $r = .30$, $p < .001$;

AEI and Language and Literature: primary $r = .10$, $p < .05$, secondary $r = .29$, $p < .001$.

Early adolescents: Gender moderated association of personality traits and trait EI with actual social status. Children: Gender moderated perceived social status. Total Cohort: Gender moderated effect of actual social status on scholastic achievement; female adolescents were more affected by poor peer acceptance.
Note. Adolescent Development: Approximate ages for Early Adolescent Development (± 10–14 years), Late Adolescent Development (± 15–19 years) and Young Adulthood (± 20–24 years) (Sawyer et al., 2012). Schutte Self-Report of Emotional Intelligence (SSRI); Mayer–Salovey–Caruso Emotional Intelligence Test (MSCEIT); Mayer–Salovey–Caruso Emotional Intelligence Test: Youth Version (MSCEIT: YV); Multifactor Emotional Intelligence Scale: Adolescent (MEIS: A); Bar-On Emotional Quotient Inventory: Youth Version (EQ-i:YV); Bar-On Emotional Quotient Inventory: Short Form (Bar-On EQ-i: S); Swinburne University Emotional Intelligence Test: Adolescent Version (SUEIT: A); Trait Emotional Intelligence Questionnaire (TEIQue); Trait Emotional Intelligence Questionnaire–Child Form (TEIQue-CF); Trait Emotional Intelligence (TEI); Exploring and Developing Emotional Intelligence Skills (EDEIS) Self-Report; Tapia Emotional Intelligence Inventory (EII); Woodcock–Johnson Tests of Cognitive Ability and Achievement 3rd Ed (WJ-III); Stanford Achievement Test Series (SAT); Wechsler Adult Intelligence Scale-Revised (WAIS-R); Big Five Questionnaire for Children (BFQ–C); and Grade Point Average (GPA).
As outlined in Table 2.3, a review of some quantitative research analysing the relationship between AEI, IQ and gender for academic achievement from 2000 to 2015 ($N = 25$), presented variable findings. First, a review of the 20 studies identified two studies that found the relationship between AEI and academic achievement was not statistically significant (Gerber, 2004; Woitaszewski, 2000). Second, three studies showed partial support for the relationship between AEI and academic achievement (Mavroveli et al., 2008; Mavroveli & Sánchez-Ruiz, 2011; Mestre, Guil, Lopes, Salovey, & Gil-Olarte, 2006). Third, as outlined in Table 2.3, 20 of the 25 reviewed studies found AEI positively related to academic achievement, directly or indirectly. The relationship between AEI and academic achievement in the 20 studies varied widely, for instance, correlational relationships and ranged from $r = .15, p < 0.05$ (Downey, Mountstephen, et al., 2008) to $r = .88, p < 0.05$ (Joibari & Mohammadtaheri, 2011); however, the majority of studies found AEI had a low to moderate correlatively relationship with academic achievement.

The low to moderate correlational relationship between AEI and academic achievement found in 20 of the 25 studies presented in Table 2.3, was consistent with the findings from the meta-analysis of trait EI and academic achievement conducted by Perera and DiGiacomo (2013). The meta-analysis investigated the relationship between EI and academic achievement in 48 samples, which included students in primary, secondary and tertiary education (Perera & DiGiacomo, 2013). The results of the meta-analysis found a modest to moderate correlative relationship between EI and academic achievement ($r = .20, 95\%, CI = .16–.24$) (Perera & DiGiacomo, 2013). Further, the variance and range of study results identified in the 25 studies outlined in Table 2.3 were anticipated to partially reflect the variance and range of: study designs, cohorts, AEI measures, academic achievement measures and psychometric analyses utilised in the research studies outlined (Field, 2009). Nonetheless, despite the variance in theoretical, methodological and psychometric analyses conducted in the 25 studies outlined, collectively the mixed research findings presented provided evidence to demonstrate that the relationship between AEI and academic achievement warranted further discussion and analysis.

Consequently, this literature review will discuss the research findings outlined in Table 2.3 in more detail. The 25 studies were organised into three categories to frame the discussion. The three groups were classified based on three predictive variables that were the focus of this study (AEI, IQ and gender). Hence, the three groups were entitled:
• AEI and academic achievement;
• AEI, gender and academic achievement; and
• AEI, IQ and academic achievement.

2.3.5 AEI and Academic Achievement
Research investigating the relationship between AEI and academic achievement has not reached the point of being able to definitively ascertain all the mechanisms that underlie that relationship (Matthews, Zeidner, et al., 2004). Nonetheless, Parker et al. (2009) suggested that there might be both direct and indirect relationship between EI and academic achievement. Therefore, the research examining the relationship between AEI and academic achievement is considered from two perspectives: First, in view of the potential for AEI to indirectly effect the relationship between AEI and academic achievement. Second, in view of AEI to directly affect academic achievement (Parker et al., 2009).

2.3.5.1 Indirect Relationships of AEI to Academic Achievement
First, AEI may have indirectly influenced academic achievement by acting as an antecedent to the subsequent direct utilisation of AEI in academic achievement or by effecting other variables such as IQ (Petrides et al., 2004) or psychological adjustment (Perera & DiGiacomo, 2015), which subsequently impacted upon the predictive effect of AEI in academic achievement. For example, Perera and DiGiacomo (2015) investigated the direct and indirect relationship between trait EI (TEIQue–SF) and academic performance as measured by their Semester One GPA, in freshman university students ($N = 470$). The Australian university students ($M_{age} = 17.7$) were in the late stage of adolescent development and were making their transition from secondary education into tertiary education. The findings from the structural equation modelling confirmed that the first year students’ academic performance was indirectly influenced by trait EI. The results found trait EI directly predicted perceived social support and the greater use of engagement coping strategies, which then predicted academic performance (Perera & DiGiacomo, 2015). Further, mediation analyses illustrated that trait EI was indirectly associated with academic adjustment through: (a) engagement coping; (b) psychological adjustment via engagement coping; and (c) perceived social support (Perera & DiGiacomo, 2015). Therefore, research by Perera and DiGiacomo (2015) provided
research evidence that confirmed AEI could indirectly influence academic achievement in a range of ways.

Petrides, Frederickson and Furnham (2004) investigated the relationship of AEI as measured by the Trait Emotional Intelligence Questionnaire (TEIQue) in secondary school students ($N = 650; M_{age} = 16; \text{Year 11}$), from two perspectives. First, the relationship between AEI and adolescent deviate behaviour was investigated. The results confirmed there was a direct relationship between low AEI and deviate behaviour. Second, Petrides et al. (2004) investigated the relationship between AEI and the variables academic achievement and IQ($gc$). A series of moderated multiple regressions were conducted with IQ ($gc$) and AEI for English, Mathematics, Science, and the General Certificate of Secondary Education (GCSE), which was the school assessment for the final compulsory year of secondary school in the United Kingdom. There were no significant main effects for AEI in the academic areas measured. However, there were significant interaction effects between: (a) IQ and AEI for English ($R^2_{adj} = 0.66$); and (b) AEI and IQ for GCSE ($R^2_{adj} = 0.66$). These findings confirmed there was a bilinear interaction whereby the predictive effects of AEI measured by the TEIQue interacted with the predictive effects of IQ ($gc$) on academic performance in English and on the overall level of academic performance, as identified by the GCSE.

Therein, the finding presented by Petrides et al. (2004) provided evidence of an indirect relationship between AEI and academic achievement, whereby AEI moderated the effect of IQ in both English and the GCSE; hence, AEI indirectly effected academic achievement. Consequently, these findings indicated AEI was particularly important for the academic achievement of educationally at-risk students with lower intellectual resources, as they sought to meet the academic demands in a secondary school environment. Petrides et al. (2004) suggested that AEI based on the trait model, might assume more prominence when the demands of the curriculum tended to outweigh adolescents’ intellectual resources. Consequently, adolescents’ limited intellectual resources potentially created more stress and the need to utilise their AEI in a compensatory manner to meet the academic demands of the English curriculum and the GCSE (Petrides et al., 2004).

To date, research findings have confirmed that AEI has played a significant role in adolescent emotional wellbeing and growth (Salovey, Detweiler-Bedell, Detweiler-Bedell, & Mayer, 2008). Students with high AEI were found to have higher levels of
emotional competence and wellbeing (Ciarrochi & Scott, 2006), pro-social behaviours (Charbonneau & Nicol, 2002b), adaptive coping skills, leadership qualities (Mavroveli, Petrides, Rieffe, & Bakker, 2007) and positive social copying skills (Chan, 2003). Further, those with higher AEI had higher attendance rates at school, which moderated the link between academic self-efficacy and academic achievement (Elias, 2003). In contrast, students with lower AEI skills were found to have also had higher levels of stress (Ciarrochi, Deane, & Anderson, 2002), depressive thoughts, somatic complaints (Mavroveli et al., 2007), anxiety, depression (Fernández-Berrocal et al., 2006) and problem behaviours (Siu, 2009). In addition, those with lower AEI skills displayed more maladaptive behaviours, such as having a higher level of tobacco use and alcohol consumption (Trinidad & Anderson Johnson, 2002). Those with lower skills in AEI also had lower rates of attendance at school and had higher rates of suspension or expulsion (Petrides et al., 2004). Therein, low AEI skills were negatively associated with a range of at risk, challenging or maladaptive behaviours in adolescent biopsychosocial development (Gemelli, 2013). The underlying mechanisms of these findings can be partially understood with reference to research by Elias, Zins, Graczyk, and Weissberg (2003), who explained: “Children who are hurting cannot learn effectively, and their presence in schools without getting needed attention drains energy, focus, and potential from the learning environment” (p. 304). Hence, students’ social and emotional development has the potential to impact upon adolescents’ ability to effectively engage in the learning processes; leading to school adjustment or maladjustment that enables or inhibits their academic achievement (Elias et al., 2003).

2.3.5.2 Direct Relationships of AEI to Academic Achievement

Second, the direct relationship between AEI and academic achievement has been investigated by a growing number of researchers who have collectively provided research evidence to affirm the positive correlation between AEI and academic achievement, as illustrated in Table 2.3. For instance, Parker, Creque, et al. (2004) examined the role of AEI as measured by the EQ-i: YV (Bar-On & Parker, 2000) and academic achievement as measured by their GPA, in high school students (N = 667). The secondary school students were enrolled in Years 9, 10, 11 and 12 and the students were between 14 and 18 years of age (M_{age} = 16 years). The overall GPA was a derived from all the courses taken by the adolescents for the year. Correlations between EQ-i: YV (interpersonal abilities,
intrapersonal abilities, stress management, adaptability, and total AEI) were calculated. In the total cohort, low to moderate correlations were found between GPA and interpersonal abilities \((r = .32)\), intrapersonal abilities \((r = .08)\), adaptability \((r = .27)\), stress management \((r = .24)\), and total EQ-i: YV \((r = .33)\). A latent variable path model analysis was conducted based on goodness of fit and the model was found to meet the criteria for adequacy of fit. As demonstrated in the path model, the relationship between the latent variable AEI and academic achievement \((r = .41)\) was moderately correlated and accounted for 16.8\% of the variance in secondary students’ GPA.

Parker, Creque, et al. (2004) then divided the total cohort into three groups, based on the students’ level of academic achievement (GPA). The three subgroups were entitled: the highly successful group (top 20\%; \(n = 138\)), moderately successful group (middle 60\%; \(n = 398\)) and the less successful group (bottom 20\%; \(n = 131\)). A series of ANOVAs were conducted with reference to gender by academic group (three groups) by grade for the dependent variable as EQ-i: YV total score or one of the four EQ-i: YV subscales. The ANOVA findings found a main effect for gender in intrapersonal and interpersonal skills, whereby adolescent females scored higher than adolescent males. However, adolescent males scored higher than females on their adaptability skills. There was also a main effect for the academic group in the interpersonal skills, adaptability skills, stress management skills, and total EQ-i: YV, whereby the successful group scored higher than both the moderately successful and less successful groups. In addition, there was a main effect for grade on the interpersonal abilities, intrapersonal abilities, stress management, adaptability, and the total AEI. The subsequent statistical analysis confirmed that the Year 9 students scored lowered than the Year 10, 11 and 12 students on their interpersonal abilities, intrapersonal abilities and total AEI scores. The Year 9 students also had lower scores on their adaptability and stress management skills compared to Year 11 and 12 students (Parker, Creque, et al., 2004). Therein, collectively the findings by Parker, Creque, et al. (2004) provided evidence to support: (a) the positive relationship between secondary students’ AEI and academic success; (b) the comparatively higher AEI scores found in the successful group than the moderately successful and less successful adolescent groups; (c) the individual differences in some AEI subscales for female and male adolescents; and (d) the lower AEI scores found in Year 9 students when compared to those in the higher year levels, which may have
reflected developmental changes in AEI skills from Year 9 to Year 12 in secondary school students.

Parker, Creque, et al. (2004) noted that the positive association identified between AEI and academic achievement in secondary school students ($r = .41$) was consistent with, and higher than, previous research findings in university students (Parker, Summerfeldt, et al., 2004). Previous research by Parker, Summerfeldt, et al. (2004) examined the relationship between AEI as measured by the EQ-i: Short Form (Bar-On, 1997a) and academic achievement (GPA) in first year university students ($N = 372$, $M_{age} = 19$ years). The first year university students’ AEI was measured in their first month at university. The participants’ academic achievement was measured by two criteria: their GPA at the end of high school and their GPA at the end of their first university year. Correlations between AEI (interpersonal abilities, intrapersonal abilities, stress management, adaptability, and total AEI) and GPA in the total cohort were variable (Parker, Summerfeldt, et al., 2004). The findings confirmed there was not a statistically significant correlation between high school GPA and AEI. However, the correlation between university GPA and: AEI ($r = .20$) was low; intrapersonal abilities ($r = .27$) was low; stress management ($r = .32$) was low–moderate; and adaptability ($r = .37$) was low–moderate (Parker, Summerfeldt, et al., 2004). Hence, adolescents’ adaptability accounted for 13% of the variance in GPA and therein was the strongest predictor of GPA in their first year of university. Adolescents’ skills in stress management accounted for 10% of the variance in academic achievement and were the second strongest predictor in their university GPA. While intrapersonal skills, such as the ability to understand one’s own feelings, accounted for 7% of the variance in academic achievement and was the third strongest predictor of GPA in first year university students. Parker, Summerfeldt, et al. (2004) noted that the factors entitled: adaptability, stress management and intrapersonal skills, were more significant predictors of university GPA than the adolescents’ previous secondary school GPA scores.

Furthermore, Parker, Summerfeldt, et al. (2004) also investigated the relationship between AEI measured by the Emotional Quotient Inventory Short Form (EQ-i: Short) and academic achievement (GPA) in students who had just made the transition from high school to university. In the first month of university the participants in the study completed the EQ-i: Short to see if their AEI predicted their subsequent academic achievement at university. The academic records of the total cohort ($N = 131$) were
reviewed at the end of their first year at university and then they were classified into two groups. The two subgroups were referred to as the academically successful group and the academically less successful group. The successful group \((n = 67)\) encompassed those with a GPA at or above 79%, which included 18% of the total cohort. The less successful group \((n = 64)\) encompassed those with a GPA below 60% of the group, which included 17% of the total cohort. An ANOVA was conducted with a gender by group (successful and unsuccessful groups) by AEI analysis of variance, whereby AEI was the dependent variable (Parker, Summerfeldt, et al., 2004). A main effect for group was identified and the successful student group scored higher in their level of AEI in comparison to the unsuccessful student group \(F(1, 127) = 64.86, p < 0.001, \eta^2 = .34\). In addition, a main effect for AEI type was confirmed \((\eta^2 = .30)\), with students having higher scores for interpersonal abilities, followed by adaptability. In addition, univariate \(F\)-test analysis found the successful student group had higher skills than the less successful group on intrapersonal ability, stress management, and adaptability (Parker, Summerfeldt, et al., 2004). These results indicated that the academically successful adolescent student group had higher AEI subscale skills than the less academically successful university group. Further, the successful group had higher skills in adaptability, stress management and intrapersonal skills at the start of the university year, which were subsequently predictive of their higher academic achievement at the end of their first year at university (Parker, Summerfeldt, et al., 2004). Therefore, these findings illustrated the significant positive and negative effect of AEI on academic achievement in both successful and unsuccessful students, respectively.

Szuberla (2005) also examined the relationship between AEI and academic achievement in students \((N = 61, \text{Age} = 10–13 \text{years of age}, \text{Years} = 4–6)\). Based on the developmental guidelines previously outlined for this study, these students were classified to be in the early adolescent stage of development \((\geq 10–14 \text{years of age})\) (Sawyer et al., 2012). In the study AEI was measured by the MSCEIT: The Terra Nova measured YV and academic achievement. The results of correlational analyses confirmed there was a significant relationship between: (a) understanding emotions and Reading \((r = .58)\), Language \((r = .60)\) and Mathematics \((r = .51)\). In addition, the results found there was a significant relationship between (b) managing emotions and Reading \((r = .56)\) and Language \((r = .33)\). A simultaneous Multiple Regression Analysis was conducted with
MSCEIT: YV and the Terra Nova composites, accounting for 41% of the variance in Reading; 36% of the variance in Language; and 27% of the variance in Mathematics; and the MSCEIT: YV total scores accounted for 25% of the variability in the Terra Nova. Szuberla’s (2005) findings provided evidence of the significant relationship between school success and AEI in elementary early adolescent school students. In particular, the AEI skills of understanding and managing emotions were significantly related to academic achievement in early adolescents. Therefore, the findings presented by Szuberla (2005) indicated that students’ levels of academic achievement was positively related to their AEI skills. Consequently, it was noted teachers could utilise the opportunity to address remedial skill deficits in AEI in the treatment or prevention of behaviours that impede academic progress. Further, Szuberla (2005) recommended future research should consider developing a workable model of AEI that could be incorporated into the daily operations of an elementary school.

Menzie (2005) also examined the relationship between AEI and academic achievement in middle school students (N = 57). In addition, Menzie (2005) investigated the relationship between AEI and social competence. The study cohort included middle school youth who were in Year 6 (49%), Year 7 (28%), and Year 8 (23%). Based on the developmental stages outlined by Sawyer et al. (2012), the students in this study (age range = 11–14 years, M_age = 12.5) were classified in the early adolescent stage of development (≥ 10–14 years of age). The construct of AEI was measured by the EQI: YV (Bar-On & Parker, 2000). The research study measured the students’ social competence based on the Achenbach Youth Self-Report, while their GPA was used as a measure of the students’ academic competence.

The correlational results outlined by Menzie (2005) found significant relationships between low scores on the EQI: YV subscales and the Achenbach Youth Self-Report scores, which identified students at risk for problems. With the exception of the EQI: YV general mood subscale, the other four subscales (intrapersonal, interpersonal, adaptability and stress management) and the Total EQI: YV were significantly and negatively correlated with the clinical elements of the Achenbach Youth Self-Report (the Achenbach). For instance, the EQI: YV total scores were moderately and negatively correlated with anxious/depressed (r = -.40); withdrawn (r = -.34); attention problems (r = -.59) strong correlation; social problems (r = -.32); thought problems (r = -.44); internalising (r = -.47); and externalising (r = -.44). The EQI: YV total scores were
weakly and negatively correlated with rule breaking \((r = -0.26)\) and aggression \((r = -0.26)\). While the EQI: YV total scores were strongly and negatively correlated with total problems \((r = -0.53)\).

An analysis of correlations between the measures indicated a strong negative correlation between subscales of the EQI: YV and the clinical scales of the Achenbach, while positive correlative relationships were identified between the academic and social competence scales of the Achenbach. The Achenbach academic performance subscale was positively correlated with two EQI: YV scales, adaptability \((r = 0.29)\) and stress management \((r = 0.34)\). The Achenbach academic performance subscale was also negatively associated with thought problems \((r = -0.43, p < 0.001)\); attention problems \((r = -0.57)\); rule breaking \((r = 0.33)\); and aggression \((r = 0.34)\). Academic achievement as measured by the GPA was weakly correlated with the EQI: YV subscale of stress management \((r = 0.27)\). Further, the Achenbach was negatively correlated with the following: somatic complaints \((r = -0.26)\); thought problems \((r = -0.27)\); and attention problems \((r = -0.27)\).

Consequently, Menzie’s (2005) findings indicate there was a relation between middle school students’ AEI, school problems, school success, psychological wellbeing and academic achievement. These findings were considered to support the contention that lower levels of AEI were related to lower levels of psychological wellbeing and problems, whereas high levels of AEI were related to the competence scales of the Achenbach. Higher levels of AEI were associated with academic performance, particularly the subscales of adaptability and stress management. When the predictive variable stress management was considered with the Achenbach scale of attention problems, the importance of students developing impulse control and self-management skills to optimise academic performance was highlighted.

In 2006, Márquez Gil-Olarte, Martin, and Brackett explored the relationship of AEI with social competency and academic achievement in students in their final year of high school \((N = 77, M_{age} = 15\) years, Age Range = 14–17 years). AEI was measured by the MSCEIT 2.0 \((Mayer, Salovey, & Caruso, 2002b)\), Spanish version. The research findings indicated AEI was significantly associated with social competence as measured by the social-cognitive attitudes and strategies. A factor analysis of the social-cognitive attitudes and strategies identified two general factors entitled: pro-social behaviour and maladaptive behaviour. Pro-social behaviour, which encompassed social sensibility, cooperation, self-confidence, leadership, apathy and shyness, accounted for 33% of the
variance. Maladaptive behaviour, which incorporated aggressiveness, dominancy and conformity, accounted for 20% of the variance. There was a moderate positive correlation between AEI and pro-social behaviour ($r = .41, p < 0.001$) and there was also a negative weak correlation between AEI and maladaptive behaviour ($r = -.19, p < 0.05$).

Márquez Gil-Olarte et al. (2006) also found AEI was moderately correlated with academic achievement, as measured by GPA of the end-of-year school grades ($r = .46$). In addition, when academic intelligence as measured by the Factorial General Intelligence was statistically controlled, the partial correlation between AEI and academic achievement remained moderately correlated ($r = .43$). Further, when personality as measured by the Big Five Questionnaire was statistically controlled, the partial correlation between AEI and academic achievement continued to be moderately correlated ($r = .36$). The strongest relationships were found between AEI and self-confidence, pro-social behaviour and academic grades. Therefore, these findings support the relationship between AEI and pro-social and maladaptive behaviours and academic achievement in high school students in Spain. Consequently, it was concluded that lessons on social and emotional learning in schools may decrease maladaptive behaviour, increase pro-social behaviour and improve students’ academic performance (Gil-Olarte et al., 2006).

In 2008, Downey, Mountstephen, Lloyd, Hansen and Stough examined the relationship between AEI and academic achievement in secondary school students ($N = 209$). The study cohort included adolescent students from Years 7, 8, 9, 10 and 11. The students’ GPA provided a measure of their academic achievement. The students’ AEI was measured by the SUEIT: A, which provided a total score and four trait scores. The SUEIT: A trait scores were defined as:

1. **Emotional Recognition and Expression**: The ability to identify one’s own feelings and emotional states and the ability to express those inner feeling to others;

2. **Understanding Emotions**: The ability to identify and understand the emotions of others;

3. **Emotions Direct Cognition**: The extent to which emotions and emotional knowledge are incorporated in decision making and/or problem solving; and
4. **Emotional Management and Control**: The ability to manage positive and negative emotions both within oneself and others and control strong emotional states (Downey, Mountstephen, et al., 2008).

In addition, a review found the mean scores of the SUEIT: A were similar to those previously presented by Leubbers et al. (2007), with the exception of emotional management and control that had a slightly higher mean score (Downey, Mountstephen, et al., 2008). Further, Downey, Mountstephen, et al. (2008) sought to extend the previous research methodology outlined by Parker, Creque, et al. (2004). Therefore, the academic achievement of the cohort was reviewed based on their GPA scores. Then the cohort was divided into three groups entitled: the successful group (n = 43, 80th percentile), the middle group (n = 124, between the 20th and 80th percentile), and the less successful group (n = 42, 20th percentile). A review of the relationship between AEI scores found the successful and middle groups scored higher than the less successful group in total EI. A series of ANOVAs found adolescent females scored higher than adolescent males on emotional recognition and expression $F(1,207) = 9.21$, $p < .003$, understanding emotions $F(1,207) = 22.58$, $p < .05$ and total AEI $F(1,207) = 20.07$, $p < .001$. Further, significant main effects for academic group were identified in emotional management and control $F(2,206) = 4.88$, $p < .013$ and total AEI $F(2,206) = 3.10$, $p < .05$.

The total AEI score positively correlated with GPA ($r = .15$), Geography ($r = .27$) and Science ($r = .14$) scores. Using a regression model significant main effects were found between emotional management and control and GPA $F(1,207) = 4.87$, $p < .05$; Maths $F(1,207) = 11.58$, $p < .01$; and Science $F(1,207) = 6.96$, $p < .01$. Understanding emotions significantly predicted Art $F(1,207) = 7.35$, $p < .01$; and Geography $F(1,207) = 11.86$, $p < .01$. These findings supported the assertion that while individuals differed in their AEI skills, there was a significant relationship between AEI and academic achievement (Mayer & Salovey, 1997). Further, these results provided evidence of a relationship between higher levels of AEI and academic success in adolescent students attending secondary school. Downey et al. (2008) concluded that students who were academically better performing students, had higher skills in the ability to identify and understand the emotions of others. For example, students with higher skills of AEI in understanding others’ emotions may have had a more advanced understanding of the underlying nature of others’ emotions. Consequently, those with higher skills in understanding others’ emotions may have also been more empathetic to others and
adaptive when in learning situations with their adolescent peers in a classroom. Finally, the study results confirmed that there were individual differences in the predictive effect of AEI, which was differentiated in a range of curriculum areas (Downey, Mountstephen, et al., 2008).

Hassan, Sulaiman, and Ishak (2009) conducted a research study with two major goals in high school students in rural Malaysia \((N = 223)\). First, they aimed to identify the relationship between AEI measured by the Schutte Self-Report of Emotional Intelligence (SSRI) and the students’ anxiety, which was measured using the Beck Anxiety Inventory. Anxiety in children and adolescents has been noted to include the core elements of an intense fear or worry associated with emotional distress and/or avoidance behaviour (Kendall, Hedtke, & Aschenbrand, 2006). Second, Hassan et al. (2009) sought to identify the relationship between SSRI and academic achievement in Form One and Form Four in high school students. An examination of adolescent’s AEI level based upon their age was conducted. A series of \(t\)-test analysis found there was not a significant difference for AEI between males aged 13–16 years. In contrast, there was a significant difference in AEI between ages in the females aged 13–16 years \(t(95) = 2.28, p < 0.05\). A gender analysis also found a significant difference between adolescent males and females \(t(221) = 5.35, p < 0.05\), with females having a higher mean. There was not a significant difference in the AEI of the 13-year-old adolescent males and females. However, there was a significant difference \(t(121) = 5.45, p < 0.05\) in the AEI of the 16-year-old adolescent males and females (Hassan et al., 2009).

The findings by Hassan et al. (2009) also indicated the AEI levels of all students were negatively and strongly correlated to anxiety \((r = -.60)\). Further, anxiety was negatively and strongly correlated to AEI for both the 13-year-old student group \((r = -.73)\) and the 16-year-old student group \((r = -.64)\). Anxiety was also negatively and moderately correlated to AEI for both the males \((r = -.63)\) and the females \((r = -.52)\). In contrast, the correlation between AEI and academic achievement was positive and strong \((r = .78)\). The correlational relation between AEI and age was also positive and strong for 13-year-old students \((r = .85)\) and 16-year-old students \((r = .82)\), as it was for males \((r = .79)\) and females \((r = .76)\). The analysis of correlation between AEI and academic achievement was significantly positive for male students \((r = .76)\) and female students \((r = .57)\). Hassan et al. (2009) found the correlation between the level of anxiety and academic achievement for the total cohort was significantly negative \((r = -.70)\).
Consequently, the findings by Hassan et al. (2009) identified the relationship between: (a) high levels AEI, low levels of anxiety and higher level of academic achievement experienced by adolescents; and (b) alternatively low levels AEI, high levels of anxiety and lower levels of academic achievement experienced by adolescents (Hassan et al., 2009). However, the analysis was correlative, therefore no cause and effect relationships could be deduced. However, the strong to moderate correlative relationships indicated a meaningful and quantifiable relationship was identified between AEI, anxiety and academic achievement in Malaysian adolescents. Hassan et al. (2009) found that AEI was significantly related to adolescent levels of anxiety and this finding was consistent with the previous research findings outlined by Ciarrachi and Scott’s (2006).

Ciarrochi and Scott (2006) examined emotional competence in university students (N = 163, M_age = 21). They aimed to identify what aspects of emotional competence helped protect university students from stress, anxiety and depression. Furthermore, they aimed to determine if emotional competence supported the development of positive affect, referred to as wellbeing. In this study, emotional competence was considered how effectively students dealt with emotions and emotionally charged problems (Saarni, 1997, 2000). The study results by Ciarrochi and Scott (2006) found student difficulties in identifying and describing emotions predicted increases in anxiety and decreases in positive affect. It was also noted that ineffective problem orientation, such as rumination, focused on the past or future, while not noticing the present. Further, ineffective problem orientation predicted increases in anxiety and stress and decreases in positive affect. In addition, the predictive variance of students experiencing difficulty managing their emotions was associated to decreases in positive affect.

Hence, Ciarrochi and Scott (2006) concluded that adolescent students’ wellbeing may benefit from developing the emotional competencies of: (1) identifying and describing emotions to decrease anxiety and increase positive affect; (2) effective problem solving to decrease anxiety and stress, while also increasing positive affect; and (3) managing emotions in order to increase positive affect. The research findings outlined by Ciarrochi and Scott (2006) are argued to have implications for expanding the current understanding of AEI and some of the AEI traits. For instance, these research findings may provide further insight into the components of AEI presented by Leubbers et al. (2007); such as emotional recognition and expression, understanding emotions, emotions direct cognition and emotional management and control. Further, the research findings

Wood (2006) also asserted that there was a link between high anxiety and impaired cognitive performance, and therefore reduced academic performance was reflective of the physiological stimulation and narrowing of focus and attention on a perceived future threat. The focus on the real or perceived future threat impaired concentration on other non-threatening factors. For example, the focus on future threats may reduce the students’ ability to engage in the learning process or to recall facts and consequently, which may result in reduced levels of academic performance (Ma, 1999). In addition, Wood (2006) found that intervention with cognitive-behavioural therapy (CBT) ($N = 40$, age range = 6–13 years) clinical anxiety (including separation anxiety disorder; generalised anxiety disorder; and social phobia) was reduced and resulted in improvements in school performance and social functioning. Further, Owens, Stevenson, Norgate, and Hadwin (2008) found academic performance was positively associated with working memory and negatively associated to high levels of anxiety. An examination found students’ ($N = 50$, age range 11–12 years) verbal working memory accounted for 51% of the association between anxiety and academic performance. However, spatial working memory only accounted for 9% of the association between anxiety and academic performance and did not statistically mediate the relationship between working memory and academic performance (Owens et al., 2008).

Lawler (2012) conducted a longitudinal study into the nature of academic performance in light of personality, AEI, self-efficacy and absenteeism. The cohort was enrolled in Sixth Form and attended secondary college in Merseyside, in the United Kingdom ($N = 120$, male = 47, female = 73). The cohort was aged between 16–19 years of age, which met the criteria for classification in the late stage of adolescent development in the current literature review (Sawyer et al., 2012) Personality was measured with the International Personality Item Pool Big Five Fifty Items (FFI) (Goldberg et al., 2006) The construct of EI was measured with two assessments. The Assessing Emotions Scale (Schutte et al., 1998) and The Trait Meta-Mood Scale (TMMS) for Emotional Attention, Clarity and Repair (Salovey et al., 1995). The Emotional Self-Efficacy Scale (ESE) and The Academic Self-Efficacy Scale (ASE) were also utilised in the study. The secondary college provided the researchers with data pertaining to student absenteeism and their academic achievement. Academic achievement was based on the students’ GPA, which
was calculated based on their score in the General Certificate of Secondary Education (GCSE) and course work results for Mathematics, Science and English.

Lawler (2012) completed a series of correlational analyses, which was followed by a hierarchical regression analysis, in order to determine the predictive effect of AEI, FFI, ESE, ASE on academic achievement (GCSE–GPA). The correlational analysis found AEI based on the Assessing Emotions Scale and the TMMS was not significantly related to adolescent academic achievement, with the exception of one subscale. The TMMS Attention was significantly and negatively correlated to GPA \( (r = -.17) \) based on a one-tailed at the \( p < .05 \) level of statistical significance. Further, the measures of personality and self-efficacy were correlated to academic achievement. Therefore, TMMS Attention, the FFI, ESE, ASE and absenteeism were included in the hierarchical regression analyses.

The results of the hierarchical regression analyses found TMMS Attention did not make a significant contribution to the model. Therein, AEI was not found to be significantly predictive of academic achievement in secondary school students who were in the late stage of adolescent development. Nonetheless, the fourth and final regression model accounted for 42% of the variance in academic achievement. Agreeableness was the strongest predictor in the model \( (\beta = .38, p < .01) \). Absenteeism was the second strongest predictor of academic achievement \( (\beta = .24, p < .01) \), followed by Openness, ESE and ASE.

Lawler (2012) theorised that the negative correlational relationship of TMMS Attention may have been reflective of the tendency for adolescents for focus too much attention on their emotions, which then negatively impacted upon their academic achievement. However, the relationship was not strong enough to remain a significant factor in the regression models. For instance, when TMMS Attention and ESE were added to the model, there was only a 2% increase in the significance of the model and TMMS Attention did not contribute a unique predictive effect to the final model.

Costa and Faria (2015) conducted a study to investigate the predictive effect of AEI on the academic achievement of Portuguese secondary school students \( (N = 380) \). The secondary students who participated in the study were aged from 14 to 17 years of age \( (M_{\text{age}} = 15.4 \text{ years}) \). The students in Year 10 and Year 11 were followed through the three-year span of the secondary school system in the Portugal’s educational system (Costa & Faria, 2015). Academic achievement was measured using three variables: the
students’ end of year GPA, the end-of-year scores for Portuguese Language, and Mathematics. The students’ AEI was determined with two measures: (a) The self-report measure of the Emotional Skills and Competence Questionnaire (ESCQ); and (b) the Vocabulary of Emotions Test (VET) (Costa & Faria, 2015).

Costa and Faria (2015) analysed the data with three path analysis models of the two measures of AEI and one measure of academic achievement that included the GPA, Portuguese Language and Mathematics at the end of Years 10, 11 and 12. The path analysis of AEI and the students’ GPA found both ESCQ ($r = .14$) and VET ($r = .32$) were predictive of Year 10 GPA. However, only VET was predictive of Years 11 and 12 GPA. Further, some of the pathways in the predictive effect of AEI for GPA differed by gender. The path analysis of AEI and the students’ Portuguese Language found VET ($r = .32$) was predictive of Year 10 Portuguese Language ($r = .31$) and Year 11 Portuguese Language ($r = .10$). Further, the path analysis of AEI and the students’ Mathematics found both ESCQ ($r = .12$) and VET ($r = .26$) was predictive of Year 10 Mathematics (Costa & Faria, 2015). These findings confirmed that the VET measure of AEI had a strong predictive effect on academic achievement in the three measures (GPA, the Portuguese Language and Mathematics). Further, the strongest predictive effect of both AEI measures was identified in Year 10 GPA. Costa and Faria (2015) concluded that AEI was a significant variable in secondary school academic achievement, which may be strongest in younger secondary school students.

Therefore, to date, research findings have identified a range of indirect and direct relationships between AEI and academic achievement (Matthews, Zeidner, et al., 2004). The link between EI, health and wellbeing have been clearly established (Zeidner et al., 2012). Further, the link between wellbeing and academic achievement has also been well established (Elias, 2006; Greenberg et al., 2003). Therefore, it is plausible that the indirect and the direct predictive effects of AEI in academic achievement may be more effectively understood from a multi-faceted developmental perspective (Zeidner et al., 2003). Furthermore, an understanding of the individual difference in the predictive effect of AEI in academic achievement within a secondary school environment may be more effectively understood from an ecological human developmental perspective with reference to the male or female adolescent’s “goodness of fit” to the demands of their environment (Bronfenbrenner, 1977; Zeidner et al., 2003). The adolescent was theorised to directly utilise their AEI developmentally, dynamically and adaptively in progressive
accommodations to the changes in their psychosocial and academic environment (Bronfenbrenner, 1977; Zeidner et al., 2003).

Hence, the degree that AEI was utilised in academic achievement may be subject to an adolescent’s developmental stage and their gender, which may further influence their appraisal of their developmental resources to adequately or inadequately meet the psychosocial and academic demands of their environments (Bronfenbrenner, 1977; Zeidner et al., 2003). Consequently, the gender differences in AEI and academic achievement are now investigated. The following literature review seeks to determine if gender differences in AEI have the potential to influence individual differences in the relationship between AEI and academic achievement.

### 2.3.6 AEI, Gender and Academic Achievement

The literature review will now investigate the nature of the relationship between EI and academic achievement in light of the potential effect of gender to differentiate that relationship. Research by Jaušovec and Jaušovec (2005) investigated gender differentiation in the neurological functioning of EI and intelligence in male and females. The results identified different resting electroencephalography (EEG) brain activity for males and females in EI and general intelligence. In males, brain activity decreased with an increase in their EI capacity. In contrast, the females’ brain activity increased with an increase in their level of EI. A similar pattern in neurological brain activity in males and females was found for general intelligence. However, the statistically significant differences between intelligence in males and females was higher than the statically significant differences found between EI in males and females (Jaušovec & Jaušovec, 2005). Although gender differentiation in EI is evident in the adult population (Jaušovec & Jaušovec, 2005), it is argued that understanding the developmental nature of gender differentiation in AEI from early adolescence, late adolescence and in young adulthood (Sawyer et al., 2012) may be a particularly challenging task due to the asynchronous maturation of the adolescent male and female emotional and cognitive systems (Spear, 2013).

Petrides and Furnham (2000a) analysed gender differences in actual and estimated AEI in university students ($N = 260, M_{age} = 23$ years) using the Emotional Intelligence Questionnaire (EQ-i) (Schutte et al., 1998). There was not a significant difference between male and female AEI total scores; however, females were found to have higher
AEI social skills than males. Further, self-estimations of AEI in females were inaccurately low. In contrast, the self-estimations of AEI in males were inaccurately high. Petrides and Furnham (2000a) suggested that these under and over self-estimations of AEI, may have implications for students’ health and education. The high self-estimations of AEI, which were found in the male group, may have been associated with males’ positive psychological adjustment and higher self-esteem. On the contrary, the low self-estimations of AEI in the female group may have been associated to depression and a reduction in engagement when faced with challenging tasks. Therefore, while the self-estimated AEI of men was high, this may have led to an over-estimation of their actual AEI abilities. In contrast, the under-estimation of women’s AEI skills may have led to a low mood and stimulated females’ to withdrawal (Petrides & Furnham, 2000a).

In addition, Rieff et al. (2001) examined the relationship of AEI, learning disabilities (LD) and gender in the academic achievement of college students (N =128). AEI was measured with the EQ-i. The college students with a LD (n =54) had lower academic scores than students and without a LD (n = 74). Further, adolescent females attained a higher level of academic achievement than adolescent males. The AEI EQ-i self-report instrument was designed to measure AEI subscales: interpersonal skills, intrapersonal skills, stress management skills, adaptability skills and general mood. The MANOVA analysis found main effects for both LD and gender. In light of these main effects, Rieff et al. (2001) conducted a post hoc univariate analyses of the five EQ-i subscales. The findings identified a significant difference between students with a LD and students without a LD for the AEI subscales entitled, stress management and adaptability. The students with a LD scored lower than those without a LD for both stress management and adaptability.

Rieff et al. (2001) suggested lower stress management scores indicated “less capacity to withstand adverse events and stressful situation, often accompanied by impatience, reactivity, and loss of control”, with reference to research by Bar-On in 1997 (Reiff et al., 2001, p. 72). The findings also confirmed students with a LD were less adaptable than students without a LD. The reduced ability to adapt in those with a LD was speculated to be indicative of their decreased ability to cope with the increasing academic demands in their environmental and to deal with problematic situations. Rieff et al. (2001) suggested that students with a LD may have found that the relatively unstructured university environment placed more demands on their abilities to self-regulate, study
independently and adapt to the increased academic pressures. In addition, the findings were differentiated by gender. Adolescent males and females had significant differences in their interpersonal skills, with females scoring higher than males. The results also confirmed that there was an interaction effect between LD and gender on interpersonal skills; whereby females without a LD had the highest scores. Reiff et al. (2001) concluded that the significant degree that lower skills in stress management and adaptability negatively predicted academic achievement in student with a LD, was indicative of the importance of these skills in academic achievement and tertiary success.

Stottlemyer (2002) also investigated if there was a significant relationship between AEI for academic achievement in male and female Years 11 and 12 students \((N = 200)\) in Texas. Further, Stottlemyer hypothesised that the relationship between AEI and academic achievement would be differentiated by gender, ethnicity and socio-economic status. In this study both the Texas Learning Index and the Texas Assessment of Academic Skills measured academic achievement. In 1998, Nelson and Low developed a self-report construct of EI entitled Exploring and Developing Emotional Intelligence Skills (EDEIS), which was utilised in the research by Stottlemyer (2002). The EDEIS was designed to incorporate a range of factors in four areas of emotional competencies:

1) Interpersonal Communication Under Stress: Focusing on emotional communication and control in building and maintaining healthy and productive relationships—assertion, anger control and management, fear control and management;

2) Personal Leadership: Developing responsible leadership and leading in positive ways—comfort, empathy, decision making and leadership;

3) Self-Management in Life and Career: Self-direction and management to achieve meaningful goals and a career—drive, time management, commitment and positive personal change; and


The EDEIS model provided a model of AEI with a unique theoretical and conceptual structure, when compared to other EI ability and trait models. The EDEIS model offered both a specific focus and the functional connections within each competency and between the competencies. The measure provided a clear scaffold for
each AEI competency to collectively result in a personal AEI development plan, which on a practical level may have been helpful in pinpointing both areas for personal improvements and current strengths. A factor analysis of the EDEIS identified four factors: interpersonal skills, motivation, intrapersonal skills, and self-management needs.

The primary findings of Stottlemyer’s (2002) research are now discussed in relation to AEI, academic achievement and gender. With reference to academic achievement, Stottlemyer (2002) found females scored significantly higher than males on Reading. The finding indicated there was a significant negative relationship between the AEI skill of change orientation and Reading ($r = -.13$), this finding was indicative of personal dissatisfaction with current level of AEI skills and was negatively correlated to reading achievement. The results also indicated gender was significantly associated with Reading ($r = -.19$) and to the AEI skills of aggression ($r = -.20$), empathy ($r = -.26$) and stress management ($r = .18$). It was also found that gender was significantly correlated to leadership ($r = -.12$) and ethics ($r = -.13$).

With reference to gender, Stottlemyer (2002) found a gender difference in AEI, with females having scored more highly in empathy, leadership, and commitment ethic than males; while males had higher scores in aggression and stress management than females. For females, the regression analysis between Mathematics and AEI found the predictive variance accounted for was 19% ($R^2 = 186$). In females, Mathematics and the AEI skill of comfort ($r = -.24$) was negatively correlated. In contrast, AEI and leadership ($r = .01$) in females was positively correlated. In males, the regression analysis between Mathematics and AEI accounted for was 22% ($R^2 = 217$). For Mathematics in males the results indicated the AEI skills of drive strength ($r = -.01$) and commitment ethic ($r = .21$) were predictive. For females, a regression analysis for Reading and AEI accounted for 23% of the variance ($R^2 = 226$). In Reading, for females there was a negative relationship between the AEI skills of aggression ($r = -.20$), comfort ($r = -.18$) and change orientation ($r = -.18$). The set of predictor variables accounted for 23% ($R^2 = 186$). None of the AEI skills were predictive of reading scores in males.

Therefore, Stottlemyer (2002) found AEI was predictive of academic achievement for the cohort, but differed based upon gender. The AEI skills of change orientation, drive strength, commitment and comfort were typically associated with academic achievement. Females had higher AEI skills than males, with higher levels of empathy and had higher levels of reading achievement. Males AEI skills of aggression, leadership, commitment
ethic, and stress management were correlated. Therefore, Stottlemyer (2002) recommended that future research use a saturated regression model and a larger sample size in order to examine the relationship between AEI, gender and academic achievement in more detail. Further, the findings illustrated the importance of incorporating AEI in the curriculum for younger students and particularly students with communication styles that were aggressive or deferent, which were typically found in students who engaged in school violence (Stottlemyer, 2002).

Gerber (2004) also studied the relationship between AEI measured by EQ-i: YV and success in school as measured by academic achievement scores/grades, extracurricular activities, absences, tardiness and discipline referrals for students in Year 8 ($N = 51$). Gerber (2004) found females scored higher than males on the EQ-i: YV interpersonal scale. Furthermore, the study results indicated that students with an average to above average AEI did not perform better on measures of success than students with below average AEI. This finding contrasted with the findings presented by Stottlemyer (2002) and Rieff et al. (2001), who did find that differences in AEI skills were associated to differences in academic achievement.

Chong Abdullah et al. (2004) examined Malaysian secondary students ($N = 205$) to discover how their Emotional Intelligence Quotient (EQ) could enhance their emotional competency, and in turn improve their learning. They measured their EQ and their level of negative affect generated by emotions such as anxiety, anger and frustration in relation to specific school tasks and academic achievement. The Adolescent Multifactor Emotional Intelligence Scale (AMEIS) developed by Mayer, Salovey & Caruso in 1997, the Academic Competency Scale (ACS) and the Negative Academic Affect Scale (NAAS) was utilised in the research with academic achievement, as determined from the students’ mid-year exam results along with a specific task. The analysis identified a negative linear relationship between a student’s EQ and their negative affect towards school tasks, with a positive linear relationship between Emotional Intelligence and academic achievement. In sum, the findings indicated that students who were able to regulate their negative affects related to academic achievement had a more positive perception of their academic competency.

Furthermore, Silveri et al. (2004) acknowledged notable adolescent brain growth and sought to examine the trajectories of emotional, cognitive and academic growth in males and females ($N = 19$) at high or low risk of drug use based on family histories after
one year. The measure of AEI was the Bar-On Emotional Quotient Inventory (EQ-i). Anxiety was measured with the Multidimensional Anxiety Scale (MAS) and stress was measured with the Perceived Stress Scale (PSS). The findings indicated gender differences interacted with a family history of drug use, which was a risk factor for adolescent development. Improvements in cognitive development identified for boys and low-risk girls, was superior to high-risk girls, who showed little improvement after one year. The findings also indicate gender differences in AEI, with Total Emotional Quotient in girls declining significantly over one year. After one year, girls also reported significantly higher levels in stress scores than boys, and boys also out-performed girls in academic tasks. Further, the girls with a family history of drug abuse also displayed poorer academic performance when compared to other adolescents. The findings may indicate there was a more pronounced impact from family drug abuse on girls in comparison to boys. The results of this study highlight the individual differences in adolescent emotional, cognitive and academic development, indicating AEI and cognitive development may be significantly influenced by environmental risks, such as a history of family drug abuse.

Tapia and Marsh (2006) conducted a factor analysis of the EI Inventory (Tapia, 2001), identifying the four factors of empathy, utilisation of feelings, handling relationships and self-control in high-ability secondary students (N = 319). Analysis of variance (ANOVA) was conducted with the four EI factors as dependent variables with GPA and gender. The results identified: (1) Females scored significantly higher than males in empathy scores; (2) A significant difference in self-control was identified in students with high GPAs as opposed to students with low GPAs; and (3) The results of a post hoc analysis of the interaction between gender and GPA were found to be significant, due to the males’ higher skills in handling relationships.

Hassan et al. (2009) conducted a series of correlative analysis to determine the relationship between: (1) AEI and anxiety, and (2) AEI and academic achievement. The study participants were secondary school students aged 13–16 years (N = 223), who were in Forms One to Four and lived in a rural region of Malaysia. The construct of AEI was measured with the Schutte Self-Report of Emotional Intelligence (SSRI). Anxiety was measured with the Beck Anxiety Inventory (BAI). Academic achievement was based on GPA collected at the end of the year. A review of the cohort found significant gender
differences in AEI for adolescent male and female students, with females scoring higher than males.

Hassan et al. (2009) found there was a significant negative correlation between AEI and anxiety for the total group \((r = -0.60, p < .01)\), with males \((r = -0.63, p < .01)\) and females \((r = -0.52, p < .01)\). A significant positive correlation between AEI and academic achievement was identified for the total group \((r = 0.78, p < .01)\), males \((r = 0.79, p < .01)\) and females \((r = 0.76, p < .01)\). Further, there was a significant negative correlation between anxiety and academic achievement for the total group \((r = -0.70, p < .01)\), in males \((r = -0.57, p < .01)\) and in females \((r = -0.76, p < .01)\). These findings indicated that increasing skills in AEI were related to decreasing levels of the adolescents’ anxiety. Consequently, lower levels of AEI were associated with higher levels of anxiety. In addition to this, the level of AEI was positively correlated to academic achievement. Therefore, higher skills in AEI were related to higher levels of academic achievement. While the correlative analyses in this study were not causal, the study results provided evidence to support the positive relationship between AEI and academic achievement, as well as a negative relationship between AEI and anxiety. Further, the negative correlation between anxiety and academic achievement indicated that as anxiety increased in the secondary school students, their academic achievement decreased. Hassan et al. (2009) concluded that: (1) higher skills in AEI were related to better academic achievement in secondary school students; (2) AEI was negatively associated to anxiety; and (3) higher levels of anxiety were negatively associated to secondary school students’ academic achievement. Therefore, the study findings provided evidence of the significant role that AEI had in academic achievement (Hassan et al., 2009).

In summary, an examination of the research outlined, which investigated the relationship between AEI and gender for academic achievement, presented mixed results. First, neurological research confirmed brain functions differed when EI was measured in adult males and females (Jaušovec & Jaušovec, 2005). Second, Petrides and Furnham (2000a) found adolescent males were more likely to over-estimate their AEI skills, while adolescent females were more likely to underestimate their AEI skills. Third, adolescent females were found to have higher levels of AEI than adolescent males (Chong Abdullah et al., 2004). Adolescent females had higher skills in emotional perception and expression in themselves and in others; while adolescent males had stronger skills in emotional regulation and management than females. Fourth, the developmental changes in the
adolescent cognitive system and the emotional system (Spear, 2013) were also argued to uniquely differentiate AEI from the commencement to the completion of the adolescent stage of development (Sawyer et al., 2012).

Nonetheless, there were few studies that examined the relationship between AEI, gender and academic achievement, while also controlling for the adolescent developmental changes that have been found in early adolescence, late adolescence and young adulthood. Therefore, few studies have also considered the impact of individual differences in gender to differentiate AEI from the commencement to the completion of the adolescent stage of development (Sawyer et al., 2012). In addition, studies examining the relationship between AEI and academic achievement have noted the significance of identifying the stages of adolescent development and the differentiated maturational trajectory of adolescent males and females to effect individual differences in the maturation of the AEI skills and consequently, the individual differences in degree that AEI skills were associated with academic achievement. Hence, it was speculated that developmental differences in adolescent stages of maturation, which was further differentiated by adolescent gender differences (particularly in adolescent male and female emotional and cognitive systems), could developmentally differentiate AEI in adolescent males and females.

Therefore, it was speculated that AEI was developmentally differentiated from early adolescence to the completion of the adolescent stage of development. Further, the AEI was also uniquely differentiated by gender in each stage of adolescent development. Therefore, individual differences in the association between AEI and academic achievement may have been influenced by individual differences in adolescent development for adolescent males and females. Furthermore, the relationship between AEI and academic achievement may be influenced by: (a) differences in adolescent developmental stages; and (b) differences in gender. In addition, the individual differences found in the relationship between AEI, gender and academic achievement might also be influenced by developmental differences in other factors, such as students’ intellectual skills or abilities. Therefore, the literature review will now investigate previous research studies that have examined the relationship between AEI and IQ for academic achievement. The literature review will provide an understanding of how the relationship between AEI and academic achievement, may be influenced by individual differences in adolescent IQ.
2.3.7 AEI, IQ and Gender in Academic Achievement

One of the earliest studies examining the relationship of AEI, IQ and academic achievement was conducted by Fannin (2001), who completed a doctoral dissertation. EI was measured using the Adolescent Multifactor Emotional Intelligence Test (AMEIS) developed by Mayer and Salovey (1997). Fannin classified the students in the cohort, who were aged 13–14 years of age, as children (N = 115). However, with reference to The Stages in the Human Life Cycle (Bogin (1999) cited in Gluckman et al., 2009, p. 113) and the three stages of adolescent development (Sawyer et al., 2012), these students were developmentally classified in the early stage of adolescent development for this literature review. The relationship between AMEIS and (a) academic achievement, (b) analytic intelligence and (c) academic production was analysed as outlined in the following three points:

(1) Academic Achievement: Analysed the relationship between AMEIS and the Terra Nova Achievement Test to determine academic achievement. Findings: Regression analysis between AMEIS and Reading, Language and Mathematics achievement were in the moderate to strong range (Rs = .48 – .53). Further, a regression analysis found the relationship between IQ and academic achievement was also strong. It was found that IQ accounted for the variance in: 31% of the variance in reading scores; 22% of the variance in language scores, and 42% of the variance in mathematics scores.

(2) Analytic Intelligence (IQ): The relationship between AMEIS and the Otis-Lennon School Ability Test (OLSAT), which was a test of abstract thinking and reasoning to determine analytic intelligence (IQ). Tests administered in the previous school year indicate there could have been a developmental lap between the test of AEI and the Otis-Lennon test. The findings confirmed that Analytic Intelligence or IQ score accounted for 21% of the total variance in GPA (R = .45, p < .01).

(3) Academic Production (GPA): The relationship between AMEIS and GPA determined by an average of the final grades in Social Studies, English, Mathematics and Science in Year 8 students. The findings based on a regression analysis (R = .41, p < .01) found AEI accounted for 17% of the
variance in GPA. Further, the AEI subscale entitled managing emotions, accounting for a significant portion of the variance \( (r = .24, p < .05) \).

These empirical findings by Fannin (2001), indicated AEI was significantly correlated with GPA and achievement. The results indicated that students with better emotional management skills attained better grades than those who were less skilled in emotional management abilities. However, IQ was a better predictor of GPA than AEI as measure by the AMEIS. The relationship between AMEIS and academic achievement was moderate to strong. Correlations of IQ and AEI scores were significant, but in the weak to moderate range \( (r = .19 \text{ to } r = .32) \), with a median of \( r = .23 \). Hierarchical multiple regression analyses were performed, entering IQ scores followed by AEI for GPA. The results found that IQ scores accounted for 21% of the total variance in GPA, AEI scores accounted for an additional 9% of the variance in academic performance, and both AEI and IQ combined accounted for a total of 30% \( (R = .55, p < .01) \) of the variance explained in academic performance. These resulted suggested that students with high IQ scores and high AEI scores attained higher grades than their peers who had high IQs but lower skills in AEI. Fannin (2001) also noted that these findings supported the previous assertion made by Mayer and Salovey that AEI as measured by AMEIS was a separate, although related, set of abilities to IQ. Therein, Fannin (2001) found that AEI accounted for 9% of the unique predictive variance in academic achievement, which was beyond the predictive variance already accounted for by IQ in academic achievement. Consequently, Fannin (2001) concluded that AEI was a prerequisite skill, which students must develop in order to attain their highest potential GPA scores.

Historically educators have placed an emphasis upon the development of academic skills. Emotions and emotion development was addressed on an individual basis, an only when emotions interfered with learning. This study and previous research on emotional intelligence would suggest that emotional development is an important aspect of learning and therefore should be taught and nurtured in the school setting. Such a shift in the way emotions are perceived and how emotion is related to the learning process would entirely change how children are educated. (Fannin, 2001, p. 94)

Gumora and Arsenio (2002) investigated the connections of middle school students’ emotional dispositions and academic affect with their school performance \( (N = \)
103, Age Range = 11–14 years, $M_{age} = 12$ years, Years 6–8). The goal of the study was to examine if, as asserted by Mayer and Salovey in 1997, students’ affective dispositions and tendencies uniquely influenced their school performance. It was hypothesised that students who reported more negative emotions during academic tasks would have lower GPA. The measures included self-rated assessments of academic competency, affective tendencies including both mood and emotion regulation and negative emotions experienced during school related tasks. The teachers assessed positive and negative mood, achievement test results (Iowa Tests of Basic Skills and Educational Records Bureau’s Comprehensive Testing Program: Cognitive Ability), and students’ grades.

The findings indicated the affect and cognitive variables accounted for approximately 60% of the variance in GPA (Gumora & Arsenio, 2002). Specifically, the results indicated their teachers rated the students with higher levels of emotional regulation as also having a more positive mood ($r = 0.19, p = .05$) and having less negative academic affect ($r = -0.23, p = .01$). Conversely, the students who rated themselves as having higher levels of negative mood also reported higher levels of negative academic affect ($r = -0.23, p = .05$) and were rated by teachers as less emotionally positive ($r = -0.34, p = .001$). The relationship between GPA and cognitive abilities was supported and students with more positive conceptions of their academic ability were found to have higher GPAs. A stepwise regression found: Step (1) cognitive abilities were predictive of GPA ($R^2 = 0.424, F_{change} = 36.83, p < .001$); Step (2) affect related variables made a significant contribution to GPA, beyond the cognitive contribution ($R^2 = 0.572, F_{change} = 8.35, p < .001$); and Step (3) the negative affect was still a significant predictor of GPA even after accounting for the other cognitive and affective variables ($R^2 = 0.574, F_{change} = 4.59, p < .05$). The findings indicated that students who reported more negative emotions related to school tasks, performed worse in school and this was not the result of underlying cognitive differences. Consequently, emotional regulation, general affective dispositions and academic affect were related to each other, however, they also made a unique contribution to the students’ GPA, above cognitive factors. Negative emotionality was also related with lower levels of GPA; importantly, negative emotionality was not related to the influence of cognition, as it was evident over and above the influence of cognition.

As previously outlined, Petrides, Frederickson and Furnham (2004) found there was a bilinear interaction between AEI measured by the TEIQue and cognitive ability ($gc$)
for adolescent academic achievement in secondary school students. The moderating effects of AEI on IQ for academic achievement was stronger in students with lower IQ scores, who were considered to be more educationally vulnerable or disadvantaged students. In contrast, the opposite was the case for students with a high IQ, who were considered to have more intellectual resources to utilise in coping with the academic demands of the curriculum. With reference to the students with a high IQ, the predictive effects of AEI for academic achievement became increasingly weaker as students’ intellectual acumen increased. Further, an examination of the Simple Slopes Data Plots found there was an intersection at one SD above the mean (IQ 128.2) between academic achievement in English and AEI, thereafter the predictive effect of AEI became increasingly negative as the adolescents’ IQ increased. Similarly, this pattern in the findings was also evident in academic achievement as measured by GCSE. Whereby, following the intersection between AEI at IQ 130.9, the positive predictive effect of AEI became negative and the negative predictive effect became more significant and the adolescents’ IQ increased (Petrides et al., 2004).

Hence, Petrides et al. (2004) found the bilinear predictive effects of AEI interacted with IQ for academic achievement and became weaker in students with higher IQ scores. The interaction effect between AEI and IQ for academic achievement was positively predictive until approximately one SD above the mean; thereafter, the interaction effect became negatively predictive of academic achievement in both English and GCSE. Petrides et al. (2004) noted that these findings indicated that AEI may have been used to compensate for the limited intellectual resources. The findings presented by Petrides et al. (2004) are considered in light of the previous research results presented Reiff, et al. (2001), which found the AEI skills of stress management and adaptability were lower in those with a LD than those without a LD. Stress has been found to have contributed to heightened emotional states (Lazarus, 1993b). In addition, EI has been linked to increased psychological and physical responses (increased cortisol levels and cardiovascular blood pressure) associated with stress in adults (Salovey et al., 1995; Salovey, Stroud, Woolery, & Epel, 2002) and adolescents’ depression, hopelessness and suicidal ideation (Ciarrochi et al., 2002). Therein, it may be theoretically plausible that those students with few resources including the students with lower levels of AEI and IQ, were subject to high levels of stress, and therefore needed to utilise their AEI directly in managing their stress,
in order to utilise their cognitive resources effectively in the process of learning and subsequently, their academic achievement.

Furthermore, Colom, Rubio, Shih, and Santacreu (2006) found a strong to moderate correlation between working memory and fluid intelligence whereby increasing levels of IQ were correlated with increasing levels of skills in working memory. Hence, it may also be reasonable to speculate that students with a low IQ and a low working memory would find learning academic tasks harder than those with higher skills in intelligence and higher levels of working memory. Therefore, the students with lower intellectual skills would be anticipated to experience higher levels of stress when challenged by the academic demands in secondary school. In addition, the increased stress may also further reduce the students’ working memory, unless it is managed. This subsequently makes it even harder to perform academically and places more demand on the skills encompassed in AEI to manage and control the stress associated with academic achievement, as demonstrated in the research findings outlined by Petrides et al. (2004).

In addition, as previously mentioned, Petrides et al. (2004) found the association between AEI and academic achievement became weaker in English and GCSE as the students’ IQ increased. At approximately IQ 128, which was one standard deviation above the mean for the cohort, the construct of AEI based on the trait model of EI became increasingly irrelevant to academic performance. Furthermore, a series of ANOVAs were conducted with four groups comprised of students classified as having high IQ skills and low IQ skills; and students with high AEI and low AEI, who were grouped into four groups: Group 1: low IQ/low AEI; Group 2: high IQ/low AEI; Group 3: low IQ/high AEI; Group 4: high IQ/high AEI. The results indicated that for the high IQ group, high or low levels of AEI did not make a significant difference to their academic achievement. However, in the low IQ groups, the higher AEI students had higher academic scores.

In sum, the findings from Petride’s et al. (2004) research based on the Trait EI model were differentiated from the findings presented by Fannin (2001), which were based on the Ability EI model. The Trait Model TEIQue measure and analysis did not identify a main effect for EI that was found in the Ability Model AMEIS measure and analysis. However, the bilinear interactional effect between AEI and IQ (gc) for academic achievement identified by Petrides et al. (2004) provided important insight for educators and researchers into the complexity and variability of the role of AEI in academic achievement. The potential implications of the findings outlined by Petrides et al. (2004)
were further understood in light of the research outlined by Reiff et al. (2001). Research by Reiff et al. (2001) that examined the relationship between AEI and academic achievement in both students with and without in LD, found that both stress and difficulties with adaptability were significant factors in effecting academic achievement in college students. Further, the association of low AEI with anti-social conduct highlighted the importance of AEI for at educationally at-risk adolescents (Petrides et al., 2004). Collectively, these research findings provided evidence of the direct and indirect range of processes that underlined the relationship between AEI and academic achievement; these findings highlighted the importance of understanding the nature of AEI and the role of AEI in academic achievement and in pro-social behaviour, both in mainstream and at educationally at-risk adolescents.

Finally, Petrides’ et al. (2004) also found that AEI was also negatively related to school absences and expulsions. These findings stimulating more research to explore the relationship between AEI and academic performance in: (1) intellectually gifted and non-gifted students (Parker et al., 2009); (2) students within the average to low range of intellectual functioning, potentially experiencing more difficulties learning and LD; (3) students with behavioural issues. Thereby, it is theoretically plausible that the effect of the adolescents’ appraisal (Arnold, 1960b) may partially stimulate the type, valence and degree of emotions experienced. For instance, the individual may experience stress (distress or eustress) (Lazarus, 1993b), which may then partially impact on the degree that AEI is directly utilised in academic achievement.

Zeidner, Shani-Sinovich, Matthews, and Roberts (2005) examined AEI in gifted adolescence using both a trait and an ability measure of AEI. The research findings indicated that there were individual differences in AEI scores for gifted adolescents depending on what measure of AEI was used; hence, individual differences in AEI for gifted adolescents were found to be measure dependent. In addition, Schwean, Saklofske, Widdifield-Konkin, Parker, and Kloosterman (2006) conducted a comparative analysis of gifted and non-gifted students’ self-report AEI. The results found non-gifted students scored higher on interpersonal abilities and gifted students scored higher on intrapersonal and adaptability scales of the EQ-i: YV. Consequently, the research results presented by Schwean et al. (2006) suggested gifted students were not as emotionally intelligent as non-gifted students in their interpersonal skills, which are skills that are used on a daily basis to communicate and to interact with others, in both one to one situations and when
working in groups. Nonetheless, gifted students were more emotionally intelligent than non-gifted students in intrapersonal skills, with their ability to know, understand and utilise ones’ own emotions. In addition, gifted students were more adaptable and therefore more skilled at managing and coping with differences or changes in their environment.

Furthermore, Lee and Olszewski-Kubilius (2006) measured AEI with the EQ-i: YV in both gifted and non-gifted or normative students. A comparison of the gifted students to normative scores found gifted males were similar to normative males for AEI total score; however, gifted females scored lower than normative females (Lee & Olszewski-Kubilius, 2006). In comparison to the normative group, the adaptability scores were higher for the gifted males and the gifted females had lower scores for stress management. Further, Lee and Olszewski-Kubilius (2006) also found AEI scores were not related to academic scores.

Doring (2006) examined the predictive variance of two aspects of EI (emotion receiving and emotional regulation), IQ and teacher rating scales for the academic success of gifted children. Gender was found to be the best predictor of academic success in the Gifted and Talented Program, with gifted females performing better than gifted males (Doring, 2006). Further, Doring (2006) found a significant negative correlation between females’ emotion receiving ability and achievement in Mathematics. A growing body of research exploring gifted students’ EI in relation to social and emotional issues and leadership is emerging (Chan, 2003, 2005a, 2005b; Lee & Olszewski-Kubilius, 2006). Collectively, these research findings have provided evidence to suggest there are individual differences in the development of AEI in the gifted population and the non-gifted population. Further, there are also individual differences in the relationship of AEI to academic achievement in the gifted and non-gifted adolescent populations. The research examining AEI, IQ and academic achievement will now be discussed in other populations of adolescents.

Mestre, Guil, Lopes, Salovey and Gil-Olarte (2006) investigated the relationship between AEI and academic achievement in found the EI of Spanish adolescents ($N = 127$) and their ability to understand and manage emotions as measured by the MSCEIT correlated positively with academic achievement and adaptation for both males and females. Mestre, Guil, Lopes, Salovey and Gil-Olarte (2006) found the self-report EI was not related to the academic achievement after controlling for IQ and the Big Five
personality traits; however, the relationship between “Strategic” EI and academic achievement remained significant.

Hogan (2009) investigated the predictive effect of AEI and social support on academic achievement in Year 10 adolescent students with a Learning Disability (LD) and without a LD. The PhD study by Hogan (2009) also examined the role of verbal IQ, socio-economic status (SES), gender, peer social support, and family support on the relationship between AEI and academic achievement. The study measured AEI with the Bar-On Emotional Quotient Inventory: Youth Version (Bar-On & Parker, 2000), which included four factors entitled: intrapersonal, interpersonal, adaptability and stress management. The students’ social support was measured with the Social Support Behaviors Scale (SSB) (Vaux, Riedel, & Stewart, 1987). Intelligence was measured based on verbal intelligence (IQ). The study cohort was divided into two groups and the analysis will now be presented for Study One and Study Two (Hogan, 2009):

In Study One (N = 192) a paths analysis was conducted to investigate the individual and interactive influence between GPA, IQ, AEI, peer social support and family social support (Hogan, 2009). The study results found that AEI partially mediated the relationship between verbal IQ and GPA in adolescent males; however, this relationship was not significant in adolescent females (Hogan, 2009). The mediating effects of AEI were associated to the effects of adaptability and stress management on verbal IQ and GPA. In addition, the effect of peer and family social supports did not make a significant difference to the path model (Hogan, 2009).

In Study Two (N = 44) the cohort included 22 students with a LD and 22 students without a LD (Hogan, 2009). A series of correlational analysis and hierarchical multiple regressions were conducted between students with a LD and without a LD. A series of separate regressions were conducted to determine the predictive effect of AEI, peer social support, and family social support on academic achievement measured by the students’ GPA. In the step by step regression models, step one included verbal IQ, SES and gender, which were regressed on GPA (Hogan, 2009). In step two, one of the following were included:

- The four AEI scales of intrapersonal, interpersonal, adaptability and stress management; or
- Peer social support including emotional, practical, financial, advice/guidance, and socialising supportive behaviours; or
Family social support including emotional, practical, financial, advice/guidance, and socialising supportive behaviours.

Hogan (2009) found those without a LD had higher scores than those with a LD for a range of variables, including: IQ, GPA, AEI, peer social support, and family social support. In addition, the study found that Reading Comprehension and Mathematics was significantly correlated to the students’ GPA for those with a LD. In contrast, the research findings for the students without a LD indicated the variables AEI, family social support and vocabulary were the most strongly correlated to the students’ GPA. Therefore, the results for Study Two indicated that AEI had no significant impact on academic achievement for the Year 10 students with a LD (Hogan, 2009). In contrast, AEI was predictive of academic achievement for the Year 10 students without a LD. Hence, the student results presented by Hogan (2009) presented mixed results, which highlighted the individual differences in the impact of AEI in the academic achievement of adolescent males and females, as well as students with and without a LD (Hogan, 2009).

Peters et al. (2009) investigated the validity of the MSCEIT: YV (Mayer, Salovey, & Caruso) due to the lack of research instruments for the childhood and adolescent populations. The cohort of students who took part in the study were in Years 4 to 12 and they ranged from 10 to 18 years of age ($M_{age} = 14.3$) ($N = 50$, males = 23, females = 27). This cohort of students was classified in the early ($\geq 10–14$ years) and late ($\geq 15–19$ years) stages of adolescent development; with reference to the stages of adolescent development defined by Sawyer et al. (2012). Therefore, the current literature review will utilise the term AEI in reference to the developmental stage of EI in this cohort. The validity of the MSCEIT: YV was analysed with a range of variables, which included: coping, general cognitive ability (IQ), academic achievement, deviant behaviour, chronological age, and the self-report AEI assessment by Bar-On, the EQ-i:YV (Bar-On & Parker, 2000). The coping scale was only administered to those 13 years and older ($n = 29$), which was a relatively small cohort. The method of analysis was primarily correlational and $t$-tests, the statistically significant findings were at the $p > .05$ level, unless otherwise indicated. Therefore, the study findings outlined by Peters et al. (2009) are not predictive or causal, rather, the findings provided further information into the shared variance of the variables discussed (Field, 2009).

The findings presented by Peters et al. (2009) indicated there was a moderate correlation between AEI as measured by the MSCEIT: YV and AEI as measured by the
EQ-i:YV ($r = .42$). This finding indicated that while both AEI measures had a moderate level of common factors, both tests also measured different attributes of AEI in school-aged adolescent students. Three of the four AEI subsets were positively correlated to chronological age and therefore improved as the adolescent matured. However, the AEI skill of perceiving emotions did not correlate positively with chronological age. Therein, Peters et al. (2009) found that AEI was positively correlated to chronological age in three of the four AEI, which provided evidence that AEI developed with age in the school-aged population of the study.

Peters et al. (2009) measured the general cognitive ability (IQ) with several subsets of the Woodcock–Johnson Test of Cognitive Abilities and Achievement. The relationship between AEI and IQ was $r = .35$, which accounted for 12.2% of the shared variance. This finding provided evidence of a moderate positive relationship between the MSCEIT: YV as a measure of AEI and general cognitive ability or IQ (Petrides et al., 2004). Discipline referrals were negatively correlated to AEI ($r = -.47$), which accounted for 22% of the shared variance. Further, a review of the AEI second-order domains found the strongest negative relationship was between discipline referrals and adolescents’ ability to perceive emotions ($r = -.60$), which accounted for 36% of the shared variance (Petrides et al., 2004). This finding was indicative of the significant relationship between adolescents’ weaker AEI skills in perceiving others emotions and a higher rate of inappropriate behaviours, which were classified as discipline referrals. While this finding was correlational and therefore was not causal (Tabachnick & Fidell, 2007), it provided some insight into the nature and the potential importance of adolescents’ ability to perceive others emotions in discipline issues at school.

Peters et al. (2009) also found there was a significant relationship between AEI and Reading ($r = .35$), as measured by the Woodcock–Johnson (3rd Edition) Academic Achievement Assessment. In contrast, there was not a significant relationship between AEI and Mathematics as measured by the Woodcock–Johnson Assessment (3rd Edition). Further, AEI was more strongly correlated to academic achievement in Reading ($r = .53$) and Mathematics ($r = .36$) when was measured by the scores on the Stanford Achievement Test (SAT) Series 10th Edition. Finally, in a sub-cohort of adolescents attending school ($n = 29$) AEI was significantly and negatively correlated to emotion coping ($r = -.46$). The lower scores in emotion coping were associated to individuals’ having a tendency for responding to stressful situations with emotional outbursts (Peters et al., 2009).
Collectively, these findings provided evidence to suggest that when the test of academic achievement was interpreted as being of greater importance to the student, for example in the SAT as a nationally standardised assessment, the adolescents may have experienced higher levels of stress and therefore utilised higher levels of their AEI in academic achievement. These research findings and the interpretation of the findings were somewhat theoretically consistent with the research findings presented by Petrides et al. (2004); whereby, Petrides et al. (2004) suggested those with lower intellectual skills may have experienced higher levels of stress and therefore utilised high levels of AEI in their academic achievement to compensate for their lower intellectual resources, when faced with academic demands that outweighed their intellectual resources.

Di Fabio and Palazzeschi (2009) completed an analysis of high school students’ (N = 124, Years 11 and 12, M_age = 17, SD = .66) academic success, hypothesising there would be a positive correlative percentage of incremental variance of both Trait and Ability EI, personality and fluid intelligence. The measures included GPA for academic success, while the Eysenck Personality Questionnaire, Revised Short Form, measured personality and the Advance Progressive Matrices measured intelligence. The trait model of EI was measured with the BarOn Emotional Quotient Inventory: Short (the Italian version) (Bar-On, 2002). The subsets of the BarOn EQ-i:S were entitled: Intrapersonal, interpersonal, stress management, and adaptability skills. The ability model of EI was measured with the MSCEIT and included the subsets entitled: perceiving emotions accurately; using emotion to facilitate thought; understanding emotion; and managing emotion (Mayer et al., 2002b).

The three-step hierarchical regression conducted by Di Fabio and Palazzeschi’s (2009) used GPA as the dependent variable: the first step included fluid intelligence; the second step included personality; and the third step alternatively included the MSCEIT, the BarOn EQ-i:S and the subsets of both EI tests. The three-step hierarchical regression results identified the variance in GPA were as follows: (1) fluid intelligence accounted for 10% of the variance; (2) personality accounted for 5% of the greater variance (F = 5.07, p < .001); (3) BarOn EQ-i: S accounted for 5% of the variance (F = 5.63, p < .001); BarOn EQ-i: S subsets accounted for 6% of the variance (F = 3.76, p < .001); MSCIET accounted for 7% of the greater variance (F = 6.60, p < .001); the subsets on the MSCEIT accounted for 12% (F = 5.18, p < .001); while managing emotions was the strongest subscale to predict academic achievement.
The MSCEIT subset entitled managing emotions (Mayer, Salovey, & Caruso, 2004) was the best predictor of academic achievement in the adolescents (Di Fabio & Palazzeschi, 2009). The findings indicated high school students who incorporated the use of emotional information in problem solving, relationships and coping with emotions had better academic achievement. The adolescents’ skills in managing emotions to solve problems or to attain goals may be related to the individual’s development, self-knowledge and social awareness. Di Fabio and Palazzeschi’s (2009) findings suggested that fluid intelligence, personality traits and EI, particularly the MSCEIT the ability to manage emotions, which incorporates the ability to regulate emotions and facilitate emotional and intellectual growth, were linked to better adolescent scholastic performance.

Qualter et al. (2012) conducted a five-year longitudinal study that examined the relationship of the ability model of AEI measured by the MSCEIT:YV (Mayer, Salovey, et al., 2005) and the trait model of AEI as measured by the EQ-i:YV (Bar-On & Parker, 2000) in Year 7 with academic achievement in Year 11. In addition, the relationship between AEI and academic achievement was investigated in adolescent learning with reference to other important predictors of academic achievement such as gender, cognitive ability (IQ) and personality. The assessments of AEI based on the ability and trait models, IQ and personality were conducted when adolescents commenced their Year 7 studies in secondary school. These factors were examined in relation to academic achievement, which were attained from the school at the end of Year 11. In Year 11 the students completed the General Certificate of Secondary Education (GCSE), which was a nationally standardised assessment of academic achievement. The data for adolescent males and females was analysed separately. Structural Equation Modeling (SEM) was utilised in the analysis of the data.

First, Qualter et al. (2012) found there was a series of low to moderate correlational relationship between the ability AEI, which was measured by the MSCEIT:YV and the trait AEI, which was measured by the EQ-i:YV. Five statistically significant correlations between ability and trait AEI were identified in the female cohort, and six correlations were identified in the male cohort; with correlations ranging from $r = -.15$ to $r = .29$. The strongest significant correlation was found between trait AEI interpersonal skills and ability AEI facilitative skills ($r = .29, p < .001$) in adolescent females. The total scores for both ability and trait AEI measures were not included in the
data provided by Qualter et al. (2012), however, the inclusion of the total AEI scores would have assisted in making direct comparisons with other studies. Nonetheless, collectively the moderate correlations between ability AEI and trait AEI identified by Qualter et al. (2012) were consistent with the previous research findings presented by Peters et al. (2009). Therein, both studies offered evidence to support the identification of moderate commonalities and the unique psychometric properties in the constructs of ability and trait AEI, as measured by the MSCEIT:YV and the EQ-i:YV, respectively (Peters et al., 2009; Qualter et al., 2012).

Second, bivariate assessments of the study variables found there were gender differences in a range of factors, whereby adolescent females attained higher scores than adolescent males (Qualter et al., 2012). Females attained higher scores than their male peers in all four subsets of ability AEI, and two subsets of trait AEI entitled intrapersonal and interpersonal traits when in Year 7 in early adolescence (Sawyer et al., 2012). Further, females in the early stage of adolescent development also attained higher scores for neuroticism than adolescent males at the same stage of adolescent development (Qualter et al., 2012). When the students were in the late stage of adolescent development, females attained higher scores in GCSE English Language and English Literature than adolescent males in Year 11 (Qualter et al., 2012).

Third, Qualter et al. (2012) analysed the data in two Structural Equation Models (SEM), with one model for adolescent males and the other for adolescent females. The SEM included the variables of AEI (trait and ability models) cognitive ability (IQ) and academic achievement (GCSE). Personality was not significantly related to academic achievement and therefore not included in the final SEM model. The SEM model presented by Qualter et al. (2012) found mixed results for the adolescent male and female cohorts. The SEM for the adolescent males found ability AEI assessed in Year 7 had a direct effect on academic achievement and moderated the effect of IQ on academic performance in Year 11 (Qualter et al., 2012). Furthermore, in the male cohort, trait AEI had a small direct effect on academic achievement and moderated the effect of ability AEI. In addition, a review of the SEM analysis in the female adolescent cohort found ability AEI measured in Year 7 had direct effect on academic achievement and moderated the effect of IQ on academic performance in Year 11 (Qualter et al., 2012). However, in the female adolescent cohort, trait AEI did not have a statistically significant direct or moderating effect on academic achievement for female adolescents (Qualter et al., 2012).
Hence, the ability model of AEI had a stronger predictive effect on academic achievement than the trait model of AEI.

Collectively, the study findings confirmed that adolescent males and females with higher scores on ability AEI in Year 7 attained higher scores in academic achievement five years later in Year 11, than others. The study findings confirmed that IQ was the strongest predictor of academic achievement, when compared to both ability and trait AEI. Nonetheless, the research findings presented by Qualter et al. (2012) also confirmed that ability AEI moderated the association between IQ and academic achievement uniquely in adolescent males and females:

In the adolescent male cohort, the effect of ability AEI on academic achievement was strongest for adolescent males with low cognitive skills and in males with high cognitive skills. An examination of academic achievement in adolescent males with low and high cognitive ability was conducted in light of their ability AEI skills. The males with low and high cognitive ability and higher ability AEI skills achieved higher academic scores than those with lower ability AEI skills. Therein, for adolescent males with low cognitive skills and high cognitive ability having higher ability AEI skills positively affected their level of academic achievement. However, in the adolescent female cohort, the effect of ability AEI on academic achievement was strongest when females had a high cognitive ability. In contrast to the findings for males, adolescent females’ ability AEI skills did not make such a marked difference to their level of academic achievement when females had low cognitive skills. Hence, in the female adolescent cohort the positive effects ability AEI in academic achievement were most strongly identified in females with high cognitive skills.

The findings outlined by Qualter et al. (2012) provided empirical evidence of the significant longitudinal effect of AEI in the early adolescent stage of development to be predictive of academic achievement five years later in Year 11. Therefore, these research findings implicitly suggest that the development and teaching of AEI skills may improve academic achievement. These findings have also illustrated the differentiated relationships between AEI measured by both ability and trait models, in adolescent male and female academic achievement. Further, Qualter et al. (2012) suggested that future research should examine the individual differences in the relationship between AEI and academic achievement in light of gender and intellectual differences.
Andrei, Mancini, Mazzoni, Russo, and Baldaro (2015) conducted a study to investigate if: first, personality and trait EI were related to social status; second, if social status influenced academic achievement; and third, if gender moderated any of these relationships (N = 595). The study cohort consisted of Italian students who were divided into two smaller cohorts: (1) primary school children (n = 376, M_age = 9.3 years, range 8–10 years); and (2) secondary school adolescents (n = 202, M_age = 12.05 years, range 11–13 years). Based on the age ranges outlined in the current study, the adolescent students are classified in the early adolescent stage of development (Sawyer et al., 2012). Trait EI was measured with the Italian Trait Emotional Intelligence Questionnaire–Child Form (TEIQue-CF) (Mavroveli et al., 2008). General cognitive ability was measured with the Raven’s Coloured Progressive Matrices (J. Raven, Raven, & Court, 2000) and provided a measure of IQ. Academic achievement was determined with reference to the students’ Italian Language scores and Mathematics scores, which were collected at the end of the year and represented the students’ GPA. Students’ social status was identified based on a sociometric model, whereby peer student nominations and self-nominations were used to determine actual and perceived social status. Personality was measured with the Big Five Factors Childhood Form (BFQ-C).

The data was examined with a series of ANOVAs and Pearson’s correlation coefficients. Andrei et al. (2015) found there were developmental differences between the childhood and early adolescent cohorts for IQ, indicators of social status and perceived rejection, and the personality factors of energy and emotional instability. Further, females had higher scores for trait EI than males in both the childhood and early adolescent cohorts. Trait EI in primary school students also had a moderate correlation with all factors of personality: energy r = 41, emotional instability r = -44, agreeableness r = .44, openness r = .36, and conscientiousness r = 41. In addition, primary students’ trait EI also correlated with gender r = .19, self-perceived social acceptance r = .10, social acceptance r = .15 and social rejection r = .14 and Language and Literacy r = .10. There were also significant correlations between trait EI in children with social acceptance and rejection; however, this was not the case with early adolescents. The secondary school students’ trait EI also had a moderate correlation with all factors of personality: energy r = 35, emotional instability r = -40, agreeableness r = .52, openness r = .44, and conscientiousness r = 52. The secondary school students’ trait EI also correlated with gender r = .21, Mathematics r = 30 and Language and Literacy r = .29.
Regression models (hierarchical) were calculated for the primary and secondary cohorts separately. In regard to the regression models that predicted social status for children, Andrei et al. (2015) found the final model for perceived acceptance accounted for 7.1% of the variance; and perceived rejection accounted for 12.2% of the variance. In both regression models gender moderated the effect of trait EI; whereby, the interaction effects were only significant for females. Concerning the regression model for predicting academic achievement, the model for children accounted for 30.6% of the variance and the model for early adolescents accounted for 45.7% of the variance in scholastic performance. In the childhood and early adolescent cohort, the first step of the regression model included age and IQ; the second step included personality factors and trait EI; and the third step of the regression included interaction factors such as trait EI x Gender (Andrei et al., 2015). The results of the regression model for the both the childhood cohort and the early adolescent cohort confirmed that trait EI did not make a significant contribution to the model for social status or academic achievement. Andrei et al. (2015) suggested that the theoretical similarities between the trait model of EI, which was theoretically based in the personality field (Petrides et al., 2007) and the personality factors in the BFQ-C, may have contributed to these findings.

To conclude, Part Three of this literature review has presented theoretical models, psychometric measures and research findings to investigate the relationship between AEI, IQ and gender for academic achievement. Empirical research appears strong enough to suggest that AEI is a construct of psychoeducational significance (Bailie & Ekermans, 2006; Gil-Olarte et al., 2006; Noble Shuler, 2004; Qualter et al., 2012; Schwean et al., 2006; Van der Zee, Thijs, & Schakel, 2002). The review of the research findings \( N = 25 \) identified mixed results; nonetheless, the majority of the research findings provided evidence to demonstrate that AEI had a moderate to low correlative relationship with academic achievement.

The review has examined the direct and indirect relationship between AEI and academic achievement, while also considering the relevant psychological and behavioural variables, which enable or inhibit adolescents’ engagement in the learning process and consequently leads to academic achievement. The review of the literature found AEI was directly and indirectly associated with adolescent academic achievement, which was consistent with the previous assertion made by Parker et al. (2009). Research by Chong Abdullah et al. (2004) found a negative linear relationship between AEI and negative
affect (anxiety, anger and frustration) towards specific secondary school tasks. In
addition, a positive linear relationship was found between AEI and adolescent academic
achievement \( (r = .18) \) in secondary school students (Chong Abdullah et al., 2004).

Research examining the predictive effect of AEI and academic achievement, also
found that when IQ was included in the analysis, the predictive effect of AEI varied. For
instance, research by Mestre et al. (2006) found the AEI ability to understand and manage
emotions as measured by the MSCEIT, was positively correlated to academic
achievement and adaptation in adolescent males and females. However, when IQ and
personality were controlled for, the results indicated only the correlation between the AEI
subsets of understanding emotion and emotional management remained significant for
academic adaptation in males and peer friendships in females (Mestre et al., 2006). In
contrast, Gil-Olarte et al. (2006) found AEI was predictive of academic achievement and
social competence and remained so even when personality and IQ were controlled for in
the analysis. In addition, Qualter et al. (2012) found there was a significant long-term
predictive effect for ability AEI and trait AEI measured in Year 7 for academic
achievement in Year 11. However, there were individual differences in how both ability
and trait AEI directly and indirectly effected academic achievement for adolescent males
and females with different IQ skills.

In addition, researchers have confirmed there were gender differences in the
construct of AEI (Sánchez-Núñez et al., 2008). For instance, this literature review
confirmed that there were gender differences in ability AEI as measured by the four
subsets of the MSCEIT: YV and in two subsets of the EQ-i:YV (Qualter et al., 2012).
Further, that there are unique differences in the ways that AEI effects academic
achievement in adolescent males and females with differentiated intellectual skills
(Qualter et al., 2012). This literature review also confirmed there were individual
differences in the relationship between AEI, IQ and academic achievement, particularly in
relation to intellectually gifted students’ development (Qualter et al., 2012; Schwean et
al., 2006) and students who have lower intellectual skills (Petrides et al., 2004; Qualter et
al., 2012). These findings highlight the importance of conducting further research to
examine the complex nature of the relationship between AEI and academic achievement.

Hence, there are many questions yet to be addressed to determine the nature of the
relationship between AEI and academic achievement (Mayer & Cobb, 2000). First, is AEI
a significant variable that accounts for predictive variance beyond the known variance
already identified by that of IQ and gender? Second, are the individual differences in the relationship between AEI and academic achievement influenced by developmental differences in adolescent IQ and gender? Collectively, the research findings presented in Chapter Two indicated further research is required to explore the simultaneous predictive effect of AEI, IQ and gender in adolescent academic achievement in secondary school students. As few studies have conducted developmentally differentiated research in secondary school adolescent students in the same Year level and developmental stage to investigate the simultaneous predictive effect of AEI, IQ and gender in adolescent academic achievement.

2.4 Implications for The Current Research Study: AEI, IQ and Gender in Academic Achievement

This literature reviewed 25 primary research articles that investigated the nature of AEI in adolescent academic achievement. First, while the primary research findings provided mixed results, the majority of studies provided evidence of a low to moderate positive predictive effect of AEI in adolescent academic achievement (Downey, Mountstephen, et al., 2008; Parker, Creque, et al., 2004). Second, the literature review provided evidence to indicate that AEI was differentiated by gender (Hassan et al., 2009; Qualter et al., 2012). Third, when the relationship between AEI, IQ and academic achievement was investigated, AEI modified the predictive effect of IQ on academic achievement and most strongly effected those with lower intellectual resources (Petrides et al., 2004). Hence, it was concluded that AEI was a significant variable in academic achievement, which could be utilised in developing educational innovations and effective strategies to increase the quality of educational experiences and the completion rates of Australian VCE students to 90% by 2020 (Council of Australian Governments, 2011).

However, the literature review found there were few studies that examined the individual differences in the relationship between AEI, IQ and gender in academic achievement from a multi-level developmental perspective (Zeidner et al., 2003). The current study sought to address this limitation in the research by investigating the individual differences in the simultaneous predictive effect of AEI, IQ and gender in adolescent academic achievement, from an ecological human developmental perspective (Bronfenbrenner, 1977). With reference to the ecological developmental model (Bronfenbrenner, 1977) the individual differences in the predictive effect of AEI on academic achievement identified in previous research findings, were conceptualised as
being a dynamic, developmental and an adaptive response to the changing relationship between the growing individual adolescent and the demands of their learning environment at school. Therefore, the current research study sought to examine the individual differences in the simultaneous predictive effect of AEI, IQ and gender in academic achievement by examining the predictive effect of AEI for academic achievement in four IQ and gender combination groups. A simultaneous saturated regression model would allow a detailed analysis of the unique predictive effect of each variable and the decomposition of the regression model would provide insight into the individual differences of the predictive effect of AEI in academic achievement for the four groups. Therefore, the current research study aims to address the gap in the current research literature that seeks to understand the nature of the predictive effect of AEI in adolescent achievement; by conducting a simultaneous regression analysis of the predictive effect of AEI, IQ and gender for VCE academic achievement in Year 12 secondary school students.

Based on an ecological theory of human development (Bronfenbrenner, 1977) the current study theorised that individual differences in the predictive effect of AEI on academic achievement may be dynamically influenced by the developmental resources of the individual (AEI, IQ and gender) to meet the psychosocial and academic demands of their secondary school environment. The individual adolescent’s developmental resources (AEI, IQ and gender) may have acted as an antecedent, which was then influenced by the adolescent’s appraisal of their chances to utilise their resources to successfully or unsuccessfully meet their biopsychosocial needs (Gemelli, 2013), the environmental academic demands of VCE and achieve their personal goals (Bronfenbrenner, 1977). The interaction between the individual adolescent’s developmental resources (Gemelli, 2013) and the demands of the environment were anticipated to create a degree of emotional stimulus or tension (Lazarus, 1993b), i.e. stress (ranging from distress to eustress). The degree of appraised stress (Lazarus, 1995) was anticipated to stimulate the need for AEI in academic achievement and consequently, influence the degree that AEI was directly utilised by the adolescent in academic achievement.

With reference to the individuals’ resources (AEI, IQ and gender) in the holistic process of learning and consequently academic achievement: intelligence as measured by IQ remains the strongest predictor of academic achievement (Jensen, 1998). Therefore, a low IQ presented a major risk factor and a high IQ was a major protective factor for
academic achievement. Previous research has also found AEI was positively predictive of academic achievement (Downey, Mountstephen, et al., 2008; Parker, Creque, et al., 2004; Rivers et al., 2012). Therefore, low AEI was a moderate risk factor and high AEI was a moderate protective factor for academic achievement. Gender differences were found in both AEI (Hassan et al., 2009; Qualter et al., 2012) and academic achievement (Kaufman, Reynolds, Liu, Kaufman, & McGrew, 2012), with adolescent females scoring higher than adolescent males.

The current study was designed to build upon the previous research of Petrides et al. (2004), by including a measure of gf and considering the role of gender in adolescent students in their final year of secondary school. It was hypothesised that AEI would be a significant factor in academic achievement, even when the simultaneous predictive effect of IQ and gender were also taken into account. Further, it was also anticipated that there would be individual differences in the predictive effect of AEI in academic achievement, based on developmental differences in IQ and gender. Previous research by Petrides et al. (2004), was based on the trait model of EI. The adult version of the SUEIT has been found to have been a psychometrically valid and reliable measure of the trait model of EI (Palmer & Stough, 2001b; Stough & Palmer, 2003). The SUEIT: A (Luebbers et al., 2007) has been normed and used in research with Australian adolescent students (Downey, Mountstephen, et al., 2008). Consequently, the SUEIT: A (Luebbers et al., 2007) was selected as the measure of AEI for the current study. The SUEIT: A provided a self-report measure of AEI that included a total AEI score and the scores for five AEI traits. The SUEIT: A traits were entitled: emotional recognition and expression; understanding emotions; emotions direct cognition and emotional management and control (Luebbers et al., 2007).

The measure of intelligence utilised in research by Petrides et al. (2004) was based on gc as a measure of IQ. In the current study, intelligence was based on a gf measure of IQ. It was anticipated that the inclusion of a measure of gf in the current study would provide a differentiated more effective measure of g (Jensen, 1998). It was theorised that by including: (1) a measure of gf to determine adolescents’ IQ; and (2) a measure of gender in the current study, the current study would expand the previous research conducted by Petrides et al. (2004). Further, it was argued that an optimal research model for the current study should incorporate the investigation of the simultaneous interactions of AEI, IQ and gender in adolescent academic achievement; in order to assess the role of
AEI in adolescent learning and academic achievement from a multi-level holistic developmental perspective (Zeidner et al., 2003).

To date, there are few research designs that have targeted: (1) the late stage of adolescent development; (2) adolescents in the secondary school environment rather than the university educational environment; and (3) investigated the predictive significance of AEI to account for academic achievement from a holistic ecological developmental perspective (Bronfenbrenner, 1977) by simultaneously including other adolescent developmental factors that are predictive of academic achievement, such as intelligence and gender. There are few studies known to the author, which had previously conducted research to determine the simultaneous predictive effect of AEI, IQ and gender in academic achievement of secondary school students who were in the late stage of adolescent development.

Therefore, the results of the literature review suggested that further research was required into the simulations predictive effects of AEI, IQ (gf) and gender for adolescent academic achievement in Year 12 VCE students. Research simultaneously considering the predictive effects of the three variables, AEI, IQ and gender in an adolescent academic achievement was required in order to build on previous research Petrides et al. (2004). It was anticipated that this research would provide further insight into the complex and unique of AEI in academic achievement for adolescent male and adolescent female students with variable intellectual skills, who were in the late stage of adolescent development. The current research study theorised that a statistically significant relationship may be identified between AEI total score or one of the AEI trait scores, IQ (gf) and gender for the academic achievement of students attending secondary school. Hence, in order to extend the seminal research by Petrides et al. (2004) the current study sought to investigate the individual differences in simultaneous predictive effect of AEI, IQ and gender in academic achievement of Year 12 students completing their VCE in Victoria, Australia.

2.5 Conclusion: Chapter Two

This literature review has analysed a range of EI theoretical models, conceptual definitions, methodological research designs and research findings, which were considered to be formative to an understanding of the relationship between AEI and academic achievement. Further, the literature review aimed to investigate the current research findings that explored the individual differences in the relationship between AEI
and academic achievement; particularly in light of the developmental differences in adolescents’ IQ and gender to effect this relationship.

Therein, the aetiology of EI was investigated with reference to the previous research and theoretical models of emotion (Section 2.1) and intelligence (Section 2.2), which were foundational to the theoretical contextualisation of EI models (Mayer et al., 1990; Salovey & Mayer, 1990). The theoretical models and measures of EI were presented (Section 2.3), with reference to three models of EI, which were entitled: the psychodynamic model of EI (Leuner, 1966), the ability model of EI (Mayer, 2000), and the trait model of EI (Petrides & Furnham, 2000b). Additionally, a review of the psychometric measures EI developed for the adult population based on the ability model of EI and the trait model of EI, were presented and then critiqued.

Subsequently, the review of the literature also outlined a range of AEI models and psychometric measures (Section 2.4). Both measures developed to assess CEI (Windingstad et al., 2011) and AEI (Luebbers et al., 2007) were analysed. Furthermore, the construct of AEI was developmentally conceptualised from a multi-level perspective of EI (Zeidner et al., 2003) and understood with reference to changes in adolescent biopsychosocial development (Gemelli, 2013) throughout the three stages of adolescent development (Sawyer et al., 2012) (Section 2.5). For example, the asynchronous neurodevelopmental structural and functional changes in adolescent emotional systems and cognitive systems (Spear, 2013; Steinberg, 2010) was acknowledged and theorised to uniquely differentiate the development of AEI (Zeidner et al., 2003) from the onset to the completion of the adolescent stage of development (Sawyer et al., 2012). Furthermore, the rapid changes in the nature of adolescence, i.e. the early onset of adolescence and the protracted completion of the adolescent period (Gluckman et al., 2009) has also impacted on the changing nature of educational systems, which seek to optimise students’ levels of academic achievement as a prerequisite for employment in a technological globalised economy (OECD, 2014) (Section 2.6).

Finally, the previous research findings that investigated the relationship between AEI and academic achievement were analysed ($N = 25$) (Section 2.7). The literature review primarily focused on the direct and indirect relationship between AEI and academic achievement in secondary students, who were in the early and late stage of adolescent development (Sawyer et al., 2012). Hence, the literature review analysed the EI theoretical framework to contextualise the research studies that examined the
relationship between AEI and academic achievement, which subsequently influenced the design of the current study as outlined (Section 2.8).

In summary, the scope and sequence of this literature review were designed to encompass the relevant theoretical models and research findings to illuminate the unique developmental nature of AEI throughout the three stages of adolescent development. Further, it also sought to investigate the direct and indirect relationship between AEI and academic achievement, particularly in light of other developmental factors such as IQ and gender to differentiate that relationship. Formative to this literature review was an understanding of the changing biopsychosocial developmental stages of adolescence (Steinberg, 2011a), in particular, the changes in the adolescent cognitive and emotional systems (Spear, 2013) that had the potential to differentiate the development of AEI (Zeidner et al., 2003). The development of AEI was understood with reference to the three stages of adolescent development entitled: early adolescence, late adolescence and young adulthood (Sawyer et al., 2012). Therein, this literature review sought to gain an understanding of the developmental nature of AEI throughout the three stages of adolescence and how AEI was related to academic achievement. Further, the individual differences in the relationship between AEI and academic achievement were also theorised to be influenced by differences in adolescent biopsychosocial development (Gemelli, 2013) and the academic demands of the primary, secondary and tertiary educational environments (Bronfenbrenner, 1977). This review of the literature primarily aimed to examine research that has investigated the relationship between AEI and academic achievement in adolescent students attending secondary school, who were in the early and late adolescent stage of development. In addition, this review of the literature also discussed AEI in young adulthood, childhood and adulthood.

Based on the findings outlined in the literature review, the current research study broadly sought to build upon the previous research of Petrides et al. (2004). A review of the literature confirmed that there were few studies that had examined the simultaneous predictive effect of AEI, IQ and gender in the academic achievement of secondary school students. The current study sought to address this limitation in the literature and therefore aimed to investigate the simultaneous predictive effect of AEI, IQ and gender in the academic achievement of Year 12 students, who were in the late stage of adolescent development (Sawyer et al., 2012). In this study the AEI theoretical model was based on the trait model of EI. The AEI psychometric measure selected for the current study was
the SUEIT: A (Luebbers et al., 2007). The SUEIT: A encompassed the traits of emotional recognition and expression, understanding emotions, emotions direct cognition and emotional management and control (Palmer & Stough, 2001b; Stough & Palmer, 2003). The Raven’s Standard Progressive Matrices (J. C. Raven, 2000) was selected for the current study as a measure fluid intelligence, referred to as “gf” (Jensen, 1998). The measure of academic achievement selected for the current study was the VCE Year 12 academic achievement score. The VCE score was selected as it was a statewide standardised score of academic achievement (VCAA, 2003a), which was also used as a national (OECD, 2013b) and international measure of academic achievement (OECD, 2014).

In conclusion, with reference to the findings presented in Chapter Two this study now aims to extend the previous research findings outlined by Petrides et al. (2004). Therein, this study will examine the individual differences in the simultaneous predictive effect of AEI, IQ (gf) and gender in VCE academic achievement for students in Year 12. The hypotheses and a detailed outline of the research methodology and data analysis designed for this study will now be presented in Chapter Three.
CHAPTER THREE

Methodology

Chapter Three presents the methodology for the study, which is based upon the literature review that led to Null Hypotheses One and Two. The study methodology includes an outline of the univariate, bivariate and multivariate statistical analysis procedures used for the data analysis. A GLM saturated multiple linear regression model was used to conduct the analysis of the simultaneous predictive effects of AEI, IQ and gender for VCE academic achievement. The study methodology incorporates the analysis for the total cohort, while individual differences in the predictive effects of AEI for VCE academic achievement are further investigated in the four adolescent IQ and gender combination subgroups.

The process used for the categorical division of the total cohort into subgroups, based on the students’ IQ and gender, is also outlined. The final IQ and gender combination groups were entitled the female high group, female low group, male high group and the male low group. The analysis of the total cohort, followed by the four IQ and gender groups provided a research design that supported a controlled investigation of the individual differences in the relationship between AEI, IQ and gender for VCE academic achievement. The male and female students in the cohort were subject to the rapid developmental and maturational changes associated to the late stage of adolescent development (Sawyer et al., 2012), particularly the asynchronous maturation of their cognitive and emotional systems to affect their decision making and risk-taking behaviours (Spear, 2013; Steinberg, 2011b). Hence, the Year 12 adolescents in the current study were concurrently challenged by the need to accommodate and adapt to their individual adolescent psychosocial demands (Steinberg, 2011a) and the environmental demands of VCE academic achievement in a globalised economy (OECD, 2014).

Hence, the study methodology is presented by outlining the research as follows:

3.1 Purpose
3.2 Ethics Approval
3.3 Null Hypotheses
3.4 Variables
3.5 Method
3.6 Sample
3.1 Purpose

The purpose of this study was to determine the individual differences in the simultaneous predictive variance of AEI, IQ, and gender for VCE academic achievement in Year 12 students in the late adolescent stage of development.

3.2 Ethics Approval

Because students participated in this study, the Human Research Ethics Committee of the University of Melbourne examined and approved the project’s details that included: a) the aims and significance of the project; b) the proposed methodology; and c) the procedure and estimation of any potential risks to the participants. All appropriate ethics procedures were implemented to ensure full confidentiality of information. Confidentiality for the participating schools and students participating in the study was maintained by following the standard ethical guidelines for human research; for example, no schools or students were identified in any of the research documents. Students and parents were provided with contact names and telephone numbers for both The University of Melbourne and the researchers conducting the study (see Appendix D). The Human Research Ethics Committee of the University of Melbourne also approved an extension in the timescale of the study (see Appendix E).

Following the approval from the Human Research Ethics Committee of the University of Melbourne, the Catholic Education Office for the Archdiocese of Melbourne was asked to approve the ethics of the study, allowing the researcher to invite Catholic secondary schools in the Geelong Region to take part. The Catholic Education Office in the Archdiocese of Melbourne also examined and approved the research in principle, subject to the standard conditions outlined in their letter of response (see Appendix F, Reference Number GE05/0009).
3.3 Null Hypotheses

In light of the previous research reviewed and the research questions outlined, the following null hypotheses were formulated:

**Null Hypothesis One:** The combined effects of adolescent emotional intelligence total, IQ, gender, and their interactions will not be predictive of academic achievement.

**Null Hypothesis Two**(a, b, c, d)**: The combined effects of each of the subscales of adolescent emotional intelligence traits: emotional recognition and expression***(a)***, understanding emotions**(b)**, emotions direct cognition**(c)** and emotional management and control**(d)**, IQ, gender, and their interactions will not be predictive of academic achievement.

3.4 Variables

In each analysis, the criterion or dependent variable was the VCE score, and the set of predictor or independent variables always included IQ (low group and high group) and gender (male and female) alongside one of the following: AEI total, emotional recognition and expression, understanding emotions, emotions direct cognition, or emotional management and control.

3.5 Method

The research method used for the study was correlational and predictive, and analysis of variance and t-test correlational techniques were used to determine the extent to which two or more variables were related (Palmer & Stough, 2001b; Stough & Palmer, 2003). A GLM saturated multiple linear regression model was used as a predictive research technique (Pallant, 2007). To enhance the significance of the present psychometric analysis, the “individual student” was selected as the unit of analysis for this study (Tabachnick & Fidell, 2007). Further, the research considered the simultaneous effects of the three variables: AEI, IQ, and gender for VCE academic achievement. This method of statistical analysis made it possible to study these variables firstly, as predictors of academic achievement for the total cohort from a holistic learning perspective in order to identify global trends in the data; and secondly, as subgroups in order to examine comparative individual differences in the data associated to each subgroup (Heiman, 2001).
A GLM saturated multiple linear regression model was used to explore the main effects of each variable and the interactions of the AEI total score and AEI trait scores: emotional recognition and expression, understanding emotions, emotions direct cognition and emotional management and control, IQ (high group and low group) and gender (male and female) (Tabachnick & Fidell, 2007). The decomposition of the GLM saturated multiple linear regression model allowed the development of five regression equations. The first model, Model E, represented the main effects and interactions of all variables for the AEI total score. The four subsequent regression models were representative of the AEI trait scores, with each model representing decomposition for IQ and gender.

The research design was non-experimental as the subjects were voluntary participants from four schools (Tabachnick & Fidell, 2007). The research design aimed to predict if components of AEI, IQ and gender were simultaneously utilised by adolescents in their VCE academic achievement. Australian secondary schools commonly includes adolescent students from Year 7 to Year 12 (OECD, 2011). As previously outlined in Chapter One (Section 1.4.2), formative developmental changes occur in the adolescent cognitive and emotional systems throughout the adolescent period (Spear, 2013), which were plausibly argued to impact on the development of AEI. Hence, the cohort was limited to a single year level in order to control for the developmental variance found in the adolescent population in Australian secondary schools. Further, the research design was developed to support the investigation of individual differences in the predictive effect of AEI in academic achievement by creating four IQ and gender combination subgroups. The four IQ and gender combination groups were designed in order to investigate if there were individual differences in the predictive effect of AEI in VCE academic achievement in the four groups. The findings may provide further insight into if and how developmental changes in adolescent cognition, gender and AEI influenced how adolescents to utilised their AEI in the predictive variance of VCE academic achievement (Field, 2009).

The variables were measured with instruments that assessed the students’ current levels of AEI as measured by the Swinburne University Emotional Intelligence Test: Adolescent Version; IQ as measured by fluid intelligence “gf” with the Raven’s Standard Progressive Matrices; academic achievement as measured by each student’s VCE score; and gender analysis. The research design enabled the identification of the simultaneous predictive variance accounted for by the variables AEI, IQ and gender for academic
achievement. The design of the study also made it possible to determine if the relationship between AEI and VCE academic achievement was or was not directly or indirectly, influenced by the individual differences in IQ and gender. The method provided a clear, controlled procedure for testing the two hypotheses with a group of adolescent students. It presented operationally defined criteria and referenced measures intended to facilitate replication of the study in other comparable adolescent cohorts, both nationally and internationally (Judd, McClelland, & Ryan, 2009; Tabachnick & Fidell, 2007).

3.6 Sample

The initial cohort of 376 students was reduced in number because of the withdrawal of one student from the study, two invalid Raven’s Standard Progressive Matrices tests, and four students with four or less VCE study scores. The final cohort of $N = 369$ consisted of females ($n = 145; 39.3\%$) and males ($n = 224; 60.7\%)$.

3.6.1 Target Sample

The study cohort used to test the null hypotheses was considered appropriate for the investigation as it encompassed:

- A representative sample of male and female VCE students in the study.
- A study sample that supported a comparative analyse with previous research findings in the adolescent population (Burns, 1995). Previous research found there was no statistically significant relationship between EI and academic achievement for adolescent students with high intelligence (Woitaszewski, 2000). In contrast, the relationship between EI and academic achievement was strongest for adolescent students who were educationally vulnerable or disadvantaged; such as those in the lower range of intellectual functioning (Petrides et al., 2004) and those with learning difficulties (Reiff et al., 2001). Therefore, this study included students within the normative spread of intellectual development. The current study also included a number of students with high intellectual potential, who had an IQ ($gf$) score that was at or above two standard deviations above the mean. The current study also included students who had an IQ score that was at or below two standard deviations below the mean. Including adolescent students with a range of intellectual skills in the sample cohort, make it possible to conduct an appropriate statistical
analysis and thoroughly examine the potential for individual differences in males and females with comparatively high and low fluid intelligence.

- In order to minimise the variance in adolescent cognitive and affective developmental maturation evident in the early, middle, and late adolescent stages of development (Giedd et al., 1999; Spear, 2013; Steinberg et al., 2008), this study targeted a single year level Year 12.

- The final year of secondary school, Year 12, was selected for this study. Year 12 is typically considered to be an academically rigorous period of learning and academic achievement. Year 12 academic achievement scores are key predictors of entry into tertiary study, adult employment and National economic growth (OECD, 2014). Year 12 has been acknowledged as an important transitional year, as each student’s VCE score is a key indicator of the student’s ability transition into employment or tertiary study (OECD, 2013b). Each student’s standardised VCE academic achievement score is derived from standardised work requirements, tests, and exams (VCAA, 2010b). The Victorian statewide standardisation of the VCE curriculum and the associated assessments are argued to reduce the potential variability associated with unstandardised school or classroom-based curriculum assessments and teacher grading (Jensen, 1998). The Victorian Curriculum and Assessment Authority (VCAA) scheduled the curriculum assessments and exams, therein increasing the reliability and validity of the VCE assessment results to effectively assess each student’s level of academic achievement over their Year 12 course of study (VCAA, 2010b).

- A sample number of approximately 300 students facilitated robust statistical analysis via multiple regression modelling (Field, 2009; Tabachnick & Fidell, 2007).

### 3.6.2 Schools

Six secondary schools, located in a township with a residential population of 216, 330 within the state of Victoria, Australia (ABS, 2010), were invited to participate in the study. Two schools declined to take part in the study. Four schools accepted the invitation to participate in the study. The four participating schools included two Independent
schools and two Catholic schools. The two Independent schools taught students who were male and female, while the two Catholic schools taught students of the same gender, with one Catholic school teaching males and the other school teaching females. Because participation in the study was entirely voluntary, the sample used was non-random (Tabachnick & Fidell, 2007).

The rights and responsibilities of all key stakeholders were developed according to The University of Melbourne, Human Research Ethics Guidelines. A meeting was conducted with the principal of each school, and they were provided with an outline of the rights and responsibilities of the school, the students, and the parents of the students participating in the study. The participating schools, students, and parents were informed that they had the right to withdraw from the study if they so desired. They were also given an outline of the administrative processes used during the study, as well as the support processes associated with participation. A letter of request to participate in the research was sent to the four schools (see Appendix G), and the principals each signed a letter confirming the school’s participation in the research study.

3.6.3 Ethics

The Human Research Ethics Council at The University of Melbourne and The Catholic Education Office in the Archdiocese of Melbourne approved the research ethics (see Appendices D and E). Consequently, a meeting was convened with each of the respective school principals to present and discuss the ethics of this research study. During this meeting, the researcher discussed the ethical guidelines relevant to the research study. Each principal was provided with the letter of request for participation in the research project (see Appendix G), which included a comprehensive outline of the study ethics framework and structure incorporated in the study. In addition, the participating schools received student/parent/guardian information forms, describing the study and the participants’ rights and responsibilities in accordance with the human research ethics guidelines. These were distributed to the students and their parents/guardians (see Appendix H), and the parents/guardians and students who agreed to participate in the study signed a detailed consent form (see Appendix I).

3.7 Student Consent Process

VCE students were informed about the study and were invited to voluntarily participate in the research. First, students were verbally informed about the study at their respective school assembly times or VCE school meetings, and were invited to
participate. Second, a written notice in each school’s newsletter informed parents and students about the research proposal and invited them to take part in the study. Third, letters posted to the homes and/or the residential address of the VCE students included an invitation to participate in the study. In the information letter, the students and consenting parents or guardians could agree to volunteer for the study by completing and returning the consent form (see Appendix G). To encourage better response rates, the letters included a stamped, pre-addressed envelope, allowing participants to return the consent form by mail or deliver the form to their respective schools. Participants received the following materials via mail:

- a written statement explaining the research;
- the consent form explaining the voluntary nature of participation and the right to withdraw and/or seek support following the collection of data; and
- a pre-paid return envelope that was addressed to the respective school.

Consent forms were mailed out to parents/guardians from the four participating schools and teachers at each school collated the returned consent forms. Consent forms were received from 376 students, but the total number of participants was reduced to 369 due to the removal of compromised data associated with seven students. The final study cohort suitable for statistical analysis was comprised of 224 males (60.7%) and 145 females (39.3%).

3.8 Measures

The VCE scores were collected from the four participating schools. Students completed the Raven’s Standard Progressive Matrices (J. C. Raven, 1938) and the Swinburne University Emotional Intelligence Test: Adolescent Version (SUEIT: A) (Luebbers et al., 2007) under the supervision of the study’s researcher and teachers from the respective schools (see Appendices H and I). These two measures were successfully administered in time allocations that minimised any interruptions for teachers and students during the delivery of the VCE curriculum. The three measures in the study were selected because they were considered to meet adequate levels of reliability and validity, could be used in a school setting for approximately 350 students, and optimised the study replicability. The three measures for this study will be described in the following section.
3.8.1 Victorian Certificate of Education

The VCE scores are Victorian State standardised measurements of the students’ academic achievement (VTAC, 2004). Therefore, the VCE scores provided a standardised measure the academic achievement of the participants in the study (VCAA, 2010b). The VCE scores were used as a measure of academic achievement in the current study because they were:

- a standardised, valid and reliable measure of the students’ academic achievement, which is traditionally incorporated as a key indicator of academic achievement at a Victorian state, Australian national and OECD international level;
- a standardised academic assessment that is normatively conducted within the within the process of completing VCE in the State of Victoria. By utilising the VCE academic assessment results already scheduled and incorporated in VCE, rather than administrating additional academic assessments to the students, the pressure and interruption to the participating VCE students’ study was relatively minimised; and
- a standardised measure of academic achievement, which potentially reduce the inherent variance associated to unstandardised academic assessments that are typically developed by individual teachers for their specific class of students.

The VCE is the credential given to students who complete study over a two-year period, with Units 1 and 2 studied in Year 11, and Units 3 and 4 studied in Year 12 (VCAA, 2003b). In order to be awarded the VCE, students are required to select and study a range of five or six subjects each year. This subject selection includes English, English as a Second Language (ESL), or Literature as a compulsory subject. Students are required to complete four units of English/ESL/Literature and pass at least three of these units.

The Victorian Curriculum Assessment Authority (VCAA) awards study scores to students who satisfactorily completed Units 3 and 4 of a VCE study. These study scores are the standardised score allocated to each curriculum area or subject studied in the VCE and they are calculated for each subject through graded assessment tasks and examinations (VCAA, 2010b). The distribution of the study scores is normalised using an
inverse normal function. A study score of 50 indicates that a student had scored in the top half of the cohort, and a score of 0 indicated that a student had scored at the bottom half of the cohort. A study score of 30 is the mean, with a standard deviation of seven, which was then truncated at 0 and 50, with approximately 72% of the cohort achieving study scores of between 23 and 37. The VCAA scaling of the study scores allows for any variation in the strength of the competition between students studying various subjects (VTAC, 2004, 2010).

In 2010, the VCE Equivalent National Tertiary Entrance Rank (ENTER) was replaced with the term the VCE Australian Tertiary Admission Rank (ATAR). The Equivalent National Tertiary Entrance Rank (ENTER), or Australian Tertiary Admission Rank (ATAR) score, is a measure of the student’s ranking in the VCE total cohort (VCAA, 2003a). For example, a VCE ENTER score of 50.00 indicated that a student’s scores were higher than 50% of the student cohort (VCAA, 2003a; VTAC, 2010). A VCE ENTER score of 60 indicated that a student had achieved a VCE ENTER score higher than 60% of the student cohort; and a score of 70 indicated a VCE ENTER score higher than 70% of the student cohort. The VTAC database reported VCE ENTER scores ranging from 13.85 to 99.95 to the school principal. The VTAC reported all VCE scores that were 30 or below 30 as “30 or below” to students.

An individual student’s VCE ENTER score was derived from their English, English as a Second Language (ESL), or Literature score, plus the study scores of the next three best subjects/studies, and 10% of the next best two study scores, if available. This score was used to determine the students’ percentile ranking between 0 and 99.95, using increments of 0.05. Students were ranked in order of their VCE ENTER scores across the full VCE cohort. The VCE ENTER score process involved ranking Year 12 students among all students in their cohort, including students who commenced but did not complete Year 12, as well as those who left school prior to Year 12 (VTAC, 2011).

3.8.2 The Raven’s Standard Progressive Matrices

The Wechsler Intelligence Scale (Wechsler, 1949, 1955, 1967, 1991) and the Stanford-Binet Intelligence Scale (Becker, 2003; Roid, 2003; Terman, 1916; Terman & Merrill, 1937; E. L. Thorndike, Hagen, & Sattler, 1986) are internationally recognised measures of intelligence used in clinical and research settings, and are usually administered to individuals by a psychologist. In the current study it was considered impractical to administer individual intelligence tests to over 300 VCE students, due to
the prohibitive cost and time involved in using a psychologist to complete the intelligence
tests individually for each student.

Therefore, in this study, the Raven’s Standard Progressive Matrices (RSPM) was
selected as a measure of fluid intelligence $gf$, indicating the students’ IQ. The RSPM is a
perceptual reasoning test that measures innate intelligence and is considered to be culture-
free (De Lemos, 1995). The RSPM has a sound theoretical basis, and has been utilised
internationally in research for over 50 years (Van der Ven & Ellis, 2000). It is considered
to be a valid and reliable measurement of Spearman’s $g$ (Spearman, 1904, 1923, 1927);
specifically $gf$, described as a measure of innate, abstract fluid reasoning (Jensen, 1998).

The RSPM is an effective and reliable assessment for teachers and researchers to
administer to students in a mainstream school environment, individually or in groups, in a
time and cost-efficient manner (De Lemos, 1995; J. C. Raven, 2000). In the study, the
participating teachers were briefed and individually supported while developing the skills
to administer RSPM (see Appendix J), expediting the assessment process in schools. The
tests produced statistical results that facilitated the direct comparative statistical analysis
of adolescent students from different cultures, genders, and schools (J. C. Raven, 1989,

The RSPM consists of perceptual analogy and inductive reasoning problems
presented in the form of a matrix (J. C. Raven, 1938, 1995). These matrices present
perceptual analogies simultaneously, incorporating both horizontal and vertical
transformations, and they include a wide range of figures, relationships and
transformations, such as: an increase and decrease in size, elements added or subtracted,
shaded or unshaded, flipped; rotated; or mirror imaged. In each example, the lower right-
hand corner of the total matrix is missing, and the student selects the best option for
completing the matrix (see Appendix H). In the study, the RSPM test consisted of a series
of diagrams with a section or tile missing. From a number of tiles, the student picked the
tile they thought completed the design. The raw score of the RSPM test was equated to a
standardised score presented in the assessment manual (De Lemos, 1995), and in this
study, this standardised score was referred to as the students’ IQ.

3.8.3 Swinburne University Emotional Intelligence Test: AV 2.0

In this study, AEI was measured with the Swinburne University Emotional
Intelligence Test: Adolescent Version 2.0 (SUEIT: A) (Luebbers et al., 2007). The
SUEIT: A was selected as a measure of EI because it was developed to incorporate
language and concepts for an adolescent population and was normed with an Australian
population. The SUEIT: A is a self-report inventory that indexes the way in which an
adolescent indicates how they typically think, feel, and act. Therefore, the test design
enabled students to complete the test in school settings under the supervision of
researchers and teachers. The ability to correct the SUIET: A student response sheets
electronically at the Swinburne University of Technology enhanced the accuracy and
speed of the assessment process. The test provided an overall score, which measured an
individual’s AEI, and four subscale scores that indicated specific capacities according to
the four dimensions of AEI, in the model.

The SUEIT: A was developed and reviewed in two studies, and met the
appropriate levels of reliability and validity required (Luebbers et al., 2007; Palmer,
Stough, et al., 2003). The first study (Palmer, Stough, et al., 2003) modified the five-
factor Adult Version of the SUEIT to address the developmental needs of an adolescent
population. This study modified the vocabulary of the items to target a level of language
comprehension suitable for an adolescent population. In the second study (Luebbers et al.,
2007), the SUEIT: A was administered to a cohort of 1,002 adolescents, allowing the
researchers to identify the significant factors of the model and to determine the reliability
and validity of the SUEIT: A measure. The results indicated that four factors were the
most representative of the sample, and the subscale reliability was moderate to high. The
results also indicated the adolescents’ EI abilities were positively related to age, because
the mean scores were below those found in the adult population. Further, the adolescent
females had a higher level of EI than males, which was consistent with the gender
differentiation found in the adult population.

Therefore, the SUEIT: A was considered a valid and reliable measure to use for
this study (Luebbers et al., 2007). The SUEIT: A was designed for adolescents between
Year 7 (approximately 12 years of age) and Year 12 (approximately 18 years of age). The
SUEIT: A four-factor model encompassed a number of traits: (1) emotional recognition
and expression, (2) understanding emotions, (3) emotions direct cognition, and (4)
emotional management and control. Definitions of the four SUEIT: A traits and an
example of one item used to measure each trait, as well as a definition of the AEI total
score include:
(1) **Emotional recognition and expression**: The ability to identify one’s personal feelings and emotional states and the ability to express those inner feelings to others. For example, “I can tell others how I feel about things”.

(2) **Understanding emotions**: The ability to identify and understand the emotions of others. For example, “I can tell how others are feeling”.

(3) **Emotions direct cognition**: The extent to which emotions and emotional knowledge are incorporated in decision making and problem solving. For example, “When I try to solve problems I keep my feelings out of it”.

(4) **Emotional management and control**: The ability to manage positive and negative emotions within oneself and others and control strong emotional states. For example, “I find it difficult to calm people down when they are worried or stressed”.

(5) **Total adolescent emotional intelligence**: The adolescents’ ability to recognise, express and understand emotions in one’s self and in others. To think intelligently about one’s own and others’ emotions, to identify how emotions influence thoughts in problem solving, decision making and therefore adolescent behaviours. Further, for the adolescent to understand how to manage and control their own and others emotions adaptively within their environment.

The SUEIT: A included 64 items and took approximately 15 to 20 minutes to complete (Luebbers et al., 2007). This measure consisted of four AEI traits: emotional recognition and expression (13 items), understanding emotions (21 items), emotions direct cognition (12 items), and emotional management and control (18 items). The participants provided their responses on the questionnaire, which used a five-point Likert Scale that ranged from 1 “Very Seldom” to 5 “Very Often”. The raw scores were converted to percentages: 020 % = Very Low, 2140% = Low, 4160 % = Average, 6180 % = High, 81100 % = Very High. Respondents were instructed to indicate the extent to which each statement was true in relation to the way they typically thought, felt, and acted.

The four AEI traits scores, namely emotional recognition and expression, emotional understanding, emotions direct cognition, and emotional management and control, were combined to give the total AEI score. The AEI trait raw scores were normalised to a standardised score with a scaled score mean of zero and standard
deviation of one. The corresponding percentile ranks determined the AEI total and trait scores. Thus, the SUEIT: A scores provided raw scores, normalised scores and percentile rank scores.

3.8.4 Student Groups

Of particular interest in this study were individual differences in AEI, intellectual development, and gender developmental differentiation, and their relationship with academic achievement. Specifically, the study sought to determine if the relationship between AEI and VCE academic achievement was indirectly or directly moderated by the individual differences in IQ and gender. Therefore, the students were grouped by their gender (male and female) and IQ (low group and high group), allowing an analysis of the main or interactive effects that these variables may have had on VCE academic achievement. The groups were entitled the female high group, female low group, male high group, and the male low group.

3.8.5 Gender: Adolescent Male and Female Groups

Gender was coded as one for males and zero for females. Gender was considered an important variable to include in the study for three reasons. First, due to the gender variability previously identified in adolescent male and female academic achievement (ABS, 2011; Van de gaer et al., 2009). Second, due to the differentiated patterns of neurological development and activity that has been identified in elements of adolescent male and female general intelligence (Baron-Cohen, 2005; Chou, Cheng, Chen, Lin, & Chu, 2011). Third, due to the gender differences that is identified in the construct of EI (Jaušovec & Jaušovec, 2005; Luebbers et al., 2007; Sánchez-Núñez et al., 2008). Therefore, due to the developmental differences in adolescent males and females, in this study the predictive variable, gender, was analysed to determine if it had: (a) main or interactive effects in the total cohort for VCE academic achievement; and (b) an impact on the relationship between AEI and VCE academic achievement in the adolescent subgroups.

3.8.6 Intelligence: High Group and Low Group

The cognitive development of this cohort was considered a potentially significant predictive variable for academic achievement (Neisser, 1976; Neisser et al., 1996). From an educational perspective, students with incrementally higher cognitive development above the mean of IQ 100 typically require fewer repetitions, can understand more complex instructions, and are able to work at a more advanced level of analysis and
synthesis than their chronologically aged peers with a lower IQ (Binet & Simon, 1916; Dembo, 1994; Jensen, 1998). From an educational perspective, students with incrementally lower cognitive development below the mean of IQ 100 typically benefit from more repetitions, clear single step instructions, and a slower pace of curriculum delivery at a basic comprehension level than those with a higher IQ (Binet & Simon, 1916; Dembo, 1994; Jensen, 1998).

Further, Petrides et al. (2004) found English and the overall academic achievement of secondary school students were significantly predicted by the interaction of IQ and EI. In addition, the interaction of IQ and EI was positively predictive of academic achievement until an intersection occurred at IQ 128 and IQ 130, respectively; following each the intersection, the linear relationship reversed and EI became negatively predictive of academic achievement in secondary school students. Therefore, Petrides et al. (2004) found cognition was a significant predictor, which was differentiated in its interaction with EI for academic achievement. First, the interaction of EI and IQ was positive on the academic performance of students with lower cognitive abilities. Second, the interaction of EI and IQ was negative on the academic performance of students with higher cognitive abilities. Consequently, the research findings presented by Petrides et al. (2004) suggest understanding the individual differences in the predictive effect of EI for academic achievement should be considered in light of the individual differences in adolescents with comparably lower and higher intellectual development. Therefore, based on the findings of the previous research outlined, the IQ scores for the study cohort were analysed as a total group and as two subgroups.

The cohort of students was allocated into two IQ groups entitled the high group and the low group, in order to identify and examine any individual differences in the predictive effect of AEI for academic achievement based on developmental differences in IQ. The RSPM standardised score of IQ 115, one standard deviation above the cohort mean IQ, was used as the cut-off point for the two groups. The division of the cohort reflected the structure of the sample, because the aim was to create two comparative groups for statistical analysis. One standard deviation above the mean was selected as the division point because it was close to the cohort mean of IQ 109 and median of IQ 110. This resulted in the two groups being reasonably symmetrical and, therefore, appropriate for comparable statistical analysis. RSPM scores were normally distributed in the general population and it was estimated that a student who obtained a score that was one standard
deviation above the mean, IQ 115, would score better than approximately 84.13% of the general student population (Gross, 1994; Gross, Sleap, & Pretorius, 1999; Terman & Merrill, 1937).

3.8.7 Administration of Measures

The VCE ENTER score (VCAA, 2003a) and demographic details for each student were obtained from the school at the end of the year. Two assessment measures were administered to the students in the sample. Students completed the RSPM test (De Lemos, 1995), in order to assess their IQ before completing the SUEIT: A (Luebbers et al., 2007) in order to assess their AEI. The information relevant to the administration, data collection, or score of each measure will be presented in the following section.

3.8.8 Academic Achievement

The Victorian Certificate of Education (VCE) results were collected from the principal of each school and entered into the study database.

3.8.9 General Intellectual Ability

In the study, the RSPM (De Lemos, 1995) perceptual test of fluid intelligence $gf$ was used as a measure of Spearman’s $g$ (1938) general intelligence. Testing instructions and procedures were outlined to teachers (see Appendix J). Teachers and researchers administered the RSPM booklet and paper answer sheet to groups of 20 to 25 students in the allocated times for the test sessions, nominated by each school. Students were allocated 50 minutes to complete the test, and they were provided with a calm, quiet, organised working environment. All standardised test procedures and protocols followed the group-administered test guidelines provided by the Australian Council for Educational Research (ACER).

RSPM (De Lemos, 1995) had a ceiling effect, with a maximum standardised score of 137 (age 16 years 3 months to 16 years 8 months) and 135 (ages 16 years 9 months to 17 years 2 months). The students’ ages ranged from 16 years and 10 months, to 19 years and 7 months. The untimed format of the test was used and the researcher, using a RSPM answer sheet template, completed scoring of the tests. The raw score results were normalised following the guidelines in the Standard Progressive Matrices: Australian Manual (De Lemos, 1995), collated electronically, and entered into the study database.

3.8.10 Adolescent Emotional Intelligence

The SUEIT: A (Luebbers et al., 2007) self-report provided clearly written instructions, and began by collecting participants’ demographic information, including
name, age, gender, level of education, and cultural and ethnic background. Testing instructions and procedures were outlined to teachers (see Appendix I), and teachers and researchers administered the paper-and-pencil version of the SUEIT: A to the students. The SUEIT: A was used with groups of 20 to 25 students in the allocated times for the test sessions, which were nominated by each school. Each student had one session of a 40-minute duration to complete the SUEIT: A in a calm, quiet, organised working environment. All standardised test procedures and protocols fitted the group-administered Australian Council for Educational Research (ACER) test guidelines. Scoring of the tests was completed electronically by Swinburne University of Technology, and the results were collated electronically and entered into the study database.

3.9 Research Design

3.9.1 Target Sample Size

During the planning stage of the study, the optimal sample size range was discussed with the study supervisors. Subsequently, statistics literature relevant to determine effective sample size for a saturated regression model was reviewed (Luebbers et al., 2007; Palmer & Stough, 2001b; Palmer, Stough, et al., 2003). Following the discussion with supervisors and review of the literature, it was estimated that the target sample size range needed to include approximately 300 students, maximising the data analysis methods and ensuring statistical rigour for saturated multiple regression modelling with three predictor variables. The minimal sample size for this study was determined by the alpha level of .05, three predictors, and with the expected effect size (the relationship between two variables) being low to moderate, as described and formulated by Tabachnick and Fidell \( N \geq 50 + 8 \times 3 = 174 \) (Tabachnick & Fidell, 2007). The initial subjects were high school students in their final year of the Victorian Certificate of Education (VCE) \( (N = 376) \). Following a review of the sample collected, the data association to seven students was removed from the study database, because it was considered inappropriate for statistical analysis. The final cohort consisted of 369 students \( (n = 224 \text{ males}, n = 145 \text{ females}) \) ranging in age from 16 to 19 years \( (M_{age} = 212.9 \text{ months}, SD = 6.2 \text{ months}) \), which was an adequate sample size to conduct multiple regression modelling (Tabachnick & Fidell, 2007). The students volunteered to participate in the research and were sourced from four schools in a suburban region.
3.9.2 Limitations of the Research Design

The study research design was constructed to accommodate the time, infrastructural, and financial constraints of a part-time PhD student. The study research design was also influenced by the pressured and important nature of VCE studies, and it is believed that this restricted the number of students willing to participate in the study. Therefore, the research design was developed to enable completion of the study within these practical constraints. In order to achieve the goal of researching a sample of 250 to 300 students, teachers were incorporated into the research study as data collectors. Consequently, the research design ensured the study measures could be administered in a clear and timely manner, minimising any disruption to the students’ VCE studies.

3.9.3 Research Trial

A small trial of the study \((n = 20)\) was conducted to determine the practicalities of the study process and administration. The trial was aimed to establish if: (1) the consent form and instructions were clear; (2) the assessment tasks could be completed within the time frame; and (3) the study process was realistically achievable for the participating staff and students. Therefore, in the trial, the researcher focused on:

- working with teachers and students within the boundaries of a school setting to administer the study;
- talking to teachers and determining how they managed the administrative process associated with the study;
- checking if all parties understood the consent form and instructions, through a process of discussion; and
- observing how students responded to completing the assessment tasks.

Following the trial, the feedback from students, parents and teachers was positive, with all key stakeholders comfortable with the study’s process, communication and administration.

The teachers noted the importance of being flexible when conducting the study, due to the limited time available to students. Therefore, the trial provided the researcher with an insight into the parents’ and students’ perspectives on the study, and highlighted the importance incorporating enough flexibility to fit with each school’s VCE schedule, room, and staffing availability. The trial ensured that the research methods and designed procedures were practical and appropriate for use in mainstream school settings.
3.10 Data Collection

Six schools were invited to take part in the study. Of the six schools, two schools declined to take part in the study and four schools accepted the invitation to take part in the study. Two Independent schools and two Catholic schools volunteered to take part in the study. Each of the four participating schools was within the middle to upper socio-economic level.

3.10.1 School Data Collection

To ensure confidentiality, the schools were coded as School One, Two, Three and Four. The number and percentage of students included in the study from each school was outlined as:

- **School One: Independent Co-educational School**
  - Kindergarten to Year 12; Enrolment male and female students;
  - \( n = 190; 51.5\% \) of study cohort.

- **School Two: Independent Co-educational School**
  - Prep to Year 12; Enrolment male and female students;
  - \( n = 49; 13.3\% \) of study cohort.

- **School Three: Girls’ Catholic School**
  - Year 7 to Year 12; Enrolment female students;
  - \( n = 36; 9.8\% \) of study cohort.

- **School Four: Boys’ Catholic School**
  - Year 7 to Year 12; Enrolment male students;
  - \( n = 94; 25.5\% \) of study cohort.

Students and parents/guardians were informed about the study and consent forms were sent out at the commencement of the year. Data was collected in 2003, 2004 and 2005. The VCE results were collected from the school at the end of the year and extra information gathered from each school included: the student name, date of birth, gender, and the identification of any student with a registered disability. The total cohort consisted of 369 students, after the removal of seven students from the database.

3.10.2 Testing Students

Before each testing session, instructions were provided to the testing staff, both orally and in written form, with immediate support available from the researcher before and after the timed testing session. Group testing protocols and procedures were followed,
ensuring the data collection was efficient and that all participants experienced appropriate standardised test conditions (see Appendix J).

3.11 Data Entry and Analysis

Data entry and the analysis were conducted using Statistics Package for the Social Sciences (IBM Corporation & Statistics Package for the Social Sciences (SPSS), 2012). The schools provided the names of students, identified students with a disability, their date of birth, year level, gender, and VCE scores. The confidentiality of the participating students and schools was maintained by coding the names of the students and schools during the data entry into SPSS (Heiman, 2001).

3.11.1 Data Screening and Explorative Data Analysis

Data from the completed SUEIT: A, Raven’s Standard Progressive Matrices, VCE ENTER scores, study scores, and demographic information were entered into SPSS, using the confidential codes, and cross-checked for any entry errors. For statistical comparisons, an alpha level of .05 was used. Preliminary data screening was conducted to examine the integrity of the data for statistical analysis, and to assess whether the assumptions underlying multivariate analysis were met (Tabachnick & Fidell, 2007).

The preliminary data screening highlighted the following issues in this sample, which were addressed in the research:

- **Withdrawal:** One student (Code: 375) with written parental consent withdrew in order to study for an upcoming SAC. She was assured that her choice was acceptable and her parents were informed. Therefore, no data was collected from this student or entered into the database.

- **Four or fewer VCE Subjects:** Four students (Code: 11; 87; 252; and 127) completed four or less VCE subjects, so did not complete the requirements to attain a finalised VCE score. Consequently, the data related to these students was deleted from the database.

- **Students with Disability:** Ten students were identified by the four schools as having a disability, as defined by The Association of Independent Schools of Victoria (AISV) or the Catholic Education Department guidelines and criteria for disabilities. These disabilities were:

  - **Autism Spectrum Disorder (ASD):** Seven Students (Code 11; 252; 56; 238; 347; 152; and 296) were identified with ASD.
- **Severe Language Disability**: Three Students (Code 87; 63; and 158) were identified as having a severe language disability. The students with ASD and the three students with a Severe Language Disability were identified in the database. However, after consideration the data relating to these students was included in the cohort, because they were considered to be a component of a normative VCE cohort sample. Nonetheless, of the four students who were deleted from the database because they were studying four subjects or less, two had ASD (Code: 11 and 252) and one had a Severe Language Disability (Code: 87). Therefore, in the final cohort of students there were a total of five students with a disability, five students with ASD, and two students with a Severe Language Disability.

- **Students with an Identified Learning Difficulty**: The four schools identified a total of five students with an identified learning difficulty (Codes: 70; 40; 172; 101; and 27). Three students were identified as having Attention Deficit Hyperactivity Disorder (ADHD). ADHD is not specifically listed as a funded disability category in the Independent Schools of Victoria (ISV) or Catholic Education Department’s guidelines. However, ADHD traits are reported to have an impact on learning and behaviour (Mayes, Calhoun, & Crowell, 2000). Therefore, the data relating to these five students was retained in the cohort analysis because it was considered that students with ADHD were normatively included in a mainstream VCE class sample (Tabachnick & Fidell, 2007).

- **Raven’s Standard Progressive Matrices Unusable Data**: One Student (Code 251) completed his RSPM test with his results indicating Set A 12/12; Set B 12/12; Set C 10/12; Set D 0/12; Set E 0/12. Sets D and E were filled in with selections of patterns depicting arrows, indicating that the test was completed inappropriately. The data from this student was deleted from the database because the RSPM data was essential for accurate analysis.

- **Invalid Assessment**: One Student (Code 126) completed his RSPM test with results indicating Set A: 11/12; Set B: 11/12; Set C: 10/12; Set D: 2/12; Set E: 0/12. The dramatic drop in scores for the last two sets seemed
markedly inconsistent with the previous four high-scoring sets. This large variability in results led the researcher to doubt the reliability of the final score and speculate about the reason for the low scores in Sets D and E. Did Student 126 run out of time and rush to complete the test, have a difficult day, lose motivation to continue, or simply write anything that came to mind? Student 126 had a VCE ENTER score of 84, which indicated the possibility that the student was intellectually above average and suggested that, for undetermined reasons, the Sets D and E scores were not a valid measure of Student 126’s intellectual ability. Consequently, based on the considerable differences between Sets A to E scores in the RSPM and the contrastingly high VCE ENTER score, it was determined that the data was not valid, so the data set related to Student 126 was deleted from the database and the subsequent data analysis.

3.11.2 Sample Size

As previously outlined in detail, the initial cohort of \( N = 376 \) was reduced by one withdrawal, two invalid RSPM tests, and four students with four or less VCE study scores. The final cohort of \( N = 369 \) consisted of females (\( n = 145; 39.3\% \)) and males (\( n = 224; 60.7\% \)). In assessing the normal distribution of the variables, namely an examination of the degree of statistical skewness and the distribution of the normal curve across each data collection set, none of the variables were sufficiently abnormal to warrant transformation of the data. Descriptive statistics were generated for each variable and examined for outliers using the method recommended by Tabachnick and Fidell (2007), whereby univariate outliers are characterised as cases with a \( z \) score of over 3.29 (\( p < .001 \)). Outliers were reviewed according to Cooks Distance Analysis (Cook, 1977) and were found not to have a significant impact upon the data, and so were retained.

3.12 Descriptive Statistics

To test for relationships between the demographic variables, the predictor or independent variables, and the criterion or dependent variables, a range of statistical procedures were conducted with SPSS. These explored gender, chronological age, intellectual ability, VCE academic achievement, and the AEI total and trait scores.

3.12.1 Independent Samples \( t \)-test

The \( t \)-tests were performed to compare the mean score on some continuous dependent variables, such as AEI, for independent categorically different groups of
students, such as males and females. The t-tests determined whether there was a statistically significant difference in the mean scores for the groups.

3.12.2 Pearson Product-Moment Correlation Coefficient

Bivariate correlations (two-tailed or one-tailed) were performed to determine the relationship between the predictor or independent variables, and the criterion or dependent variables. The results were used to determine the significant relationship between the variables, and used for the assessment of the assumptions needed for the GLM saturated linear regression model, such as multicollinearity and the independence of variables (Tabachnick & Fidell, 2007).

For consistency, descriptions of linear correlations were based on the guidelines for conventional practice outlined by Cohen and Cohen (1983). This coefficient has a range of possible values from -1 to +1. The value indicates the strength of the relationship, while the sign (+ or -) indicates the direction. According to these guidelines, effect sizes for the correlations, as presented in Table 3.1, were as follows: \( r = .10 \) (classified as small), \( r = .30 \) (classified as medium), and \( r = .50 \) (classified as large). The data met the underlying assumptions for: related pairs, scale of measurement, normality, linearity and homoscedasticity.

Table 3.1

<table>
<thead>
<tr>
<th>Size</th>
<th>Value of Correlation Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>( r = .10 ) to ( .29 )</td>
</tr>
<tr>
<td>Medium</td>
<td>( r = .30 ) to ( .49 )</td>
</tr>
<tr>
<td>Large</td>
<td>( r = .50 ) to ( 1.0 )</td>
</tr>
</tbody>
</table>

Note. Table sourced from Cohen and Cohen (1983).

3.12.3 Effect Sizes

Effect sizes can be determined with a range of standardised measures to determine the strength of the difference between two groups, such as the relationship between a predictor or multiple predictor variables, and the criterion or dependent variables. Effect sizes facilitate the comparison of findings across a range of studies with diverse variables.
“Effect size emphasises the difference rather than confounding this with sample size” (Pallant, 2007, p. 132).

In this study, effect sizes were determined and reported using Cohen’s $d$, with the effect size being the strength of differences between two groups, such as males and females (Coe, 2002). For example, Cohen and Cohen (1983) suggests an effect size of .08 indicated that the score of the average person in the experimental group was 0.8 standard deviations above the average person in the control group. Partial eta squared ($\eta^2$) was also reported in this study when required, particularly in relation to discussions of other research findings.

Coe (2002) explains that the effect size is the standardised mean difference between groups, as expressed by the following equation:

\[
\text{Effect Size} = \frac{\text{Mean of experimental group} - \text{Mean of control group}}{\text{Standard Deviation}}
\]

Table 3.2 presents the effect sizes, in relation to Cohen’s $d$, expressed as a portion of a standard deviation and the effect sizes, in relation to partial eta squared, $\eta^2$, expressed as a percentage of the difference between variables. For all analyses in this study, 0.05 was determined to be the level of statistical significance, unless otherwise stated due to the practical or clinical significance of the findings (Pallant, 2007; Tabachnick & Fidell, 2007).

Table 3.2

*Effect Sizes: Eta Squared and Cohen’s $d$*

<table>
<thead>
<tr>
<th>Size</th>
<th>Eta Squared ($%$ of Variance Explained)</th>
<th>Cohen’s $d$ (Unit of Standard Deviation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>.01 or 1%</td>
<td>0.2</td>
</tr>
<tr>
<td>Medium</td>
<td>.06 or 6%</td>
<td>0.5</td>
</tr>
<tr>
<td>Large</td>
<td>.138 or 13.8%</td>
<td>0.8</td>
</tr>
</tbody>
</table>

*Note.* Table sourced from Pallant (2002).
3.13 Inferential Statistics

A series of GLM saturated multiple linear regression models (Tabachnick & Fidell, 2007) were used to test null Hypotheses One and Two(a, b, c, d). The AEI total score was used for the analysis for Hypothesis One. The AEI trait scores were used for analysis in Hypothesis Two(a, b, c, d). Reliability data for the four AEI trait scores or dimensions used in the calculations were obtained from the technical manual of the SUEIT: A (2007, p. 208). The RSPM reliability data was obtained from the technical manual (De Lemos, 1995; J. C. Raven, 1995).

3.13.1 GLM Saturated Multiple Linear Regression Model

The GLM saturated multiple linear regression model was categorised according to the statistical models referred to as general linear models (Tabachnick & Fidell, 2007). This is a statistical technique that identifies the set of prediction variables or independent variables that have a linear influence on the criterion variable or dependent variable, by looking at all levels of possible main and interaction effects. The GLM saturated multiple linear regression model reviewed a one-way effect for each variable; all two-way interaction effects for models with two or more variables; and all three-way interaction effects for models with three or more variables, etc. (Tabachnick & Fidell, 2007). The GLM saturated multiple linear regression model used the method of least squares, by establishing the best-fitting straight line based on the minimisation of the residual variance between the predicted model and the observed data. In order to ensure the regression technique was appropriate for the data set, a range of assumptions needed to be confirmed (Field, 2009). Further, linear regression analysis was suitable for use when the projections were expected to be in a straight line with the values.

A GLM saturated multiple linear regression model is considered useful when predicting human behaviour such as academic achievement, as is the case in this study (Field, 2009; Tabachnick & Fidell, 2007). Behaviour may be influenced by several factors or by variables that may be continuous, discrete, or dichotomous (Pallant, 2007). A variable that is discrete can be used if it is converted into a set of dichotomous variables by a dummy variable, such as coding with numbers, for example, using the digit/number ‘1’ and the digit/number ‘0’ (Brace, Kemp, & Snelgar, 2006).

The linear regression equation can be displayed as $Y = A + BX + \epsilon$, where $Y$ is the criterion or dependent variable, $X$ is the predictor or independent variable, $B$ is the
gradient of the line, \( A \) is the intercept of the line on the y-axis, and \( C \) is the error. The regression coefficient \( (B) \) represents the slope of the line or gradient of the rate of change in the dependent variable \( (Y) \) per unit of change in the independent variable \( (X) \). Tabachnick and Fidell (2007) presented an example of a multiple regression equation:

\[
Y = A + B_1X_1 + B_2X_2 + \ldots + B_kX_k + C
\]

The primary goal of multiple regression analysis is to investigate the relationship between a criterion variable and several predictor variables. Field (2009) noted that the predictor variables used in multiple regression analysis procedures can be reviewed by examining the Beta (\( \beta \)) standardised regression, the B weight unstandardised regression coefficients, and the \( R^2 \). Beta (\( \beta \)) standardised regression coefficient, measured in standard deviations. \( \beta \) is a measure of the strength of the influence that the predictor or independent variable has on the criterion or dependent variable.

The unstandardised regression coefficient, B, weight for an independent variable represents the change, often expressed as a percentage, in the dependent variable associated with a one-unit change in that independent variable. Placing the regression lines on the same graph enables a subjective visual assessment of the differences between two or more lines (Field, 2009).

The equation of the regression line describes the “best fit” of the data, which is expressed as \( R^2 \) (R-squared). \( R^2 \) is a measure of the correlation between the observed values of the criterion variable and the predicted values (Brace et al., 2006). The closer \( R^2 \) is to 1.00, the better the data “fits” or follows the predicted model. Adjusted \( R^2 \) is calculated based on the number of predictor variables and the number of participants. It provides the percentage of variance that the model has accounted for in the criterion variable (Brace et al., 2006). The linear regression equation can be used to identify predictor or independent variables and determine how well they predict the criterion or dependent variable for a phenomenon within a range of probability (Brace et al., 2006). The regression analysis does not imply causality between variables, as other unmeasured variables may be influencing the relationship. Causality can be argued for on the basis of logic and experimental structures (Tabachnick & Fidell, 2007).
3.14 Conclusion: Chapter Three

In conclusion, Chapter Three has presented the research design employed to test the study’s Null Hypotheses One and Two\textsubscript{(a, b, c, d)}. The method used was a quantitative model with multiple applications within each stage of the study (Tabachnick & Fidell, 2007). These included the framing of the study questions, formation of the Null Hypotheses, the study design, testing of the Null Hypotheses and the analysis of the results. Chapter Four will present the research results and the analysis of the data related to investigation of Null Hypotheses One and Two\textsubscript{(a, b, c, d)}. The study results will include the univariate statistics, bivariate statistics and the multivariate statistical analysis related to Null Hypotheses One and Two\textsubscript{(a, b, c, d)}, for the total cohort and the four IQ and gender combination groups.
CHAPTER FOUR

Results

Chapter Four provides an analysis of the data collected for testing Hypotheses One and Two \( (a, b, c, d) \); the results are outlined in three sections entitled univariate statistics, bivariate statistics and multivariate analysis (Tabachnick & Fidell, 2007). The results of the statistical analysis sought to determine if AEI was associated to academic achievement as measured by the Victorian Certificate of Education (VCE). Towards that end, the relationship between AEI and VCE academic achievement was examined in light of the synchronous predictive effect of IQ and gender.

First, the analysis sought to determine if AEI, IQ and gender were simultaneously predictive of VCE academic achievement. Second, the analysis sought to determine if one of each of the AEI traits (emotional recognition and expression, understanding emotions, emotions direct cognition, and emotional management and control), IQ and gender were simultaneously predictive of VCE academic achievement. These investigations led to five GLM saturated multiple linear regression models. Subsequently, the decomposition of each of the five models was examined to determine if there were individual differences in the predictive variance of AEI for VCE academic achievement, subject to developmental differences in the Year 12 students’ IQ and gender. The five models were analysed within the context of the four adolescent subgroups entitled the: female high group, female low group, male high group and the male low group. Third, post hoc analyses are provided.

Therein, Chapter Four presents the study results in the following configuration:

4.1 Null Hypotheses One and Two \( (a, b, c, d) \)
4.2 Multivariate Analysis Method
4.3 Data Codes Used
4.4 The General Model
4.5 The General Model Decomposition
4.6 Univariate Statistics
4.7 Bivariate Statistics
4.8 Multivariate Analysis
4.9 Assumptions of Normality Testing
4.10 GLM Saturated Multiple Linear Regression Models
4.11 Post Hoc Analysis
4.12 Conclusion: Chapter Four

4.1 Null Hypotheses One and Two

Null Hypothesis One: The combined effects of adolescent emotional intelligence total, IQ, gender, and their interactions will not be predictive of academic achievement.

Null Hypothesis Two: The combined effects of each of the subscales of adolescent emotional intelligence traits that included:

(a) emotional recognition and expression
(b) understanding emotions
(c) emotions direct cognition
(d) emotional management and control
IQ, gender, and the interactions of each if (a), to (d), will not be predictive of academic achievement.

4.2 Multivariate Analysis Method

The individual Year 12 student was selected as the unit of analysis for this study (Hopkins, 1982). The individual was selected as the unit of analysis for three reasons. First, adolescence is acknowledged as a formative period of biopsychosocial maturation (Gemelli, 2013) encompassing rapid physical, psychological, and social developmental changes, which are differentiated in male and females (Giedd et al., 1999; Pfeifer & Blakemore, 2012; Sebastian, Burnett, & Blakemore, 2008; Steinberg, 2011b). The adolescent developmental changes in early adolescents (10–14 years of age), late adolescence (15–19 years of age) and young adulthood (20–24 years of age) (Sawyer et al., 2012) were theorised to differentiate development of AEI from the onset of puberty to the adoption of adult roles in the society. In particular, the neurological structural and functional maturational changes adolescent intellectual and emotional development (Steinberg, 2011b) were speculated to developmentally differentiate the manifestation of the core components of AEI, emotion and cognition (Salovey & Mayer, 1990), in secondary school students from Year 7 to Year 12. Therefore, in order to control for the possibility of confounding (Tabachnick & Fidell, 2007) (a) developmental maturational differences in AEI; with (b) skill differences in AEI when trying to determine the
predictive effect of AEI in VCE academic achievement, the investigation of the predictive effects of AEI for VCE academic achievement focused on the individual as the unit of analysis (Tabachnick & Fidell, 2007) and targeted students in the late stage of adolescent development (15–19 years of age) (Sawyer et al., 2012) who were in a single year level, Year 12. Targeting a single year level minimised differences in the environmental demands of academic achievement on students in the late stage of adolescent development, as the VCE curriculum and assessments were nationally standardised and were therefore the same for all students irrespective of the school they attended. The inclusion of the Australian nationally standardised VCE in Year 12 also supported the replication of the current study in other OECD schools that may be utilised for international comparisons (OECD, 2014). Including the Australian national standardised VCE curriculum and assessments as a measure of Year 12 academic achievement in the current study also reduced the possibility of individual differences in academic achievement being confounded by differences in teacher-designed curriculum and assessments.

Second, including the individual as the unit of analysis in the research design facilitated the identification of interactions between variables, which allowed a more in-depth exploration of individual differences in AEI for VCE academic achievement (Hopkins, 1982). For example, using the individual as the unit analysis in the current study was particularly helpful in the investigation of the individual differences in the interactions between: (a) gender and AEI for VCE academic achievement; and (b) gender and the AEI trait scores for VCE academic achievement. While previous research had identified gender differences in EI (Salguero, Extremera, & Fernández-Berrocal, 2012; Sánchez-Núñez et al., 2008), it was unclear if and how an interactional relationship between gender and AEI was predictive of VCE academic achievement.

Third, the use of the individual as the unit of analysis for this study enabled the pooling strategy to be utilised, to investigate the total cohort and subgroups within the total cohort (Tabachnick & Fidell, 2007). Specifically, facilitating the decomposition of the five GLM regression models to enable the investigation of the individual differences in the predictive effect of AEI in VCE academic achievement, subject to developmental differences in AEI, IQ and gender. Therefore, utilising the individual as the unit of analysis in the current study enhanced the validity, scope and generalisability of analysis in relation to the total cohort and subgroups the sample (Hopkins, 1982).
4.2.1 Selection of Assessment Measures

The selection of measures was based on previous research findings and theoretical models of EI, intelligence, gender and academic achievement presented (Tabachnick & Fidell, 2007). The selection of AEI measured by the SUEIT: A (Luebbers et al., 2007), IQ measured by fluid intelligence (gf) (J. C. Raven, 1936, 1938) and gender as predictor variables for the criterion variable VCE academic achievement was made with reference to the theory of EI (Arsenio, 2003; Bar-On, 2005; Greenspan, 1989; Leuner, 1966; Meyer & Fletcher, 2007; Payne, 1985; Salovey & Mayer, 1990; Salovey & Shulter, 1997). In addition, previous research findings have confirmed the contribution of EI and academic achievement in the adolescent population (Ciarrochi et al., 2001; Downey, Mountstephen, et al., 2008; Gil-Olarte et al., 2006; Menzie, 2005; Parker, Creque, et al., 2004; Peters et al., 2009; Petrides et al., 2004).

**AEI:** The SUEIT: A was selected as a measure of AEI as it was designed for adolescents (Luebbers et al., 2007). The SUEIT: A was also utilised in research confirming academic success and was positively related to EI in an Australian secondary school adolescent population (Downey, Mountstephen, et al., 2008). The SUEIT: A is theoretically framed within the trait model of EI, which is reportedly associated to personality constructs (Petrides & Furnham, 2000b).

**IQ:** In the current study gf was selected as a measure of IQ (Cattell, 1952; Spearman, 1904). The positive predictive effect of gf for academic achievement is evident in an extensive body of research (Deary et al., 2007; Jensen, 1998).

**Gender:** Adolescent males and females have different developmental trajectories, with the earlier onset of puberty occurring for females followed by males one to two years later (Gluckman et al., 2009). Further, neurological white matter in males (13 years to 18 years of age) continues to develop, while females reach maturity levels earlier (Wang et al., 2012). In addition, gender differences in EI have also been consistently found in the adolescent populations (Downey, Mountstephen, et al., 2008; Hassan et al., 2009; Tapia & Marsh, 2006).

**Academic Achievement:** The VCE studies for Year 12 students were selected for this research study because the VCE curriculum design and assessments were standardised for the State of Victoria and are also recognised indicators of academic achievement at an Australian national level (ABS, 2011). Year 12 is the final year of secondary school in Victoria, Australia and is therefore an important transitional year,
which potentially leads to further study or employment. Therefore, completing VCE academic achievement in Year 12 is widely acknowledged as an important and potentially stressful time for adolescents (Spittal, 2013). The level of academic achievement was measured by each student’s VCE score ranking, which was based on a standardised curriculum and academic assessment schedule (VCAA, 2010b). The students’ VCE score provides a reliable and valid measure of student academic achievement, which is comparable between Australian schools. The VCE students’ total aggregate study score is used in the determination of their percentage rank over a 100-point scale, referred to as an Equivalent National Tertiary Entrance Rank (ENTER) or Australian Tertiary Admission Rank (ATAR). An ENTER/ATAR score of 50.00 means the student has performed better than 50% of the Victorian state population (VTAC, 2010).

The predictive effects of AEI, IQ and gender for VCE academic achievement are examined in the total cohort, and then within each IQ and gender subgroup (Tabachnick & Fidell, 2007). Therefore, the descriptive statistics related to the variables in the study model are presented for the total cohort and, when appropriate, provided for the IQ and gender combination groups. For all statistical analyses, a probability of 0.05 was used as the level of statistical significance unless stated otherwise. The confidence intervals were all at a 95% level. Effect sizes were calculated and are referred to as, $r^2$, $\eta^2$, or Cohen’s $d$, subject to which of the statistical analyses was used to examine the data (Cohen & Cohen, 1983; Pallant, 2007).

A GLM saturated multiple linear regression model was used to explore all of the main effects and interaction effects of AEI or one the AEI traits: emotional recognition and expression, understanding emotions, emotions direct cognition and emotional management and control, IQ, and gender (Cohen & Cohen, 1983; Judd et al., 2009; Tabachnick & Fidell, 2007). The decomposition of the GLM saturated multiple linear regression model resulted in the development of five regression equations. The codes are presented as a group. However, the analyses of the five regression equations were conducted separately. First, analysis was conducted for the general model investigating the effect of AEI total score, IQ and gender for VCE academic achievement. Second, analysis was conducted for one each of the four AEI trait measures, IQ, and gender and their effects on VCE academic achievement. The five regression equations and relative codes used for each regression are outlined in Section 4.3.
4.3 Data Codes Used

\[ V = \text{VCE ENTER score} \]
\[ R = \text{Raven’s (high group = 1 and low group = 0)} \]
\[ G = \text{Gender (male = 1 and female = 0)} \]
\[ E_{ij} = \text{Adolescent emotional intelligence} \]
\[ j = 0, 4 \]
\[ j = 0: \text{Adolescent emotional intelligence total} \]
\[ j = 1: \text{Emotional recognition and expression} \]
\[ j = 2: \text{Understanding emotions} \]
\[ j = 3: \text{Emotions direct cognition} \]
\[ j = 4: \text{Emotional management and control} \]
\[ E_{i0} = \text{Adolescent emotional intelligence total} \]
\[ E_{i1} = \text{Emotional recognition and expression} \]
\[ E_{i2} = \text{Understanding emotions} \]
\[ E_{i3} = \text{Emotions direct cognition} \]
\[ E_{i4} = \text{Emotional management and control} \]
\[ RE_{ij} = \text{Raven’s x adolescent emotional intelligence} \]
\[ RE_{i0} = \text{Raven’s x adolescent emotional intelligence total} \]
\[ RE_{i1} = \text{Raven’s x emotional recognition and expression} \]
\[ RE_{i2} = \text{Raven’s x understanding emotions} \]
\[ RE_{i3} = \text{Raven’s x emotions direct cognition} \]
\[ RE_{i4} = \text{Raven’s x emotional management and control} \]
\[ RG = \text{Raven’s x gender} \]
\[ GE_{ij} = \text{Gender x adolescent emotional intelligence} \]
\[ GE_{i0} = \text{Gender x adolescent emotional intelligence total} \]
\[ GE_{i1} = \text{Gender x emotional recognition and expression} \]
\[ GE_{i2} = \text{Gender x understanding emotions} \]
\[ GE_{i3} = \text{Gender x emotions direct cognition} \]
\[ GE_{i4} = \text{Gender x emotional management and control} \]
\[ RGE_{ij} = \text{Raven’s x gender x emotional intelligence} \]
\[ RGE_{i0} = \text{Raven’s x gender x emotional intelligence total} \]
\[ RGE_{i1} = \text{Raven’s x gender x emotional recognition and expression} \]
RGE\textsubscript{j2} = Raven’s x gender x understanding emotions
RGE\textsubscript{j3} = Raven’s x gender x emotions direct cognition
RGE\textsubscript{j4} = Raven’s x gender x emotional management and control
C = Error

Variables \(E_j\) (AEI), \(E_{j0}\) (AEI total score), \(E_{j1}\), \(E_{j2}\), \(E_{j3}\) and \(E_{j4}\) (AEI trait scores), and \(V\) (VCE ENTER score) were continuous variables. The variables \(G\) (gender) and \(R\) (Raven’s Standard Progressive Matrices, fluid intelligence referred to as IQ) were dichotomised into high ability and low ability subgroups. This was done in order to simplify the research factorial design, to support the simultaneous investigation of the three independent variables and to facilitate the decomposition of the GLM saturated multiple regression models. The models were saturated in that they contained every interaction effect between independent variables. Dummy coding was used for gender (males = 1, females = 0) and IQ (R) (high group = 1, low group = 0) (Tabachnick & Fidell, 2007). The model included all interactions among the independent variables, to ensure the optimal linear fit for each variable and, to fully saturate the model for purposes of decomposition (Heiman, 2001).

4.4 The General Model

The General Model was presented with an outlined of the decomposition for the total cohort and the IQ and gender combination groups.

\[ VCE = IQ, \text{gender, AEI (total score, emotional recognition and expression, understanding emotions, emotions direct cognition and emotional management and control).} \]

\[ V = b_0 + b_1 R + b_2 G + b_3 E_j + b_4 \text{RE}_j + b_5 \text{RG} + b_6 \text{GE}_j + b_7 \text{RGE}_j + C. \]

\( R = 0, 1 \)

\( G = 0, 1 \)
General Model Female Low Raven’s:

G = 0 and R = 0 then GE = 0, RE = 0, RG = 0 and RGE = 0

\[ V_{(G=0, R=0)} = b_0 + b_1 x 0 + b_2 x 0 + b_3 x E_j + b_4 x 0 + b_7 x 0 + C. \]

\[ V_{(G=0, R=0)} = b_0 + b_3 E_j + C. \]

General Model Female High Raven’s:

G = 0 and R = 1 then GE = 0, RE = 1, RG = 0 and RGE = 0

\[ V_{(G=0, R=1)} = b_0 + b_1 R + b_3 E_j + b_4 RE_j + C. \]

\[ V_{(G=0, R=1)} = (b_0 + b_1) + E_j (b_3 + b_4) + C. \]

General Model Male Low Raven’s:

G = 1 and R = 0 then GE = 1, RE = 0, RG = 0 and RGE = 0

\[ V_{(G=1, R=0)} = b_0 + b_2 G + b_3 E_j + b_6 GE_j + C. \]

\[ V_{(G=1, R=0)} = (b_0 + b_2) + E_j (b_3 + b_6) + C. \]

General Model Male High Raven’s:

G = 1 and R = 1 then GE = 1, RE = 1, RG = 1 and RGE = 1

\[ V_{(G=1, R=1)} = b_0 + b_1 R + b_2 G + b_3 E_j + b_4 RE_j + b_5 RG + b_6 GE_j + b_7 RGE_j + C. \]

\[ V_{(G=1, R=1)} = (b_0 + b_1 + b_2 + b_5) + E_j (b_3 + b_4 + b_6 + b_7) + C. \]
4.5 The General Linear Model Decomposition and Linear Equations

The General Linear Model (GLM) as presented in Table 4.1, resulted in the development of five GLM multiple linear regression equations. A series of GLM multiple linear regression models were employed to determine which predictor (independent) variables IQ (R) (high group and low group), gender (male and female), AEI total score, AEI traits: recognition and expression, understanding emotions, emotions direct cognition, and emotional management and control could be used to predict the response (dependent) variable, namely adolescent academic achievement, as measured by each student’s VCE score. The five models were entitled:

- Model E: adolescent emotional intelligence;
- Model 1: emotional recognition and expression;
- Model 2: understanding emotions;
- Model 3: emotions direct cognition; and
- Model 4: emotional management and control.

In Table 4.1, the decomposition of the model equation was presented based on the General Model, with the decomposition presented for each IQ and gender combination group.

Table 4.1

<table>
<thead>
<tr>
<th>Student Groups</th>
<th>Model Decomposition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female low group</td>
<td>( V_{(G = 0, R = 0)} = b_0 + b_3 E_j + \varepsilon )</td>
</tr>
<tr>
<td>Female high group</td>
<td>( V_{(G = 0, R = 1)} = (b_0 + b_1) + E_j (b_3 + b_4) + \varepsilon )</td>
</tr>
<tr>
<td>Male low group</td>
<td>( V_{(G = 1, R = 0)} = (b_0 + b_2) + E_j (b_3 + b_6) + \varepsilon )</td>
</tr>
<tr>
<td>Male high group</td>
<td>( V_{(G = 1, R = 1)} = (b_0 + b_1 + b_2 + b_5) + E_j (b_3 + b_4 + b_6 + b_7) + \varepsilon )</td>
</tr>
</tbody>
</table>
4.6 Univariate Statistics

4.6.1 Gender

The gender composition of the cohort \((N = 369)\) consisted of 61% males \((n = 224)\) and 39% females \((n = 145)\). There were 22% more males than females in this sample.

4.6.2 Chronological Age

The chronological mean age of the cohort was 17 years 7 months \((M_{\text{age}} = 212.89 \text{ months}, \ SEM = .32, \ SD = 6.23 \text{ months}, \ N = 369)\). The sample ranged from 16 years and 10 months (194 months) to 19 years and 7 months (241 months). The chronological age range in the sample was approximately 2 years and 9 months.

4.6.3 SUEIT: Adolescent Version 2.0

The SUEIT: A (Luebbers et al., 2007) raw scores for the students in this sample \((M_{\text{AEI}} = 178.89, \ SD = 17.93, \ SEM = 0.93, \ N = 369)\) were normally distributed, with a positive skew of 0.13 \((SEM = .127)\). The AEI trait raw scores of emotional recognition and expression, emotional understanding, emotions direct cognition, and emotional management and control for the total cohort are presented in Table 4.2. Each of the AEI traits had a slight negative skew in their distribution. The standard deviations for each of the AEI traits, which range from 5.12 to 9.1, was indicative of a wide spread of raw scores.

Table 4.2

\(AEI (E_j) \ Total \ and \ Trait \ Raw \ Scores\)

<table>
<thead>
<tr>
<th>(E_j)</th>
<th>(M)</th>
<th>(SEM)</th>
<th>Skew</th>
</tr>
</thead>
<tbody>
<tr>
<td>(j = 0:) Adolescent Emotional Intelligence</td>
<td>78.89</td>
<td>.93</td>
<td>0.133</td>
</tr>
<tr>
<td>(j = 1:) Emotional Recognition &amp; Expression</td>
<td>32.82</td>
<td>.26</td>
<td>-0.014</td>
</tr>
<tr>
<td>(j = 2:) Understanding Emotions</td>
<td>68.58</td>
<td>.47</td>
<td>-0.486</td>
</tr>
<tr>
<td>(j = 3:) Emotions Direct Cognition</td>
<td>29.50</td>
<td>.29</td>
<td>-0.497</td>
</tr>
<tr>
<td>(j = 4:) Emotional Management &amp; Control</td>
<td>47.82</td>
<td>.40</td>
<td>-0.218</td>
</tr>
</tbody>
</table>

\textit{Note}. \((N = 369)\).
4.6.3.2 AEI Range of Normalised Scores

The raw scores in the SUEIT: A were then converted into normalised scores (Z scores) for further analysis, with means, standard deviation, and skew, as presented in Table 4.3. The information in Table 4.3 is further contextualised with reference to the histograms presented in Figures 4.1, 4.2, 4.3, 4.4 and 4.5. A review of the normalised AEI total and AEI trait scores was conducted via the related scatter plots and histograms.

Table 4.3

<table>
<thead>
<tr>
<th>$E_j$</th>
<th>$M$</th>
<th>SEM</th>
<th>Skew</th>
</tr>
</thead>
<tbody>
<tr>
<td>$j = 0$: Adolescent Emotional Intelligence</td>
<td>0.0065</td>
<td>.93</td>
<td>0.133</td>
</tr>
<tr>
<td>$j = 1$: Emotional Recognition &amp; Expression</td>
<td>0.0018</td>
<td>.05</td>
<td>-0.014</td>
</tr>
<tr>
<td>$j = 2$: Understanding Emotions</td>
<td>0.0091</td>
<td>.05</td>
<td>-0.486</td>
</tr>
<tr>
<td>$j = 3$: Emotions Direct Cognition</td>
<td>0.0030</td>
<td>.05</td>
<td>-0.497</td>
</tr>
<tr>
<td>$j = 4$: Emotional Management &amp; Control</td>
<td>-0.0040</td>
<td>0.05</td>
<td>-0.218</td>
</tr>
</tbody>
</table>

Note. ($N = 369$).

This range encompassed the body of the AEI total ($M_{AEI} = 0.01, SD = 1.004, N = 369$), emotional recognition and expression ($M_{ERE} = 0.00, SD = 1.005, N = 369$), understanding emotions ($M_{UE} = 0.01, SD = 1.001, N = 369$), emotions direct cognition ($M_{EDC} = 0.00, SD = 1.000, N = 369$), and emotional management and control ($M_{EMC} = -0.0004, SD = 1.005, N = 369$) ranges of scores.
Figure 4.1 presents a histogram of AEI, based on normalised scores with a normal distribution curve for the total VCE cohort (\(N = 369\)). The histogram for AEI total score indicated the scores were arranged in a unimodal distribution. The Year 12 students’ scores were positively skewed, with the peak of scores distributed from the mean of zero to \(-1\ SD\) and gradually reducing to \(-2\ SD\). The distribution range of AEI scores included three interval gaps in scores: First, at approximately \(-2.1\ SD\); second at approximately \(-3\ SD\); and third, the largest interval gap between \(-3.1\ SD\) to \(-5\ SD\).
Figure 4.2 Histogram: Emotional Recognition and Expression

Figure 4.2 presents a histogram of emotional recognition and expression, based on normalised scores with a normal distribution curve for the total VCE cohort \((N = 369)\). The histogram for emotional recognition and expression indicated the scores were arranged in a unimodal distribution and included three smaller peaks, with the largest numbers of scores ranging from \(-1\ SD\) to \(1\ SD\), then gradually reduced in number to \(2.5\ SD\) above and below the mean. The students’ scores were negatively skewed, with an interval gap at approximately \(-2.5\ SD\) and a larger interval gap between approximately \(-3\ SD\) and \(-3.75\ SD\), where one outlier was identified. This wide range in the distribution of scores may explain the large standard deviation in the analysis of the percentile scores \((M_{ERE} = 49.52, SD = 27.91, SEM = 1.45, skew = -.055)\), which is presented in Table 4.4.
Figure 4.3 presents a histogram of understanding emotions, based on normalised scores with a normal distribution curve for the total VCE cohort ($N = 369$). The histogram for understanding emotions indicated the scores were also arranged in a unimodal distribution with a tail reaching approximately $-5.75 \, SD$. The Year 12 VCE students’ scores were slightly negatively skewed and the majority of scores fell between $-2 \, SD$ and $2 \, SD$. Two interval gaps in the distribution of scores were identified approximately at $-3 \, SD$ to $-4 \, SD$ and a smaller interval gap in scores at approximately $-4.7 \, SD$ to $-5.2 \, SD$. It is plausible that the two outliers at approximately $-4 \, SD$ and at $-5.2 \, SD$, contributed to a wider range of scores. This wide range distribution of normalised scores for understanding emotions may explain the large standard deviation in the subsequent analysis of the percentile scores ($M_{ue} = 51.68$, $SD = 29.47$, $SEM = 1.53$, skew = $.078$), presented in Table 4.4.
Figure 4.4 presents a histogram of emotions direct cognition, based on normalised scores with a normal distribution curve for the total VCE cohort ($N = 369$). The histogram for emotions direct cognition indicated the scores were also arranged in a unimodal distribution. The students’ scores were negatively skewed. The distribution of scores included only one interval gap of scores at approximately 2.1 $SD$, with a small cluster of scores forming a tail in the distribution from approximately -2 $SD$ to -3 $SD$. This extended distribution of scores from -2 $SD$ to -3 $SD$ may explain the large standard deviation in the analysis of the percentile scores ($M_{EDC} = 49.12$, $SD = 28.40$, $SEM = 1.47$, skew = -.030), which is presented in Table 4.4.
Figure 4.5 presents a histogram of emotional management and control, based on normalised scores with a normal distribution curve for the total VCE cohort (N = 369). The histogram for emotional management and control indicated the scores were also arranged in a unimodal distribution. The students’ scores were negatively skewed, with one interval gap at approximately -2.2 SD to -3.5 SD, followed by a second gap at approximately -3.8 SD to -4.7 SD. This very wide distribution of scores may also explain the large standard deviation in the analysis of the percentile scores (M_{EMC} = 51.98, SD = 26.40, SEM = 1.37, skew = -.109), which is presented in Table 4.4.

4.6.3.3 AEI Range of Percentile Score

The AEI total and trait percentile scores are provided in Table 4.4, along with the relevant codes. The SUEIT: A measured AEI percentile rank scores for the students in this sample (M_{AEI} = 50.54, SD = 17.75, SEM = .924, N = 369), depicting a proportionately normal distribution for the scores, with a positive skew of .256, (SEM = .127). The four AEI traits; emotional recognition and expression (M_{ERE} = 49.52, SD = 27.91, SEM = 1.45, skew = -.055); understanding emotions (M_{UE} = 51.68, SD = 29.47, SEM = 1.53, skew = -.078); emotions direct cognition (M_{EDC} = 49.12, SD = 28.40, SEM = 1.47, skew = -.030); and emotional management and control (M_{EMC} = 51.98, SD = 26.40, SEM = 1.37, skew = -
.109) were averaged to obtain the AEI total percentile rank. The AEI traits all had a negative skew in their distributions. As outlined, the standard deviations for each of the AEI traits were large, ranging from 26.40 to 29.47, indicating a wide spread of percentile rank scores. The large standard deviation found in this study for AEI trait scores can be explained with a reference to the histograms presented in Figures 4.2, 4.3, 4.4 and 4.5.

Table 4.4

*AEI (Ej) Total and Trait Percentile Rank Scores*

<table>
<thead>
<tr>
<th>Ej</th>
<th>M</th>
<th>SEM</th>
<th>Skew</th>
</tr>
</thead>
<tbody>
<tr>
<td>j = 0: Adolescent Emotional Intelligence</td>
<td>50.54</td>
<td>0.92</td>
<td>0.256</td>
</tr>
<tr>
<td>j = 1: Emotional Recognition &amp; Expression</td>
<td>49.52</td>
<td>1.45</td>
<td>-0.055</td>
</tr>
<tr>
<td>j = 2: Understanding Emotions</td>
<td>51.67</td>
<td>1.53</td>
<td>-0.780</td>
</tr>
<tr>
<td>j = 3: Emotions Direct Cognition</td>
<td>49.12</td>
<td>1.47</td>
<td>-0.030</td>
</tr>
<tr>
<td>j = 4: Emotional Management &amp; Control</td>
<td>51.98</td>
<td>0.92</td>
<td>-0.109</td>
</tr>
</tbody>
</table>

*Note. (N = 369).*

### 4.6.4 Gender: AEI

The AEI traits percentile rank scores of emotional recognition and expression, emotional understanding, emotions direct cognition, and emotional management and control, for the total cohort (N = 369), males (n = 224), and females (n = 145) are presented in Table 4.5. The AEI traits all had a negative skew (SEM = .127) in their distributions. In each of the AEI traits, the standard deviations were large, ranging from 26.4 to 29.47, for both the total cohort and the gender groups, which was indicative of a wide spread of percentile scores.

Table 4.5

*Gender: AEI Total and Trait Percentile Scores for Males and Females*

<table>
<thead>
<tr>
<th>Adolescent Emotional Intelligence</th>
<th>M</th>
<th>SD</th>
<th>SEM</th>
<th>Skew</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional Recognition &amp; Expression</td>
<td>Females</td>
<td>Males</td>
<td>Understanding Emotions</td>
<td>Females</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>---------</td>
<td>-------</td>
<td>------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>49.52 27.91 1.45 -.055</td>
<td>52.77 27.85 2.13</td>
<td>47.41 27.80 1.85</td>
<td>51.68 29.47 1.53 -.078</td>
<td>56.21 26.94 2.23</td>
</tr>
</tbody>
</table>

*Note. (N = 369, female n = 145, male n = 224).*

Figure 4.6 presents a box plot, which provides a detailed gender comparison of the AEI total and AEI trait scores for the study cohort.
Figure 4.6 Box Plot: AEI in Males and Females

The AEI total and trait percentile rank scores, by gender, are presented in the box plot in Figure 4.6. The box plot allows a comparison of the median (50th percentile), range, and spread of the cohort percentile scores. The AEI total and trait scores for the male group \( n = 224 \) and female group \( n = 145 \) in the first quartile (Q1), second quartile (Q2), and the third quartile (Q3), can be compared as follows:

- **Emotional recognition and expression:** In Q1, the boundary for males commenced at the 22nd percentile, in comparison to females, who commenced at the 29th percentile. In Q2, the females had a median at the
52nd percentile, which was slightly higher than the males’ median at the 48th percentile. The spread and range of emotional recognition and expression percentile scores for males and females was similar.

- **Understanding emotions:** As shown in Q2, the females’ median, at the 60th percentile was higher than the males’, which was at the 48th percentile. In relation to Q1 and Q3, the females’ scores ranged from the 35th percentile to the 77th percentile, while the comparative scores for the males had a smaller range, from the 18th percentile to the 76th percentile.

- **Emotions direct cognition:** In Q1 and Q3, the females displayed higher percentile scores than the males, with the females ranging from the 41st percentile to the 80th percentile. In contrast, the scores for the males ranged from the 21st percentile to the 67th percentile. Q2 female scores had a higher median, at the 58th percentile, when compared to the male median on the 41st percentile.

- **Emotional management and control:** Q2 males’ median score of the 54th percentile was higher than the females’ percentile score of the 48th percentile. Nonetheless, the females’ range of scores in Q1 and Q3 were 10 percentile points wider than the males’.

- **Adolescent emotional intelligence:** In sum, Q2 females had a higher median percentile score of 54 in comparison to the males’ median score of 45. In Q1 and Q3, the female percentile scores ranged from the 38th percentile to the 65th percentile. Similarly, the male scores ranged from the 35th percentile to the 60th percentile. Therefore, in Q1 and Q3, the range for the females was eight percentile points higher than the range for the males.

### 4.6.5 Raven’s Standard Progressive Matrices

The univariate statistics pertaining to the Raven’s Standard Progressive Matrices (De Lemos, 1995; J. C. Raven, 1995) will be presented. First, the range, mean and standard deviation of the Raven’s Standard Progressive Matrices scores will be outlined. Second, the gender differences in the Raven’s Standard Progressive Matrices scores will be reviewed for the adolescent cohort. Third, the Raven’s Standard Progressive Matrices
scores will be evaluated to determine the demarcation score that will define the nature of the two IQ subgroups entitled, the high group and the low group.

4.6.5.1 Raven’s Standard Progressive Matrices: Score Range

The Raven’s Standard Progressive Matrices (De Lemos, 1995; J. C. Raven, 1995) standardised scores for the total cohort \((N = 369)\) ranged from a minimum of 72 to a maximum of 137. The study cohort had an overall mean \((M_{IQ} = 109; SD = 15.11; SEM = .787)\) nine points above the standardised score mean of 100 (De Lemos, 1995), and a slight negative skew of 0.304 \((SEM = 127)\). The slight skew resulted in a violation of the assumption of normality. However, as the cohort sample size was relatively large \((N = 369)\), statistical procedures were considered to be robust enough to cope with the slight skew in the data (Tabachnick & Fidell, 2007).

4.6.5.2 Raven’s Standard Progressive Matrices: Gender

An independent samples \(t\)-test was conducted to compare the Raven’s Standard Progressive Matrices standardised scores for males and females. There was no statistically significant difference in the Raven’s Progressive Matrices scores for the males \((n = 224, M_{IQ} = 110.66, SD = 15.51)\) and the females \((n = 145, M_{IQ} = 107.76, SD = 14.35)\) \(t(367) = 1.80, p = 0.072\) ns (two-tailed) CI \([-0.26, 6.05]\)).

4.6.5.3 Raven’s Standard Progressive Matrices: High Group and Low Group

The students in the sample \((N = 369, M_{IQ} = 109, Mdn = 110, SD = 15.11, CI [72, 137],\) skewness -.304) were then classified according to their Raven’s Standard Progressive Matrices standardised scores (De Lemos, 1995), and assigned to intellectual (IQ) ability groups. One standard deviation (IQ 115) above the mean was selected as the divisional mark between the groups. Given that the cohort mean was IQ 109, and the median was IQ 110, the divisional point of IQ 115 provided two reasonably balanced groups for statistical analysis in the current study.

The two IQ groups were entitled the low group \(\leq IQ 115 (n = 213, M_{IQ} = 99, SEM = .71, SD = 10.4, CI [72, 113])\) and the high group \(> IQ 115 (n = 156, M_{IQ} = 123, SD = 6.3, CI [116, 137])\). The low group and the high group were then also divided by gender, resulting in four groups, the female high group, female low group, male high group, and male low group. The four groups were created in an attempt to identify and analyse any potential individual differences in the predictive variables outlined in the study model. Figure 4.7 presents a series of four histograms with normal distribution curves, which
illustrate the spread of each gender and IQ combination group in light of the other groups.

The basic psychometric properties of each group are outlined:

- female high group: \(n = 48, M_{IQ} = 123.71, SD = 6.53, SEM = .94\);
- female low group: \(n = 97, M_{IQ} = 99.87, SD = 9.90, SEM = 1.00\);
- male high group: \(n = 108, M_{IQ} = 123.78, SD = 6.30, SEM = .60\); and
- male low group: \(n = 116, M_{IQ} = 98.44, SD = 10.85, SEM = 1.00\).

4.6.6 Victorian Certificate of Education

The Victorian Certificate of Education (VCE) Equivalent National Tertiary Entrance Rank (ENTER) scores (VCAA, 2010b) for the total cohort \(N = 369, M_{VCE} = 73.03, SD = 19.49, SEM = .981\) ranged from a minimum of 13.85 to a maximum of 99.95. The standard deviation also indicated a wide spread of academic achievement for the total cohort. The scores were slightly negatively skewed, at 0.483 \((SEM = .127)\). However, due to the robust sample size, the distribution was considered appropriate for statistical analysis (Tabachnick & Fidell, 2007).

4.7 Bivariate Statistics

4.7.1 Correlations: VCE, Gender, IQ, AEI Total and AEI Trait Scores

The relationship between VCE scores, gender, IQ, and AEI total and trait scores (normalised) were investigated using Pearson product-moment correlation coefficient. Preliminary analyses were performed to ensure that there was no violation of the assumptions of normality, linearity or homoscedasticity. The descriptive statistics and correlations between all variables, including both predictor (independent) variables and the response (dependent) variable, are provided in Table 4.6. The data aimed to address: (a) the relevant components of the assumptions of normality testing required for regression analysis, such as multicollinearity in the predictor variables; and (b) identify the significant correlations between the individual variables.
Table 4.6

*Correlations, Means and SD for Gender, IQ, VCE and AEI*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Descriptive Statistics</th>
<th>Correlations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
</tr>
<tr>
<td>Gender</td>
<td>.61</td>
<td>.48</td>
</tr>
<tr>
<td>IQ</td>
<td>109.52</td>
<td>15.11</td>
</tr>
<tr>
<td>VCE</td>
<td>73.03</td>
<td>19.49</td>
</tr>
<tr>
<td>ERE</td>
<td>.001</td>
<td>1.00</td>
</tr>
<tr>
<td>UE</td>
<td>.009</td>
<td>1.00</td>
</tr>
<tr>
<td>EDC</td>
<td>.003</td>
<td>1.00</td>
</tr>
<tr>
<td>EMC</td>
<td>-.000</td>
<td>1.00</td>
</tr>
<tr>
<td>AEI</td>
<td>.006</td>
<td>1.00</td>
</tr>
</tbody>
</table>

*Note.* ($N = 369$) Correlations for adolescent emotional intelligence (AEI) normalised scores are presented. IQ = Raven’s Standard Progressive Matrices; $M$ = mean scores; $SD$ = standard deviation; VCE = ENTER score; ERE = emotional recognition and expression; UE = understanding emotions; EDC = emotions direct cognition; EMC = emotional management and control; AEI = adolescent emotional intelligence. Statistical Significance: * = $p \leq .05$ (two-tailed); ** $p \leq .01$ (two-tailed).
4.7.1.1 Correlation: IQ for VCE, Emotional Management and Control

The Pearson product-moment correlation coefficient identified a relationship between IQ, as measured by the Raven’s Standard Progressive Matrices, \( M_{IQ} = 109.5, SD = 15.11, N = 369 \) and VCE scores \( M_{VCE} = 73.0, SD = 19.49, N = 369 \). There was a medium, positive correlation between the two variables \( r = .59, N = 369, p < .01, \) two-tailed). The correlation between IQ and VCE scores accounted for 35\% \( (r^2 = .351) \) of the variance. Higher levels of IQ were associated with higher levels of VCE academic achievement.

There was also a statistically significant correlation between IQ \( M_{IQ} = 109.5, SD = 15.11, N = 369 \) and emotional management and control \( M_{EMC} = -0.51 (51.98), SD = 1.00 (26.40), N = 369 \). The small correlation between IQ and emotional management and control \( r = .21, N = 369, p < .001, \) two-tailed), had a shared variance of 4.7\% \( (r^2 = .047) \). As IQ increased, there was also a positive increase in emotional management and control.

4.7.1.2 Correlation: Gender for VCE, AEI

There was a significant correlation between gender \( M_G = 61, SD = .48, N = 369 \) and VCE scores \( M_{VCE} = 73.03, SD = 19.49, N = 369 \). For the variable gender, males were coded as “1” and females as “0”. Females were significantly negatively correlated with VCE academic achievement \( r = -.14, N = 369, p < .01, \) two-tailed). Gender and VCE scores shared a small portion of the variance 2\% \( (r^2 = .020) \) that was associated with VCE academic achievement.

There was also a small, but significant, negative correlation between gender and the AEI total and AEI trait scores. The correlation between gender and the AEI total score \( M_{AEI} = .00, SD = 1.00, N = 369 \) indicated that females showed a stronger correlation between the two scores \( r = -.11, N = 369, p < .05, \) two-tailed). The correlation represented a small range of the shared variance effect between gender and the AEI total of 1.6\% \( (r^2 = .016) \). Gender also had a small, negative significant correlation with three of the AEI traits. The correlational results confirmed that the adolescent females in the cohort had higher mean scores than the males in:

- emotional recognition and expression \( M_{ERE} = .00, SD = 1.00, N = 369 \) \( r = -.10, p < .05, \) two-tailed, \( (r^2 = .011) \), 1.1\%;
• understanding emotions ($M_{UE} = .00$, $SD = 1.00$, $N = 369$) $r = -.12$, $p < .05$, two-tailed, ($r^2 = .016$), 1.6%; and

• emotions direct cognition ($M_{EDC} = .00$, $SD = 1.00$, $N = 369$) $r = -.21$, $p < .01$, two-tailed, ($r^2 = .047$), 4.7%.

Therefore, the general trend was for adolescent females to have higher AEI trait mean scores than males in three of the four AEI traits (emotional recognition and expression, understanding emotions, and emotions direct cognition). Further, a significant correlational relationship was identified between gender and emotional management and control:

• emotional management and control ($M_{EMC} = .00$, $SD = 1.00$, $N = 369$) $r = .14$, $p < .05$, two-tailed, ($r^2 = .020$), 2%.

The findings revealed that adolescent males had a higher emotional management and control mean score ($M_{EMC} = 54.6$) than females ($M_{EMC} = 47.9$). Therefore, the correlational results showed males had a stronger correlation with emotional management and control than did the females ($M_{EMC} = .00$, $SD = 1.00$, $N = 369$). The results indicated there was a small, positive significant correlation for males’ emotional management and control ($r = .14$, $N = 369$, $p < .05$, two-tailed), which explained ($r^2 = .020$) 2% of the variance.

4.7.1.3 Correlation: VCE for IQ, Gender and AEI

Pearson product-moment correlations indicated that VCE scores were significantly correlated with two constructs previously outlined, namely IQ and gender. The Pearson correlations also confirmed a significant correlation between VCE scores and AEI total, and VCE scores and three of the AEI traits.

A small, positive correlation between VCE scores and AEI total scores ($r = .209$, $N = 369$, $p < .01$, two-tailed) explained 4.3% ($r^2 = .043$) of the variation in VCE scores. This correlation indicated that higher levels of AEI were associated with higher levels of VCE academic achievement for the total cohort.

A positive correlation was also found between emotional recognition and expression, and VCE scores, ($r = .12$, $N = 369$, $p < .05$, two-tailed). The small correlation between VCE scores and emotional recognition and expression accounted for 1.4% ($r^2 = .014$) of the shared variance in VCE scores. The findings indicated that a higher ability to recognise and express emotions in oneself and others was
associated with higher academic scores in VCE. In contrast, lower skills in emotional recognition and expression were associated with lower academic scores.

Similarly, a small, positive correlation between understanding emotions and VCE scores ($r = .168, N = 369, p < .01$, two-tailed) explained 2.8% ($r^2 = 0.028$) of the variation in VCE scores. Therefore, higher skills in understanding emotions were also associated with higher levels of VCE academic achievement.

Correspondingly, a significant correlation was identified between VCE scores and emotional management and control ($r = .192, N = 369, p < .01$, two-tailed). The positive correlation between VCE scores and emotional management and control explained 3.6% ($r^2 = 0.036$) of the variation in VCE scores, which was marginally larger than the previous correlational findings. Higher skills in emotional management and control were reflective of adolescents’ skills in regulating and managing their own and others’ emotions, which was correlated with higher levels of VCE scores.

In contrast to the other AEI traits, the relationship between emotions direct cognition and VCE scores for the total cohort was not statistically significant ($r = -.007, N = 369, p = .869$, ns, two-tailed). In order to explore this relationship further, an examination of the emotions direct cognition histograms for the total cohort, and the cohort split by gender, was conducted. It may be possible that the males’ negative association with emotions direct cognition counteracted the positive association of the females with emotions direct cognition in the effect for the total cohort.

A summary of the significant correlational findings for the individual variables identified in the bivariate analysis is presented. The correlational analysis provided information to check for the assumptions required in order to accurately and reliably conduct the GLM saturated multivariate linear regression analysis. The correlations also enabled an overview of the significant variables in the study. Two correlational path models, relevant to Hypothesis One and Hypothesis Two $(a, b, c, d)$, are provided in Figure 4.7 and Figure 4.8.
Figure 4.7 Correlational Model: AEI Total, IQ and Gender for VCE
Figure 4.8 Correlational Model: AEI Traits, IQ and Gender for VCE
### 4.7.2 Independent Samples t-test: VCE, Gender and AEI

A series of independent samples t-tests were conducted to compare the variables VCE scores, gender, and AEI total scores and AEI trait scores in the cohort. The independent samples t-tests were intended to provide supplemental information regarding the difference in mean scores between groups of students.

#### 4.7.2.1 Independent Samples t-test: Gender and VCE

In order to confirm if there were any gender differences for academic achievement in this cohort, the male and female VCE ENTER scores were reviewed with an independent samples t-test. An independent sample t-test examining the means of the VCE ENTER scores, by gender, indicated there was a statistically significant difference ($t(367) = -2.756, p = .006, CI [-9.7, -1.6]$) between the mean VCE ENTER scores of the adolescent males and the females. The mean difference between the male group and the female group was a VCE ENTER score of 5.67. The 95% confidence interval for the estimated population mean difference was between -9.72 and -1.62. The effect size of the gender variance in mean VCE scores for males and females was moderate (Cohen’s $d = 0.29$). The male group VCE ENTER score mean of 70.80 ($n = 224, M_{VCE} = 70.80, SD = 20.32, SEM = 1.35$) was lower than the female group ENTER score mean of 76.47 ($n = 145, M_{VCE} = 76.47, SD = 17.65, SEM = 1.46$). The spread of the VCE ENTER scores for the male group (13.85 to 99.90) and the female group (15.25 to 99.05) were similar, with the males having a slightly wider range.

#### 4.7.2.2 Independent Samples t-test: Gender and AEI

First, there was a significant difference in AEI total percentile scores for the males ($M_{AEI} = 48.74, SD = 17.86, SEM = 1.19$) and the females ($M_{AEI} = 53.33, SD = 17.26, SEM = 1.43$); $t(367) = -2.44, p = .01$ (two-tailed). The mean difference in AEI between the males and females was five percentile points ($M_{diff} = -4.59, 95\% CI [-8.29, -1.90]$), with females having a higher mean than the males. The effect size of the difference in AEI between the males and females was small (Cohen’s $d = 0.26$).

Second, the analysis of the independent samples t-test for emotional recognition and expression showed there was not a significant difference between emotional recognition and expression for the males ($M_{ERE} = 47.74, SD = 27.80, SEM = 1.85$) and the females ($M_{ERE} = 52.77, SD = 27.85, SEM = 2.31$); $t(367) = -1.80, p = .07$ ns (two-tailed).
Third, the independent sample $t$-test for understanding emotions identified a statistically significant difference between the mean scores of the males ($M_{UE} = 48.74$, $SD = 30.70$, $SEM = 2.05$) and the females ($M_{UE} = 56.21$, $SD = 26.94$, $SEM = 2.23$), and equal variances were not assumed $t(367) = -2.46, p = .01$ (two-tailed). The magnitude of the differences in the means for understanding emotions was seven percentile points ($M_{diff} = -7.47$, 95% CI [-13.44, -1.49]), with females having a higher mean score than males. The effect size of the difference in understanding emotions was small (Cohen’s $d = 0.25$).

Fourth, the analysis of the independent samples $t$-test for emotions direct cognition showed a significant difference between males ($M_{EDC} = 44.26$, $SD = 28.64$, $SEM = 1.91$) and females ($M_{EDC} = 56.62$, $SD = 26.41$, $SEM = 2.19$); $t(367) = -4.17, p = .000$ (two-tailed). The magnitude of the differences in the means for males and females indicated a difference of 12 percentile points for emotions direct cognition ($M_{diff} = -12.36$, 95% CI [-18.08, -6.63]), with females having a higher mean score than males. The effect size was medium (Cohen’s $d = 0.43$).

Fifth, there was a significant difference in the mean scores for emotional management and control between the males ($M_{EMC} = 54.60$, $SD = 26.23$, $SEM = 1.75$) and the females ($M_{EMC} = 47.93$, $SD = 26.23$, $SEM = 2.17$); $t(367) = 2.38, p = .01$ (two-tailed). The magnitude of the differences in the means was seven percentile points for emotional management and control, with males having a higher mean score than the females. The effect size was small (Cohen’s $d = 0.25$).

To summarise, the independent samples $t$-tests found that females had a statistically significant higher mean than males in AEI total. The effect size of the difference in AEI total between males and females was small. However, there were variable findings for gender differences in the AEI traits. Females had a higher mean than males for understanding emotions; the effect size for the difference was also small. There was no significant gender effect for the trait of emotional recognition and expression. However, females had a higher mean score for emotions direct cognition than males. The effect size of the mean difference in emotions direct cognition between the males and females was medium. An independent sample $t$-test also demonstrated that, for emotional management and control, the males had a higher
mean than the females. The effect size of the difference in emotional management and control between the males and females was small.

4.7.3 Independent Samples t-test: Female High Group, Female Low Group, Male High Group and Male Low Group

To determine the relationship between the AEI total and AEI trait scores for each of the IQ and gender combination groups, a series of independent samples t-tests were conducted. The first objective was to determine if there were any significant differences in the AEI of each gender based upon their intellectual differences. The analysis was conducted by comparing the AEI of the female high group with the female low group, and the male high group with the male low group.

The second objective was to determine if there were any differences between the males and females in their comparative intellectual groups. The analysis was conducted by comparing AEI in the four IQ and gender combination groups: the female high group is presented in Figure 4.9; the male high group is presented in Figure 4.10; the female low group is presented in Figure 4.11; and the with the male low group is presented in Figure 4.12. The series of four histograms provide the AEI total score means, standard deviation, and the number of students in each of the IQ and gender combination groups.
Figure 4.9 Histogram: AEI Total Score Female High Group
Figure 4.10 Histogram: AEI Total Score Male High Group
Figure 4.11 Histogram: AEI Total Score Female Low Group
Figure 4.12 Histogram: AEI Total Score Male Low Group
4.7.3.1 Independent Samples t-test: Female High Group and Female Low Group

First, independent samples t-tests were conducted to compare the AEI total and AEI trait percentile scores for the female high group and the female low group, as presented in Table 4.7. There was a significant difference in scores between the emotional management and control of the female high group (\(M_{EMC} = 56.48, SD = 22.83, SEM = 3.29, n = 48\)) and the female low group (\(M_{EMC} = 43.70, SD = 26.88, SEM = 2.72, n = 97\)), \(t(143) = 2.826, p = .005\), (two-tailed). The difference in mean scores was 13 percentile scores: the female high group had a higher level of emotional management and control when compared to the female low group (\(M_{diff} = 12.77, SEM = 4.52, 95\% CI [3.84, 21.71]\)). The effect size of the difference between the female high group and the female low group in emotional management and control was medium (Cohen’s \(d = 0.51\)).

Table 4.7

<table>
<thead>
<tr>
<th>Adolescent Emotional Intelligence (Percentile Scores)</th>
<th>IQ and Gender Groups</th>
<th>(t)</th>
<th>(df)</th>
<th>CI (95%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female High: (n = 48)</td>
<td>Female Low: (n = 97)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(M (SD))</td>
<td>(M (SD))</td>
<td></td>
<td></td>
<td>(95%)</td>
</tr>
<tr>
<td>Emotional Recognition &amp; Expression</td>
<td>54.08 (31.79)</td>
<td>52.12 (25.83)</td>
<td>.371</td>
<td>43</td>
</tr>
<tr>
<td>Understanding Emotions</td>
<td>56.21</td>
<td>56.21</td>
<td>.000</td>
<td>43</td>
</tr>
</tbody>
</table>

\(AEI \ t\)-test: Total and Trait Scores for Female High Group and Female Low Group
There was no significant difference in AEI total scores for the female high group ($M_{AEI} = 56.30$, $SD = 18.53$, $SEM = 2.67$, $n = 48$) and the female low group ($M_{AEI} = 51.87$, $SD = 16.50$, $SEM = 1.67$, $n = 97$), $t(143) = 1.461$, $p = .14$ ns (two-tailed), 95% CI [-1.56, 10.43]. An analysis of the independent samples $t$-tests of the remaining AEI trait scores for the female high group and the female low group found no other statistically significant association. Therefore, the results indicated that the female high group and the female low group were not significantly different in relation to their AEI total and trait scores for emotional recognition and expression, understanding emotions, and emotions direct cognition. However, as previously outlined, the female high group did have a higher mean than the female low group for emotional management and control.

4.7.3.2 Independent Samples $t$-test: Male High Group and Male Low Group

Second, independent samples $t$-tests were conducted to compare the AEI total and AEI trait scores for the male high group and the male low group, as presented in Table 4.8. There was no significant difference between the two groups. The findings suggest that the variance in the IQ of the male high group and the male low group did not contribute to any significant difference in their AEI total and AEI trait scores. Therefore, unlike the female high and low groups, who were found to have a significant difference...
in their level of emotional management and control, the male high and low group had comparable levels of AEI total and AEI trait scores.

**Table 4.8**

*AEI t-test: Total and Trait Scores for Male High Group and Male Low Group*

<table>
<thead>
<tr>
<th>Adolescent Emotional Intelligence</th>
<th>IQ and Gender Combination Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Percentile Scores)</td>
<td>Male High: n = 108</td>
</tr>
<tr>
<td>Emotional Recognition &amp;</td>
<td>( M (SD) )</td>
</tr>
<tr>
<td>Expression</td>
<td>46.25 (27.16)</td>
</tr>
<tr>
<td>Understanding Emotions</td>
<td>49.24 (32.46)</td>
</tr>
<tr>
<td>Emotions Direct Cognition</td>
<td>43.53 (30.53)</td>
</tr>
<tr>
<td>Emotional Management &amp;</td>
<td>57.03 (25.53)</td>
</tr>
<tr>
<td>Control</td>
<td>48.99 (18.07)</td>
</tr>
<tr>
<td>Adolescent Emotional Intelligence</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* Statistical significance: No statistically significant results were found. \( M = \text{Mean}, \ SD = \text{Standard Deviations}, \) which appear in parentheses below Mean Scores.
### 4.7.3.3 Independent Samples t-test: Male High Group and Female High Group

Third, independent samples t-tests were conducted to compare the AEI total and AEI trait scores for the male high group and the female high group, as presented in Table 4.9. Two statistically significant differences in scores for the male high group and the female high group were identified. There was a significant difference in the AEI total scores for the male high group ($M_{AEI} = 48.99$, $SD = 18.07$, $SEM = 1.73$, $n = 108$) and the female high group ($M_{AEI} = 56.30$, $SD = 18.53$, $SEM = 2.67$, $n = 48$), $t(154) = -2.31$, $p = .022$, (two-tailed). A review of significant difference in mean scores indicated that the female high group had a higher mean for AEI total when compared to the male high group. There was a difference of 7 percentile scores ($M_{diff} = -7.31$, $SEM = 3.16$, 95% CI [-13.56, -1.07]) between the two groups. The effect size of the difference in means between the AEI of the female high group and the male high group was moderate (Cohen’s $d = 0.39$).

An independent samples t-test also identified a statistically significant difference in the emotions direct cognition scores for the male high group ($M_{EDC} = 43.53$, $SD = 30.53$, $SEM = 2.93$, $n = 108$) and the female high group ($M_{EDC} = 58.52$, $SD = 24.50$, $SEM = 3.53$, $n = 48$), $t(154) = -3.261$, $p = .001$, (two-tailed). A review of the significant difference in mean scores indicated that the female high group had a higher level of emotions direct cognition scores when compared to the male high group. The mean difference in emotions direct cognition was 15 percentile points ($M_{diff} = -14.99$, $SEM = 4.59$, 95% CI [-24.10, -5.88]). The effect size of the mean difference in emotions direct cognition was medium (Cohen’s $d = 0.54$).

The results from the remaining independent sample t-tests confirmed there were no statistically significant differences between the male high group and the female high group for emotional recognition and expression, understanding emotions, or emotional management and control. These findings indicated that the female high group and the male high group had comparable levels of emotional recognition and expression, understanding emotions, and emotional management and control. However, as outlined the female high group had higher scores in AEI total and emotions direct cognition when compared to the male high group.
Table 4.9  
*AEI t-test: Total and Trait Scores for Female High Group and Male High Group*

<table>
<thead>
<tr>
<th>Adolescent Emotional Intelligence (Percentile Scores)</th>
<th>IQ and Gender Combination Groups</th>
<th>Male High: $n = 108$</th>
<th>Female High: $n = 48$</th>
<th>$t$</th>
<th>$df$</th>
<th>CI (95%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotional Recognition &amp; Expression</td>
<td></td>
<td>46.25 (27.16)</td>
<td>54.08 (31.79)</td>
<td>-1.576</td>
<td>154</td>
<td>-17.65, 1.98</td>
</tr>
<tr>
<td>Understanding Emotions</td>
<td></td>
<td>49.24 (32.46)</td>
<td>56.21 (28.74)</td>
<td>-1.342</td>
<td>154</td>
<td>-17.26, 3.33</td>
</tr>
<tr>
<td>Emotions Direct Cognition</td>
<td></td>
<td>43.53 (30.53)</td>
<td>58.52 (24.50)</td>
<td>-3.261**</td>
<td>154</td>
<td>-24.10, 5.88</td>
</tr>
<tr>
<td>Emotional Management &amp; Control</td>
<td></td>
<td>57.03 (25.53)</td>
<td>56.48 (22.83)</td>
<td>.128</td>
<td>154</td>
<td>-7.93, 9.02</td>
</tr>
<tr>
<td>Adolescent Emotional Intelligence</td>
<td></td>
<td>48.99 (18.07)</td>
<td>56.30 (18.53)</td>
<td>-2.315*</td>
<td>154</td>
<td>-13.56, -1.07</td>
</tr>
</tbody>
</table>

*Note.* $* = p \leq .05$, $** = p \leq .01$. Standard Deviations (SD) appears in parentheses below Mean Scores.
4.7.3.4 Independent Samples t-test: Male Low Group and Female Low Group

Fourthly, independent sample *t*-tests conducted to compare the AEI total and trait scores for the male low group and the female low group are presented in Table 4.10. There was a significant difference in the understanding emotions scores for the male low group (*M*<sub>UE</sub> = 48.27, *SD* = 29.10, *SEM* = 2.70, *n* = 116) and the female low group (*M*<sub>UE</sub> = 56.21, *SD* = 26.15, *SEM* = 2.65, *n* = 97), *t* (211) = -2.076, *p* = .039, (two-tailed). A review of the statistically significant difference between the understanding emotions mean scores indicated that the female low group had a higher mean than the male low group. The difference in means was 8 percentile points (*M*<sub>diff</sub> = -7.93, *SEM* = 3.82, 95% CI [-15.47, -.39]). The effect size of the difference in the means of understanding emotions between the male low group and the female low group was small (Cohen’s *d* = 0.28).

There was also a statistically significant difference in the emotions direct cognition scores for the male low group (*M*<sub>EDC</sub> = 44.94, *SD* = 26.88, *SEM* = 2.49, *n* = 116) and the female low group (*M*<sub>EDC</sub> = 55.68, *SD* = 27.38, *SEM* = 2.78, *n* = 97), *t* (211) = -2.879, *p* = .004, (two-tailed). A review of the significant difference in mean scores indicated that the female low group had a higher level of emotions direct cognition scores when compared to the male low group (*M*<sub>diff</sub> = -10.74, *SEM* = 3.73, 95% CI [-18.09, -3.38]). The effect size of the mean difference in emotions direct cognition was moderate (Cohen’s *d* = 0.39).

An independent sample *t*-test found there was a significant difference in the emotional management and control scores for the male low group (*M*<sub>EMC</sub> = 52.34, *SD* = 26.78, *SEM* = 2.48, *n* = 116) and the female low group (*M*<sub>EMC</sub> = 43.70, *SD* = 26.88, *SEM* = 2.72, *n* = 97), *t* (211) = 2.340, *p* = .020, (two-tailed). A review of the significant difference in mean scores revealed the male low group had a higher mean for emotional management and control when compared to the female low group. The mean difference in emotional management and control was nine percentile points (*M*<sub>diff</sub> = 8.63, *SEM* = 3.69, 95% CI [1.35, 15.91]). The effect size of the difference in emotional management and control mean scores between the male low group and the female low group were moderate (Cohen’s *d* = 0.32).
The findings of the independent $t$-tests also confirmed that the mean scores in both AEI total and emotional recognition and expression, for the female low group and the male low group, were not statistically different.

Of the five independent sample $t$-tests conducted, three AEI traits: understanding emotions, emotions direct cognition, and emotional management and control, showed a statistically significant difference in the mean scores of the male low group and the female low group. However, two of the independent sample $t$-tests conducted for the AEI traits: and emotional recognition and expression and AEI total, did not show a statistically significant difference in the mean scores of the male low group and the female low group.

Table 4.10

*AEI t-test: Total and Trait Scores for Female Low Group and Male Low Group*

<table>
<thead>
<tr>
<th>Adolescent Emotional Intelligence (Percentile Scores)</th>
<th>IQ and Gender Groups</th>
<th>Male Low: $n = 108$</th>
<th>Female Low: $n = 48$</th>
<th>$t$</th>
<th>$f$</th>
<th>CI (95%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotional Recognition &amp; Expression</td>
<td>48.49 (28.46)</td>
<td>52.12 (25.83)</td>
<td>-.967</td>
<td>11</td>
<td>-11.03, 3.77</td>
<td></td>
</tr>
<tr>
<td>Understanding Emotions</td>
<td>48.27 (29.10)</td>
<td>56.21 (26.15)</td>
<td>-.207*</td>
<td>11</td>
<td>-15.47, -.39</td>
<td></td>
</tr>
<tr>
<td>Emotions Direct Cognition</td>
<td>44.94 (26.88)</td>
<td>55.68 (27.38)</td>
<td>-2.879**</td>
<td>11</td>
<td>-18.09, -3.38</td>
<td></td>
</tr>
</tbody>
</table>

CI: Confidence Interval
In summary, the series of independent t-tests determined how the AEI total and trait scores were associated for the IQ and gender combination groups. The results revealed that the male high group and the male low group had comparable levels of AEI, because there were no statistically significant differences in the means of the AEI total and trait scores. However, there were statistically significant differences found in a range of AEI mean scores for the following groups in the outlined variables:

- **The female high group** had statistically significant higher levels of:
  a) emotional management and control than the female low group;
  b) emotions direct cognition than the male high group; and
  c) AEI than the male high group.

- **The female low group** had statistically significant higher levels of:
  a) understanding emotions than the male low group; and
  b) emotions direct cognition than the male low group.

- **The male low group** had a statistically significant higher level of:
  a) emotional management and control than the female low group.

### 4.8 Multivariate Analyses

A series of five GLM saturated multiple linear regressions were performed between academic achievement (VCE score) as the response or criterion (dependent) variable, and IQ, gender, and AEI total and trait scores: emotional recognition and expression; understanding emotions; emotions direct cognition; and emotional

### Table

<table>
<thead>
<tr>
<th></th>
<th>Mean 1</th>
<th>Mean 2</th>
<th>t-value</th>
<th>df</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotional Management &amp;</td>
<td>52.34</td>
<td>43.70</td>
<td>2.340*</td>
<td>11</td>
<td>1.35,</td>
</tr>
<tr>
<td>Control</td>
<td>(26.78)</td>
<td>(26.88)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adolescent Emotional</td>
<td>48.50</td>
<td>51.87</td>
<td>-1.422</td>
<td>11</td>
<td>-8.02,</td>
</tr>
<tr>
<td>Intelligence</td>
<td>(17.74)</td>
<td>(16.50)</td>
<td></td>
<td></td>
<td>1.29</td>
</tr>
</tbody>
</table>

*Note. * = p < .05, ** = p < .01, *** = p < .001. Standard Deviation (SD) appears in parentheses below Mean Scores.*
management and control, as the predictor (independent) variables. Analysis was performed using the Statistics Package for the Social Sciences (IBM Corporation & Statistics Package for the Social Sciences (SPSS)) (Version 21); in particular, the regression and explore functions.

4.9 Assumptions of Normality Testing

Field (2009) noted that, in order to be able to draw conclusions about the general population based on the results from a regression analysis calculated on a sample, the following assumptions should be met:

- variable types must be quantitative or categorical;
- non-zero variance for the predictor;
- no perfect multicollinearity;
- homoscedasticity is identified at each level of the predictor variable. The assumption means that the variance of the residual terms around the regression line should be constant or the same for all values of the predictor variable;
- normally distributed errors require that the residuals in the model are random, normally distributed variables with a mean of zero.
- independence of outcome variables; and
- assumption that the outcome variable has a linear relationship with the predictor variables or that the model is linear.

The five models were examined to determine if the data met the assumptions of normality, homogeneity of variance, linearity, and multicollinearity required to conduct regression analysis. There were no cases with missing data. For three predictor (independent) variables (AEI total score or one of the four trait scores, IQ, and gender), the variables were quantitative or categorical, and the Mahalanobis distance critical value recommendation was 16.27 (Pallant, 2007).

4.9.1 Outliers and Residuals

To determine if the model fit the observed data well, or if the model was influenced or biased by a small number of cases, outliers and influential cases were reviewed to determine their effect on the values of the estimated regression coefficients.
In each model, one extreme multivariate outlier was identified from the case-wise
diagnostics as having a large residual (the difference between the predicted and observed
values of the outcome). This participant (Code 62) reported a very low VCE ENTER
score of 15.25, which was significantly lower than the model prediction of an ENTER
score of 67.20. To check whether this case was having any undue influence on the results
of the model, Mahalanobis distance (6.441) and Cook’s Distance (0.025) were reviewed
(Cook, 1977). The Mahalanobis distance measures the distance of the case from the mean
of the predictor variable; in this instance the critical value recommended was 16.27,
therefore 6.4 was acceptable. Tabachnick and Fiddell (2007) suggest a Cook’s distance of
1 or above was problematic. The Cook’s distance of .02 in this instance was quite small,
suggesting this case did not have a significant effect on the regression model. Given the
size of the database and the limited impact of this case on the model, it was decided to
retain this case in the model.

4.9.2 Multicollinearity
Multicollinearity exists when there is a strong correlation between two or more
predictors in a regression model. Multicollinearity was examined by reviewing the
correlations among the predictor (independent) variables of IQ, as measured by Raven’s
Standard Progressive Matrices ($M_{IQ} = 109.52, SD = 15.11, N = 369$), and gender ($M_G = .61, SD = .48, N = 369$); AEI total ($M_{AEI} = 50.54, SD = 17.75, N = 369$); emotional
recognition and expression ($M_{ERE} = 49.52, SD = 27.91, N = 369$); understanding emotions
($M_{UE} = 51.67, SD = 29.47, N = 369$); emotions direct cognition ($M_{EDC} = 49.12, SD = 28.40, N = 369$); and emotional management and control ($M_{EMC} = 51.98, SD = 26.40, N = 369$). The relationship between AEI total and traits, IQ, and gender was investigated
using the Pearson product-moment correlation coefficient. Preliminary analyses were
performed in order to ensure there were no violations of assumptions of normality,
linearity, and homoscedasticity.

Gender was associated with AEI total ($r = -.127, p < .05$), understanding emotions
($r = -.124, p < .05$), emotions direct cognition ($r = -.213, p < .01$), and emotional
management and control ($r = -.124, p < .01$). Therefore, there were small correlations
between the predictor variables, which was not considered to cause multicollinearity
(Tabachnick & Fidell, 2007). IQ was related to emotional management and control ($r = -$
.124, \( p < .01 \)); again, this level of correlation was small to moderate and therefore was not considered to compromise the level of correlation considered for multicollinearity.

As expected, AEI was correlated to the other AEI traits. Hypothesis One utilised the AEI total score, and Hypothesis Two utilised the AEI traits. In Hypothesis One the data associated to the AEI total score was analysed, while, the data from the AEI scores was analysed in Hypothesis Two\( _{(a, b, c, d)} \). Therefore, the AEI total scores and trait scores were not used together in any psychometric analysis, which prevented any possibility of confounding the results. Further, the correlations did not result in multicollinearity. The correlational findings indicated that no other predictor variables were statistically significantly correlated. Hence, these results indicated that the data was suitably correlated with the predictor variables, as the coefficient of determination between AEI and gender was small. Further, the level of correlation was not above \( r = .80 \); therefore, the data was suitable for use as a basis for analysis in a saturated multiple linear regression model, as it was not too highly correlated (Tabachnick & Fidell, 2007).

**4.9.3 Normality**

In order to determine whether the distribution of the sample as a whole deviated from a comparable normal randomised distribution, the Raven’s Standard Progressive Matrices standardised scores, VCE ENTER scores, and AEI total normalised scores were reviewed to ensure they met the assumptions of normality. The Kolmogorov-Smirnov Test was conducted to compare the scores in the sample to a normal distribution with the same mean and standard deviation. The test results were significant (\( p > .05 \)), indicating that the distribution of the sample was not normal. Therefore, the normality of the sample was examined using Q-Q Plots, as well as stem and leaf plots, in order to review the extent of non-normality in the data.

The Raven’s Standard Progressive Matrices standardised score \( D (369) = .09, p < .05 \), VCE ENTER score \( D (369) = .08, p < .05 \), and AEI total normalised score \( D (369) = .06, p < .05 \), were significantly non-normal. These results were considered to be a possible reflection of the large sample size (\( N = 369 \)), which was sensitive to the slight negatively skewed distribution observed in the Raven’s Standard Progressive Matrices standardised scores, and the symmetrical distribution found for both the VCE ENTER scores and the AEI scores. Given that the study included students from a medium to high
socioeconomic level, the slightly high VCE scores and high Raven’s Progressive Matrices scores were considered normative for the population encompassed in the cohort. Hence, the slightly non-normal distribution in the cohort was considered to be reflective of the wider socio-economic level from which the sample was drawn.

Further, previous research findings Petrides et al. (2004), found that EI was not significantly predictive of academic achievement in students with an intellectual ability above IQ 128 and IQ 130. In addition, Woitaszewski (2000) also found EI was not significantly associated with academic achievement in gifted students. Consequently, it was decided to include the slight negative in the study sample, which would incorporate students with higher levels of gf and enable a comparison of the current study with previous research findings. Therefore, the slightly negative skew was conducive to analysis with previous research findings (Petrides et al., 2004; Woitaszewski, 2000) and consequently, the database was considered valid for the current research design.

4.9.4 Homogeneity

The results from a psychometric evaluation of statistical assumptions of normality, specifically the homogeneity of variance, were reviewed for the cohort in the current study. Homogeneity of variance checks each level of the predictor or independent variables, then determines if the variance of the residual terms is constant or has the same variance, which is known as homogeneity of variance or the concept of homoscedasticity (Tabachnick & Fidell, 2007). In this case the review found the homogeneity of variance was acceptable for a regression analysis.

In sum, the results from the evaluation of assumptions of normality including homogeneity of variance, covariance matrices, linearity and multicollinearity, were reviewed. They were considered satisfactory for both the research design and the regression statistical analysis for the current cohort. Although the coefficients and parameters of the regression equation were thought to be reasonably unbiased, it was acknowledged that the model obtained from this sample might not be the same as a model based on another sample of the adolescent population. However, by including the assessment of homogeneity of variance for the predictor variables, the possibility of the sample being similar to the broader population was increased (Field, 2009).
4.10 GLM Saturated Multiple Linear Regression Method

Since no prior hypothesis had been proposed to determine the order of entry of the academic achievement predictor variables, all items were entered simultaneously for the saturated multiple linear regression analyses. Consequently, the regression method selected was a GLM Saturated Multiple Linear Regression method. Decomposition of the general saturated multiple linear regression equation yielded five regression equations for academic achievement, namely one for each AEI total or trait by gender and IQ combinations. Model E and Models One, Two, Three, and Four are presented with the intercepts and slope coefficients of the equations, a summary of the regression analysis results, a figure, and a comparison between IQ and gender combination groups. Each model is presented in light of the relevant Null Hypothesis.

Further, the saturated multiple linear regression results, including the intercept and slope for the female high group, female low group, male high group, and the male low group, are subsequently presented in a Simple Slopes line graph. The simple slope regression graphs, which are presented in the multivariate statistics section of this chapter, were designed to incorporate data from -2.5 SD to 2.5 SD for two reasons. First, a review of the AEI raw scores, normalised scores and percentile scores found the AEI total score ($M_{AEI} = 50.54$, $SD = 17.75$, $N = 369$) had a standard deviation of 17, which was indicative of a normative spread of percentile scores. However, the AEI trait percentile scores had large standard deviations in emotional recognition and expression ($M_{ERE} = 49.52$, $SD = 27.91$), understanding emotions ($M_{UE} = 51.68$, $SD = 29.47$), emotions direct cognition ($M_{EDC} = 49.12$, $SD = 28.40$), and emotional management and control ($M_{EMC} = 51.98$, $SD = 26.40$), which was indicative of a widespread or range of scores. A review of the histograms of AEI trait scores found there were some gaps between scores beyond 2.5 $SD$ above and below the mean. Therefore, in light of the large standard deviations, the data gaps and few cases beyond 2.5 $SD$ provided evidence to indicate that the regression graphs would be more informative by presenting AEI normalised scores from -2.5 $SD$ to 2.5 $SD$ (Tabachnick & Fidell, 2007).

Second, Petrides et al. (2004) found a significant positive bilinear interaction between intelligence and trait AEI, which became negative at the point of intersection for English at IQ 128.2, and for the final overall academic score for academic achievement at
IQ 130.9. Therefore, the current study also aimed to include a wide range of scores (-2.5 SD to 2.5 SD) in order to facilitate a comparative analysis with previous research and to determine if there was a similar trend in the current findings (Field, 2009). Hence, due to the range of the data in this cohort and previous research findings, the simple slope regression graphs were designed to incorporate data from -2.5 SD to 2.5 SD and are presented in the multivariate statistics section of this chapter.

**Null Hypothesis One:** The combined effects of adolescent emotional intelligence total, IQ, gender, and their interactions will not be predictive of academic achievement.

### 4.10.1 Model E: AEI, IQ and Gender

A GLM saturated multiple regression was performed between VCE academic achievement as the dependent variable, and IQ, gender, and AEI as the predictor variables. In order to conduct the evaluation of the assumptions, analysis was performed using the SPSS (Version 21) regression and explore functions.

The results of this evaluation of the assumptions identified a slight skewness that did not require transformation. With the use of $p < .001$ criterion for Mahalanobis distance, an outlier was identified (Mahalanobis distance = 6.4). However, the impact of the outlier was not significant on the regression model and was, therefore, retained in the data. No cases had missing data, and the small correlation between predictor variables was reviewed. No correlation was above $r = .80$; consequently, the correlations did not meet the criteria for multicollinearity. The analyses confirmed that the assumptions of normality, linearity, multicollinearity, and homoscedasticity were not significantly compromised, thus confirming that the data sample was suitable for the GLM saturated multiple linear regression procedure (Field, 2009; Tabachnick & Fidell, 2007). The GLM saturated multiple linear regression aimed to predict VCE academic achievement from AEI, IQ (low group = ≤ IQ 115 and the high group = > IQ 115), and gender (males and females).

All predictor variables and their interactions were entered simultaneously into the GLM saturated multiple linear regression model. The simultaneous saturated regression
model contained seven independent variables (AEI, gender, IQ, IQ x gender, AEI x gender, AEI x IQ, AEI x IQ x gender). A review of the GLM simultaneous saturated regression model, including all predictors, confirmed that the model was statistically significant and produced an $R$, which was significantly different from zero ($R = .54$). The overall regression, $R^2 = .29$, predicted approximately 29% of the variance in VCE scores, with the 95% confidence limits for $R^2$ ranging from 0.19 to 0.38. The saturated regression model ($F (7, 361) = 21.18, p = < .0005 (SEM = 16.57), N = 369$) was statistically significant in predicting the variance in VCE academic achievement. The $R^2_{adj}$ value, .27, ($R^2_{adj} = 27\%$) indicated that just under one-third of the variability in VCE academic achievement was predicted by the model (Tabachnick & Fidell, 2007). Therefore, based on the psychometric results outlined Null Hypothesis One was rejected.

Table 4.11 presents the complete results for the GLM saturated multiple linear regression analysis. The AEI total score correlations between the predictor variables; the unstandardised regression coefficients ($b_v$); coefficient correlations ($t$); statistical significance ($p = < .05$); the 95% confidence intervals; and the part correlation coefficient as a percentage of variance, are outlined. The standardised regression coefficients differed significantly from zero, with a 95% confidence interval. An analysis of the beta weights indicated that IQ ($β = .44, p < .001$) was the major positive predictor of VCE academic achievement in the model, with higher levels of intelligence predictive of higher levels of academic achievement. Gender ($β = -.22, p < .001$) was the second strongest predictor for VCE academic achievement in the model, with adolescent females attaining higher VCE rank scores than males. AEI ($β = .21, p < .05$) was the third strongest predictor in the model, with higher levels of AEI in adolescents predictive of higher levels of VCE academic achievement. Further, an analysis of the four IQ and gender combination groups found the main predictive effects AEI for VCE academic achievement were differentiated, subject to developmental differences in IQ and gender.

At the correlational level of the regression model, two positive, statistically significant relationships were evident. First, a positive, statistically significant correlation was identified between IQ x gender. Second, a positive, statistically significant correlation was identified between gender x AEI. Although the bivariate correlations between gender and AEI ($M_{G \times AEI} = -.050, SD = .798$) were statistically different from
zero, when using a post hoc correction \((r = .174, F (7, 361), p < .000, r^2 = .030, (.3\%), N = 369)\), the correlation effect did not contribute significantly to the final regression model. It seems plausible that the correlation identified between gender and AEI was reflective of an underlying relationship in the model. Furthermore, the bivariate correlation between gender x IQ \((M_{IQ \times G} = .292, SD = .455)\) was found to be statistically different from zero; when using a post hoc a correction \((r = .274, F (7, 361), p < .000, r^2 = .075, (7.5\%), N = 369)\). However, the correlation was not significant in the final regression model. Therefore, plausibly the correlation identified between gender and IQ was reflective of an underlying relationship in the model.

Table 4.11 also includes the squared semipartial correlation between the predictor variables and is represented by the symbol \(sr^2\). Warner (2007) explained the semipartial correlation is obtained by removing the variance that is associated to \(X_1\) and from other predictor variables such as \(X_2\). The squared semipartial correlation identifies the unique proportion of the total variance of \(X_1\) in \(Y\), the criterion variable. In SPSS (Version 21), the squared semipartial correlation is identified in the regression results, coefficients section, correlations subsection and is entitled “Part”. These results indicated that intelligence uniquely contributed 6.5% of the variance in VCE academic achievement. Gender uniquely contributed to 3.06% of the unique variance in academic achievement.

The three predictor variables each made unique statistically significant contributions to the model, as presented in Table 4.11. The largest predictor was IQ \((\beta = .44, t (361) = 5.77, p = < .000)\), which contributed the largest percentage of the unique variance (6.5%) to the model. The second largest predictor was gender \((\beta = -.22, t (361) = -3.95, p = < .000)\), which explained 3% of the variance. The third largest predictor was AEI \((\beta = .21, t (361) = 2.21, p = .027)\), which explained 1% of the variance. These three predictors and interactions explained 29.1% of the variance in the dependent variable, VCE academic achievement. The sum of the unique variability explained by the three significant variables was 10.57%; the sum of the shared variability was 18.53%, which collectively accounted for the model’s total variance of 29.1%, 95% CI [0.19, 0.38].
Table 4.11

Model E: Summary of Regression Analysis for AEI Total Score, IQ and Gender Predicting VCE Score

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>$b$</th>
<th>$b_v$</th>
<th>$t$</th>
<th>$p$</th>
<th>95% CI</th>
<th>$sr^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>0</td>
<td>70.62</td>
<td>41.89</td>
<td>&lt;0.001</td>
<td>67.30, 73.94</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>1</td>
<td>17.43</td>
<td>5.77</td>
<td>&lt;0.001</td>
<td>11.49, 23.38</td>
<td>6.55</td>
</tr>
<tr>
<td>G</td>
<td>2</td>
<td>-9.04</td>
<td>-3.95</td>
<td>&lt;0.001</td>
<td>-13.54, -4.54</td>
<td>3.06</td>
</tr>
<tr>
<td>$E_{j0}$</td>
<td>3</td>
<td>4.13</td>
<td>2.21</td>
<td>0.027</td>
<td>.46, 7.80</td>
<td>0.96</td>
</tr>
<tr>
<td>R x $E_{j0}$</td>
<td>4</td>
<td>4.83</td>
<td>-1.62</td>
<td>0.105</td>
<td>-10.68, 1.02</td>
<td>0.51</td>
</tr>
<tr>
<td>R x G</td>
<td>5</td>
<td>2.42</td>
<td>0.64</td>
<td>0.518</td>
<td>-4.94, 9.80</td>
<td>0.08</td>
</tr>
<tr>
<td>G x $E_{j0}$</td>
<td>6</td>
<td>1.39</td>
<td>0.583</td>
<td>0.561</td>
<td>-3.32, 6.11</td>
<td>0.06</td>
</tr>
<tr>
<td>R x G x $E_{j0}$</td>
<td>7</td>
<td>1.42</td>
<td>0.386</td>
<td>0.700</td>
<td>-5.82, 8.66</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Note. ($N = 369$), $b_v$ = Unstandardised regression coefficients; $t$ = coefficient correlations; $sr^2$ = the squared semipartial correlation coefficient, indicating the unique variance predicted by the independent variable when the shared predictive variance of other predictor variables is partialled out of the predictive effect.

The regression results presented for each IQ and gender combination group are now outlined in Table 4.12. The intercept and slope for the female high group, female low group, male high group, and the male low group are provided.
Table 4.12

Model E: Regression of Academic Achievement (VCE Score) on AEI Total Score ($E_{j0}$), IQ (R) and Gender (G)

<table>
<thead>
<tr>
<th>Group</th>
<th>Intercept</th>
<th>Slope</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V(G = 0, R = 0)$</td>
<td>$b_0^*$ + $b_3 E_{j0}$</td>
<td>70.62</td>
</tr>
<tr>
<td>$V(G = 0, R = 1)$</td>
<td>$(b_0 + b_1) + (b_3 + b_4) E_{j0}$</td>
<td>88.06</td>
</tr>
<tr>
<td>$V(G = 1, R = 0)$</td>
<td>$(b_0 + b_2) + (b_3 + b_6) E_{j0}$</td>
<td>61.58</td>
</tr>
<tr>
<td>$V(G = 1, R = 1)$</td>
<td>$(b_0 + b_2 + b_3) + (b_3 + b_4 + b_6 + b_7) E_{j0}$</td>
<td>81.45</td>
</tr>
</tbody>
</table>

Note. $b_0^*$ and $b_{1a}$ are adolescent emotional intelligence total score intercept and slope coefficients for each group: the female low group; female high group; male low group and the male high group.

Table 4.12 presents the relationship between AEI and VCE ENTER scores, as indicated by the size and direction of the intercepts and the slopes for each group. The male low group had the lowest intercept VCE score (61) of all the groups, and made the largest gain of 5 ENTER points per standard deviation for a unit increase in AEI ($b_{1a} = 5.53$). The male high group had the second lowest intercept VCE score (70) of all the groups, and made the third largest gain of 2 ENTER points per standard deviation increase in AEI ($b_{1a} = 2.12$). The female low group, had the second highest intercept VCE score (81) of all the groups, and made the second largest gain of 4 ENTER points per standard deviation for a one-unit increase in AEI ($b_{1a} = 4.13$). The female high group had the highest intercept VCE score (88), however, their AEI was negatively associated with VCE academic achievement. Therefore, the female high group was the only group to make a slight loss, of .7 ENTER points per standard deviation, for a one-unit increase in AEI ($b_{1a} = -0.7$).

Therefore, the findings indicated that AEI was a positive significant predictive variable for VCE academic achievement in the male low group, the female low group and
the male high group. In contrast, for the female high group, AEI was negatively predictive of VCE academic achievement, resulting in a decrease of .07 ENTER points per standard deviation. These findings indicate the predictive variance of AEI for VCE academic achievement was differentiated by individual variances in adolescent IQ and gender. Figure 4.13 displays the interaction pattern for VCE academic achievement, AEI total score, IQ, and gender.

![Figure 4.13 Simple Slopes Data Plot: Linear Predictive Effect VCE Regressed Against AEI Total Score, IQ and Gender](image)

*Figure 4.13 Simple Slopes Data Plot: Linear Predictive Effect VCE Regressed Against AEI Total Score, IQ and Gender*

Figure 4.13 shows the predictive effect of AEI for VCE academic achievement in the female high group, female low group, male high group, and the male low group. The
AEI total score and regression model findings, which predicted VCE scores for each group are presented for each subgroup. The AEI score had a stronger effect on the male low group, the female low group, and the male high group in comparison to the female high group. Further, Table 4.13 presents a comparison of the VCE ENTER score differences for the female high group, female low group, male high group, and the male low group.

### 4.10.1.1 Male High Group and Male Low Group

The positive regression slope for the male high group \(b_{1a} = 2.12\) and the male low group \(b_{1a} = 5.53\) reflected an increment of 2 and 5 VCE ENTER points, respectively, for each standard deviation change in the AEI total score. The male VCE ENTER scores ranging from \(-2\ SD\) to \(2\ SD\) above the mean were:

- a) male high group - \(2\ SD\): 77 VCE ENTER points to \(2\ SD\): 85 VCE ENTER points; and
- b) male low group - \(2\ SD\): 50 VCE ENTER points to \(2\ SD\): 72 VCE ENTER points.

Therefore, even though IQ remained relatively constant in each group, the increased AEI total scores made a positive contribution to both the male high group’s and the male low group’s VCE ENTER scores. A review of the difference between the male high group and the male low group at each standard deviation revealed an ENTER score difference of 27 \((-2\ SD\)), 23 \((-1\ SD\)), 19 \((0\ SD\)), 16 \((1\ SD\)) and 13 \((2\ SD\)) points. The difference between the groups becomes less with the increase in AEI; which was largely driven by the significant gains made by the male low group (5 ENTER points per \(SD\)).

### 4.10.1.2 Female High Group and Female Low Group

The ordinal regression slope for the female high group \(b_{1a} = -0.7\) and the female low group \(b_{1a} = 4.13\) reflected an increment of \(-.7\) and 4 ENTER points, respectively, for each standard deviation change in the AEI total score. The female VCE ENTER scores were higher than the two male groups, ranging from \(-2\ SD\) 89 VCE ENTER for the female high group and 62 VCE ENTER for the female low group, to \(2\ SD\) 85 VCE ENTER for the male high group and 72 VCE ENTER for the male low group. The female high group had a small negative regression slope, which reflected a subtle decline
in VCE ENTER scores as AEI increased. Speculation why this slight decline occurred will be discussed in Chapter Five. The female VCE ENTER scores ranging from -2 SD to 2 SD above the mean were:

a) female high group - 2 SD: 89 VCE ENTER points to 2 SD: 89 VCE ENTER points; and

b) female low group - 2 SD: 62 VCE ENTER points to 2 SD: 78 VCE ENTER points.

With increases in the AEI total score, the female low group made steady improvements in their academic achievement. A review of the difference between the female high group and female low group at each standard deviation revealed a VCE ENTER score difference of 27 (-2 SD), 22 (-1 SD), 17 (0 SD), 12 (1 SD), and 7 (2 SD) points. This pattern of the differences between the female high group and the female low group was similar to the differences found when comparing the male high group and male low group. The largest differences between the groups were found at the lower levels of AEI, and the differences between the groups narrowed at the higher levels of AEI.

4.10.1.3 Female High Group and Male High Group

The regression slope for the female high group ($b_{1a} = -0.7$) and the male high group ($b_{1a} = 2.12$) reflected an incremental change of -.7 and 2.1 VCE ENTER points, respectively, for each standard deviation change in the AEI. The slope for the male high group continued in a positive direction and intersected with the slope of the female high group, because the female high group continued to make a slightly negative decline. A review of the difference between the female high group and the male high group, at each standard deviation, revealed a VCE ENTER score difference of 1.2 (-2 SD), 9 (-1 SD), 6 (0 SD), 3 (1 SD) and 1 (2 SD) point, as illustrated in Table 4.13. The female and male high groups displayed the smallest differentiation between groups. However, the trend in scores remained very similar to the female and male low groups. The differences in AEI between the male high group and the female high group were larger at -2 SD (12 ENTER points) and the difference between groups became smaller at 2 SD above the mean (1 ENTER point).
**4.10.1.4 Female Low Group and Male Low Group**

The regression slope for the female low group \( (b_{1a} = 4.13) \) and the male low group \( (b_{1a} = 5.53) \) reflected an increment of 4 and 5 VCE ENTER points, respectively, for each standard deviation change in the AEI total score. The VCE ENTER intercept was 61.58 for the male low group and 70.62 for the female low group, which equated to the males being 9.12 VCE ENTER points lower than the females. However, the influence of AEI on the ENTER scores of males was the strongest for all the groups. A review of the difference between the female low group and the male low group, at each standard deviation, revealed a VCE ENTER score difference of 12.1 (-2 SD), 10.4 (-1 SD), 9.1 (0 SD), 7.6 (1 SD) and 6.2 (2 SD) points, as illustrated in Table 4.13. Therefore, a comparison of the ordinal simple slopes for the female low group and the male low group showed that the differentiation between the groups narrows as their AEI increased. In effect, the difference between the female low group and the male low group halves, from 2 SD below the mean to 2 SD above the mean.

Table 4.13

*Model E: AEI Total Score and Predicted VCE Scores for Four Groups with Comparisons*

<table>
<thead>
<tr>
<th>Group</th>
<th>AEI Total: Standard Deviation (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-2 SD</td>
</tr>
<tr>
<td>Male High ENTER</td>
<td>77.2</td>
</tr>
<tr>
<td>Male Low ENTER</td>
<td>50.2</td>
</tr>
<tr>
<td><strong>VCE ENTER</strong></td>
<td><strong>27.0</strong></td>
</tr>
<tr>
<td><strong>Difference</strong></td>
<td></td>
</tr>
<tr>
<td>Female High ENTER</td>
<td>89.4</td>
</tr>
<tr>
<td>Female Low ENTER</td>
<td>62.3</td>
</tr>
</tbody>
</table>
In conclusion, a GLM saturated multiple linear regression was performed on the sample data in order to determine whether VCE academic achievement could be predicted by the variables AEI, IQ, gender and their interactions. A statistically significant relationship was identified between the VCE scores and the combined effects of the predictor variables. The F-ratio for the model was significant at the .05 critical alpha level, $F(7, 361) = 21.18, p = < .000$. Thus, Null Hypothesis One was rejected and it was concluded that AEI, IQ, and gender were positively predictive of the variance in VCE academic achievement.

**Null Hypothesis Two** $(a, b, c, d)$: The combined effects of each of the subscales of adolescent emotional intelligence trait: emotional recognition and expression $(a)$; understanding emotions $(b)$; emotions direct cognition $(c)$; and emotional management and control $(d)$, IQ, gender and their interactions will not be predictive of academic achievement.
Null Hypothesis Two(a): The adolescent emotional intelligence trait: emotional recognition and expression, IQ, gender and their interactions will not be predictive of academic achievement.

4.10.2 Model One: Emotional Recognition and Expression, IQ and Gender

A saturated multiple linear regression was performed between VCE academic achievement as the dependent variable, with IQ, gender, and emotional recognition and expression as the predictor variables. In order to conduct the evaluation of the assumptions, analysis was performed using the SPSS (Version 21) regression. The analyses supported the assumptions of normality for emotional recognition and expression, linearity, multicollinearity, and homoscedasticity, and were not significantly compromised. This confirmed that the data sample was suitable for conducting a saturated multiple linear regression procedure.

The saturated multiple linear regressions aimed to determine the predictive effect of emotional recognition and expression, IQ (high group = IQ 115 ≥ and low group = IQ 114 ≤), and gender (males and females) for VCE academic achievement. All variables were entered simultaneously. The three predictor variables, IQ (Raven’s Progressive Matrices), gender, and emotional recognition and expression normalised score, including interactions, produced an $R$ that was significantly different from zero, at $R = .54$ and $R^2 = .27$. The strength of the overall relationship between the variables of emotional recognition and expression normalised score, IQ and gender, including all the interactions, was an $R^2$ of .279 ($F(7, 361) = 19.93$, $p = < .0005$ ($SEM = 16.71$)) for the prediction of VCE ENTER scores. With $R^2$ at .27 and 95% confidence limits from 0.18 to 0.37, the total variance explained by the model was 27.9%. The adjusted $R^2$ value of 26.5% indicated that the IQ, gender, and emotional recognition and expression regression model predicted just over one quarter of the variability in VCE ENTER scores. Table 4.14 presents results for the GLM saturated multiple linear regression analysis. This includes correlations for the independent variables, the unstandardised regression coefficients ($b_v$), coefficient correlations ($t$), statistical significance ($p = < .05$), the 95% confidence intervals, and the part correlation coefficient as a percentage of variance.
The $R^2_{adj}$ value was .27, which indicated that just under one-third of the variability in VCE academic achievement was predicted by the level of IQ ($\beta = 17.35$, $SEM = 2.98$), the student’s gender ($\beta = -9.46$, $SEM = 2.30$), and the interaction between emotional recognition and expression x gender, ($\beta = 4.35$, $SEM = 2.43$). The standardised regression coefficients differed significantly from zero, at a 95% confidence interval.

Table 4.14 displays the predictor variables, which demonstrate there were two predictor variables making unique statistically significant contributions to the VCE ENTER score as a measure of academic achievement. First, IQ ($\beta = 17.35$, $t (361) = 5.80$, $p = < .0005$) contributed the largest percentage of the variance (6.7%). Higher levels of intelligence were associated with higher levels of academic achievement. The second largest predictor was gender ($\beta = -9.46$, $t (361) = -4.09$, $p = < .0005$), which explained 3.3% of the variance. Females had a higher mean for VCE academic achievement than males, but there was no statistically significant gender difference in emotional recognition and expression. Gender by emotional recognition and expression was the third largest predictor ($\beta = 4.35$, $t (361) = 1.78$, $p = .074$), which explained .6% of the variance in the model. Meanwhile, the relationship between VCE scores and emotional recognition and expression was not statistically significant in the final regression model ($r = 1.78$, $p = .07$). These predictors with unique and shared variance explained 27.9% ($R^2_{adj}$ 26.5%) of the variance in the dependent variable of the VCE score. The regression results presented for each IQ and gender combination group in Table 4.15 indicate that the relationship of emotional recognition and expression with VCE academic achievement was modified by the variance in IQ and gender.

At the correlational level of the regression model, three positive and statistically significant correlations were evident. A significant correlation was identified for (1) IQ x gender; (2) emotional recognition and expression; and (3) gender x emotional recognition and expression. Although the bivariate correlation between IQ x gender was statistically different from zero, when using a post hoc correction, $r = .274$, $F (7, 361)$, $p < .000$, $r^2 = .075$, (7.5%), $N = 369$, so the correlation effect did not contribute significantly to the regression. However, it seems plausible that the correlations identified between IQ x
gender, gender x emotional recognition and expression, may have provided an underlying influence on the regression model.

Furthermore, the bivariate correlation identified for emotional recognition and expression was found to be statistically different from zero when using a post hoc correction, and $r = .120$, $F (7, 361), p < .01, r^2 = .014, (1.4\%), N = 369$). However, the correlation was not significant in the final regression model. Finally, the bivariate correlation identified for gender x emotional recognition and expression was found to be statistically different from zero when using a post hoc correction, $r = .135$, $F (7, 361), p < .005, r^2 = .018, (1.8\%), N = 369$). As previously suggested, it seems plausible that both the correlations identified for emotional recognition and expression, and gender x emotional recognition and expression, may have been influenced the model.

Table 4.14

Model One: Summary of Regression Analysis for Emotional Recognition and Expression, IQ and Gender Predicting VCE Score

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>$b$</th>
<th>$b_v$</th>
<th>$t$</th>
<th>$p$</th>
<th>95% CI</th>
<th>$sr^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>$b_0$</td>
<td>70.76</td>
<td>41.45</td>
<td>&lt;0.001</td>
<td>67.41, 74.12</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>1</td>
<td>17.35</td>
<td>5.80</td>
<td>&lt;0.001</td>
<td>11.47, 23.22</td>
<td>6.7</td>
</tr>
<tr>
<td>G</td>
<td>2</td>
<td>-9.46</td>
<td>-4.09</td>
<td>&lt;0.001</td>
<td>-14.0, -4.92</td>
<td>3.3</td>
</tr>
<tr>
<td>E_{ij}</td>
<td>3</td>
<td>0.95</td>
<td>0.49</td>
<td>0.62</td>
<td>-2.82, 4.72</td>
<td>0.0004</td>
</tr>
<tr>
<td>R x E_{ij}</td>
<td>4</td>
<td>-2.25</td>
<td>-.81</td>
<td>0.41</td>
<td>-7.69, 3.19</td>
<td>0.001</td>
</tr>
<tr>
<td>R x G</td>
<td>5</td>
<td>2.79</td>
<td>0.74</td>
<td>0.45</td>
<td>-4.55, 10.14</td>
<td>0.001</td>
</tr>
<tr>
<td>G x E_{ij}</td>
<td>6</td>
<td>4.35</td>
<td>1.78</td>
<td>0.07</td>
<td>-.43, 9.13</td>
<td>0.006</td>
</tr>
</tbody>
</table>
Table 4.15 displays the intercept and slope between the female high group, female low group, male high group, and the male low group. Figure 4.12 displays the interaction pattern for academic achievement, IQ, gender, and the AEI trait score of emotional recognition and expression.

Table 4.15

**Model One: Regression of Academic Achievement (VCE Score) on Emotional Recognition and Expression (E\textsubscript{j1}), IQ (R) and Gender (G)**

<table>
<thead>
<tr>
<th>Group</th>
<th>Intercept</th>
<th>Slope</th>
</tr>
</thead>
<tbody>
<tr>
<td>( V(G = 0, R = 0) = b_0 + b_3 E_{j1} )</td>
<td>70.76</td>
<td>0.95</td>
</tr>
<tr>
<td>( V(G = 0, R = 1) = (b_0 + b_1) + (b_3 + b_4) E_{j1} )</td>
<td>88.11</td>
<td>-1.30</td>
</tr>
<tr>
<td>( V(G = 1, R = 0) = (b_0 + b_2) + (b_3 + b_6) E_{j1} )</td>
<td>61.30</td>
<td>5.30</td>
</tr>
<tr>
<td>( V(G = 1, R = 1) = (b_0 + b_2 + b_5) + (b_3 + b_4 + b_6 + b_7) )</td>
<td>81.45</td>
<td>1.17</td>
</tr>
</tbody>
</table>

**Note.** \( b_0 \) and \( b_{1a} \) are intercept and emotional recognition and expression slope coefficients for each group the: female low group; female high group; male low group and the male high group.

Table 4.15 presents the relationship between emotional recognition and expression and VCE ENTER scores, as indicated by the size and direction of the intercepts and the slopes for each IQ and gender combination group. The male low group (\( b_0 = 61.30, b_{1a} = 5.30 \)) made the most significant gain in ENTER points, with an
increase of 5.30 ENTER points per standard deviation. In effect, at -2 SD, the male low group attained an ENTER of 50 points and, at 2 SD above the mean, attained an ENTER of 71 points. The male high group (b0 = 81.45, b1a = 1.17) made a steady moderate gain of 1.17 ENTER points, attaining an ENTER of 79 points at -2 SD, a score increasing to 83 ENTER points at 2 SD above the mean. The female low group (b0 = 70.76, b1a = 0.95) made a gain of just under one ENTER point per standard deviation, attaining an ENTER of 68 at -2 SD, increasing to 72 ENTER points at 2 SD above the mean. The female high group (b0 = 88.11, b1a = -1.30) showed a negative relationship with academic achievement and emotional recognition and expression, decreasing by 1.3 ENTER points for each standard deviation. The group attained an ENTER of 90.7 at -2 SD, which decreased to an ENTER of 85 at 2 SD above the mean.

Therefore, the regression model indicated that IQ and gender demonstrated the main effects in the model; however, the interaction of gender with emotional recognition and expression had a moderating effect on the academic achievement of the students. The relationship of emotional recognition and expression with VCE academic achievement for the female high group was slightly negative. By contrast, the linear relationship of emotional recognition and expression with VCE academic achievement was strongly positive for the male low group.

Figure 4.14 shows the derived effect of emotional recognition and expression for each gender and IQ combination (low group = ≤ IQ 114 and the high group = ≥ IQ 115), resulting in four groups. Table 4.16 presents the differentiation between emotional recognition and expression trait scores, and the predicted ENTER scores for each group, from -2 SD to 2 SD. Table 4.16 presents a comparison of VCE score differences for the gender and IQ combination groups.
4.10.2.1 Male High Group and Male Low Group

A comparison of the slopes of the male high group and the male low group shows an ordinal interaction. A review of the difference between the male high group and the male low group, at each standard deviation, revealed a VCE ENTER score difference of 28.4 (-2 SD), 24.2 (-1 SD), 20.1 (0 SD), 16.0 (1 SD) and 11.8 (2 SD) points, as illustrated in Table 4.16. The difference in VCE ENTER scores between these groups is the largest of all the groups.
4.10.2.2 Female High Group and Female Low Group
A comparison of the slopes of the female high group and the female low group shows an ordinal interaction. A review of the difference between the female high group and the female low group, for emotional recognition and expression at each standard deviation, revealed an ENTER score difference of 21.9 (-2 SD), 19.6 (-1 SD), 17.4 (0 SD), 14.4 (1 SD) and 12.9 (2 SD) points, as illustrated in Table 4.16. The large differences between the female high group and the female low group are reflective of the trend previously outlined, with differences between the groups largest at 2 SD below the mean, and smallest at 2 SD above the mean. This gradual decrease in the differences between the groups was largely driven by the improvement in VCE ENTER scores associated with the improvement in emotional recognition and expression for the female low group.

4.10.2.3 Female High Group and Male High Group
A comparison of the female high group and the male high group for emotional recognition and expression and ENTER scores, finds the ordinal simple slopes becoming disordinal, with the point of intersection at approximately 2.3 SD above the mean. The difference between the female high group intercept (88.11) and the male high group intercept (81.45) was 6.6 VCE ENTER points; which was a smaller incremental intercept difference than the 9.4 ENTER points difference found between the female low and male low groups. A review of the difference between the female high group and the male high groups, at each standard deviation, revealed a VCE ENTER score difference of 11.6 (-2 SD), 9.2 (-1 SD), 6.7 (0 SD), 3.5 (1 SD) and 1.8 (2 SD) points, as illustrated in Table 4.16. The female high group showed a slightly negative relationship (b1a -1.30) between emotional recognition and expression and ENTER scores.

4.10.2.4 Female Low Group and Male Low Group
A comparison of the slopes for the female low group (b0 70.76 ENTER score) and the male low group (b0 61.30 ENTER score) shows that the differentiation between the groups narrowed as their emotional recognition and expression increased. This means that the male low group and female low group slopes were disordinal, with the point of intersection at approximately 2.3 SD above the mean. The strong influence of emotional
recognition and expression for the male low group, with an increase of 5.30 points for every unit increase in emotional recognition and expression, made a significant contribution to this disordinal interaction. A review of the difference between the female low group and the male low group at each standard deviation revealed an ENTER score difference of 18.1 (-2 SD), 13.8 (-1 SD), 9.4 (0 SD), 5.1 (1 SD) and 0.7 (2 SD) points, as illustrated in Table 4.16.

Table 4.16

Model One: Emotional Recognition and Expression Trait Score and Predicted VCE Scores for Each Group with Comparisons

<table>
<thead>
<tr>
<th>Group</th>
<th>Emotional Recognition &amp; Expression: Standard Deviation (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-2 SD</td>
</tr>
<tr>
<td>Male High ENTER</td>
<td>79.1</td>
</tr>
<tr>
<td>Male Low ENTER</td>
<td>50.7</td>
</tr>
<tr>
<td><strong>VCE ENTER</strong></td>
<td><strong>28.4</strong></td>
</tr>
<tr>
<td><strong>Difference</strong></td>
<td></td>
</tr>
</tbody>
</table>

Female High ENTER | 90.7 | 89.4 | 88.1 | 86.1 | 85.5 |
Female Low ENTER  | 68.8 | 69.8 | 70.7 | 71.7 | 72.6 |
**VCE ENTER**  | **21.9** | **19.6** | **17.4** | **14.4** | **12.9** |
**Difference** |       |     | 17.4 | 14.4 | 12.9 |

Female High ENTER | 90.7 | 89.4 | 88.1 | 86.1 | 85.5 |
Male High ENTER  | 79.1 | 80.2 | 81.4 | 82.6 | 83.7 |
In summary, a saturated multiple linear regression was performed on the sample data to determine if there was a significant relationship between VCE scores and the combined effects of emotional recognition and expression trait score, IQ, gender, and their interactions. The F-ratio for the model was significant at the .05 critical alpha level, $F(7, 361) = 19.93, p = < .0005$. Thus, Null Hypothesis Two(a) was rejected and it was concluded that there was a positive significant relationship between VCE ENTER scores and emotional recognition and expression trait score, IQ, and gender.

*Null Hypothesis Two(b): The adolescent emotional intelligence trait: understanding emotions, IQ, gender and their interactions will not be predictive of academic achievement.*

### 4.10.3 Model Two: Understanding Emotions, IQ and Gender

A GLM saturated multiple linear regression was performed between VCE academic achievement as the dependent variable, and IQ, gender, and understanding emotions as the predictor variables. Analysis was performed using SPSS (Version 21) regression, correlation, and explore for evaluation of the assumptions. The analyses confirmed that the assumptions of normality for understanding emotions, linearity, multicollinearity and homoscedasticity, were not significantly compromised. This confirmed that the data sample was suitable for the GLM saturated multiple linear regression procedure.
The GLM saturated multiple linear regression aimed to determine if the predictive variance in VCE academic achievement was statistically significantly accounted for by understanding emotions, IQ (high group = IQ 115 ≥ and low group = IQ 114 ≤), and gender (males and females). All variables were entered simultaneously. The three variables of IQ (Raven’s Progressive Matrices), gender, and understanding emotions normalised score, including interactions, produced an $R^2$ of .280 ($F (7, 361) = 20.01, p = < .0005 (SEM = 16.70))$ for the prediction of VCE ENTER score, with $R^2$ at .28 and 95% confidence limits from 0.18 to 0.37. The adjusted $R^2$ value of .26 indicated that just over a quarter of the variability in VCE ENTER scores was predicted by IQ, gender, and understanding emotions. The total variance explained by the model, with both unique and shared variance, explained 28% ($R^2_{adj} 26\%$) of the variance in the dependent variable, VCE ENTER score.

Table 4.17 presents the understanding emotions correlations between the independent variables, the unstandardised regression coefficients ($b_v$), coefficient correlations ($t$), statistical significance ($p = < .05$), the 95% confidence intervals, and the part correlation coefficient as a percentage of variance. As outlined in Table 4.17, the findings indicating that two predictor variables made unique, statistically significant contributions to VCE ENTER scores. IQ ($\beta = 17.32, t (361) = 5.75, p = < .0005$) contributed the largest percentage of the variance (6.6%), with higher levels of IQ associated with higher levels of academic achievement. The second largest predictor was gender ($\beta = -9.02, t (361) = -3.88, p = < .0005$), which accounted for 2.9% of the variance. Females were stronger than males in both academic achievement and understanding emotions. The third largest predictor was the interaction of gender and understanding emotions ($\beta = 3.07, t (361) = 2.21, p = .227, \text{ns}$), which explained .2% of the variance; however, the interaction effect was not statistically significant.

Three positive, statistically significant correlations were evident. A significant correlation was identified for (1) IQ x gender; (2) understanding emotions; and (3) gender x understanding emotions. Although the bivariate correlation between IQ x gender was statistically different from zero, when using a post hoc correction, $r = .274, F (7, 361), p < .000, r^2 = .075, (7.5\%), N = 369$, which was exactly the same correlation as for
emotional recognition and expression, therefore, the correlation effect did not contribute significantly to the regression.

It seems plausible that the correlation identified between IQ, gender, and understanding emotions was influenced by the relationship between the IQ and gender variables in the regression model. The bivariate correlation identified for understanding emotions was shown to be statistically different from zero, when using a post hoc correction, $r = .168, F(7, 361), p < .001, r^2 = .028, (2.8\%), N = 369). However, the correlation was not significant in the final regression model. Finally, the bivariate correlation identified for gender x understanding emotions was statistically different from zero, when using a post hoc correction, $r = .162, F(7, 361), p < .001, r^2 = .026, (2.6\%)\), $N = 369). As previously suggested, it seems plausible that the correlations identified for IQ x gender, understanding emotions, and gender x understanding emotions, were influenced by the relationship between IQ and gender in the model.

Table 4.17

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>$b$</th>
<th>$b_v$</th>
<th>$t$</th>
<th>$p$</th>
<th>95% CI</th>
<th>$sr^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>$b_0$</td>
<td>70.56</td>
<td>41.45</td>
<td>&lt;0.001</td>
<td>67.41, 74.12</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>$b_1$</td>
<td>17.32</td>
<td>5.75</td>
<td>&lt;0.001</td>
<td>11.40, 23.24</td>
<td>6.6</td>
</tr>
<tr>
<td>G</td>
<td>$b_2$</td>
<td>-9.02</td>
<td>-3.88</td>
<td>&lt;0.001</td>
<td>-13.58, -4.45</td>
<td>2.9</td>
</tr>
<tr>
<td>$E_{ij2}$</td>
<td>$b_3$</td>
<td>2.0</td>
<td>0.99</td>
<td>0.32</td>
<td>-1.95, 5.96</td>
<td>0.7</td>
</tr>
<tr>
<td>R x $E_{ij2}$</td>
<td>$b_4$</td>
<td>-2.23</td>
<td>-.69</td>
<td>0.22</td>
<td>-8.61, 4.13</td>
<td>0.09</td>
</tr>
<tr>
<td>R x G</td>
<td>$b_5$</td>
<td>2.63</td>
<td>0.70</td>
<td>0.48</td>
<td>-4.75, 10.01</td>
<td>0.09</td>
</tr>
</tbody>
</table>
Table 4.18 displays the intercept and slope between the groups entitled the female high group, female low group, male high group, and male low group. Figure 4.13 displays the interaction pattern for academic achievement, IQ, gender, and AEI trait score: understanding emotions. Table 4.19 presents a comparison of VCE score differences for the female high group, female low group, male high group, and male low group.

Table 4.18

Model Two: Regression of Academic Achievement (VCE Score) on Understanding Emotions (E_{j2}), IQ (R) and Gender (G)

<table>
<thead>
<tr>
<th>Group</th>
<th>Intercept</th>
<th>Slope</th>
</tr>
</thead>
<tbody>
<tr>
<td>(V(G = 0, R = 0)) = (b_0 + b_3 E_{j2})</td>
<td>70.56</td>
<td>2.00</td>
</tr>
<tr>
<td>(V(G = 0, R = 1)) = ((b_0 + b_1) + (b_3 + b_4) E_{j2})</td>
<td>87.88</td>
<td>-0.23</td>
</tr>
<tr>
<td>(V(G = 1, R = 0)) = ((b_0 + b_2) + (b_3 + b_6) E_{j2})</td>
<td>61.54</td>
<td>5.08</td>
</tr>
<tr>
<td>(V(G = 1, R = 1)) = ((b_0 + b_2 + b_5) + (b_3 + b_4 + b_6 + b_7) E_{j2})</td>
<td>81.49</td>
<td>2.2</td>
</tr>
</tbody>
</table>

*Note.* \(b_0^*\) and \(b_{1a}\) are the understanding emotions intercept and slope coefficients for each of these treatment groups the: female low group; female high group; male low group and the male high group.
gender and IQ grouping combination. The male low group \((b_0 = 61.54, b_{1a} = 5.08)\) made the most significant gain in ENTER points, with an increase of approximately 5 VCE ENTER points per standard deviation. In effect, at 2 SD below the mean, the male low group attained an ENTER of 51.3 points and at 2 SD above the mean, they attained an ENTER of 71.7 points. The male high group \((b_0 = 81.49, b_{1a} = 2.2)\) made a steady, moderate gain of just over 2 ENTER points, attaining an ENTER of 77 points at -2 SD, increasing to 85 ENTER points at 2 SD above the mean. The female low group \((b_0 = 70.56, b_{1a} = 2.0)\) made gains of 2 ENTER points per standard deviation, attaining an ENTER of 66.5 at -2 SD, increasing to 74.5 ENTER points at 2 SD above the mean. The female high group \((b_0 = 87.88, b_{1a} = -0.23)\) showed a negative relationship between academic achievement and emotional recognition and expression, decreasing by 0.23 ENTER points for each standard deviation. The group attained a VCE score of 88.3 at -2 SD, a score decreasing to a VCE score of 87.4 at 2 SD above the mean.

Therefore, the regression model indicated that IQ and gender had statistically significant effects on the model, while the interaction of gender with understanding emotions had a moderating effect on the academic achievement of the student. The relationship with understanding emotions for the female high group was slightly negative; by contrast, the relationship was strongly positive for the male low group and positive for both the female low group and the male high group.
**Figure 4.15** Simple Slopes Data Plot: Linear Predictive Effect of Understanding Emotions Regressed Against VCE Academic Achievement, in the Four IQ and Gender Combination Groups

Figure 4.15 shows the derived effect of understanding emotions for each gender and IQ combination, resulting in four groups. An analysis of the Simple Slopes Data Plot for understanding emotions was similar to the previous two plots (AEI and emotional recognition and expression). Table 4.19 presents the understanding emotions trait scores and regression model predicted VCE scores for each group.

**4.10.3.1 Male High Group and Male Low Group**

The male high group and the male low group displayed ordinal positive regression slopes. The strongest impact of understanding emotions was on the male low group ($b_0 = 61.54; b_{1a} = 5.08$). The second strongest influence of understanding emotions was for the
male high group \( (b_0 = 81.49; b_{1a} = 2.20) \). A review of the differences between the male high group and the male low group, at each standard deviation, revealed an VCE score difference of 25.7 (-2 SD), 22.8 (-1 SD), 19.9 (0 SD), 17.0 (1 SD) and 14.1 (2 SD) points, as illustrated in Table 4.19.

### 4.10.3.2 Female High Group and Female Low Group

The regression slope for the female high group \( (b_0 = 87.88; b_{1a} = -0.23) \) and the female low group \( (b_0 = 70.56; b_{1a} = 2.0) \) shows an ordinal interaction between gender and ability. There were significant differences between the understanding emotions trait for the female high group and the female low group. The female high group had a negative slope, which was reflective of a slight decline in academic achievement, while the female low group showed a positive slope, which reflected an increase in academic achievement.

A review of the difference between the female high group and the female low group at each standard deviation revealed VCE score differences of 21.8 (-2 SD), 19.6 (-1 SD), 17.3 (0 SD), 15.1 (1 SD), and 12.9 (2 SD) points, as illustrated in Table 4.19.

### 4.10.3.3 Female High Group and Male High Group

The female high group and the male high group displayed simple slopes with a disordinal interaction and an intersection point at 2.5 SD above the mean. The negative slope of the female high group and the positive slope of the male high group highlighted the different effects that understanding emotions has on each gender in the high IQ group range. A review of the difference between the female high group and the male high group, at each standard deviation revealed, VCE ENTER score differences of 11.3 (-2 SD), 8.9 (-1 SD), 6.4 (0 SD), 4.0 (1 SD), and 1.6 (2 SD) points, as illustrated in Table 4.19. The VCE score differences between the male and female high groups were more modest when compared to the differences between the male and female low groups.

### 4.10.3.4 Female Low Group and Male Low Group

A disordinal interaction was also noted for the female low group and the male low group, with both groups showing a positive relationship with understanding emotions. The male low group, however, had a stronger variance \( (b_{1a} = 5.08) \) than the female low group \( (b_{1a} = 2.0) \). A review of the difference between the female low group and the male
low group, at each standard deviation, revealed VCE score differences of 15.2 (-2 SD), 12.1 (-1 SD), 9.0 (0 SD), 5.9 (1 SD), and 2.8 (2 SD) points, as illustrated in Table 4.19.

Table 4.19

Model Two: Understanding Emotions Trait Score and Predicted VCE Scores for Each Group with Comparisons

<table>
<thead>
<tr>
<th>Group</th>
<th>Understanding Emotions: Standard Deviation (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-2 SD</td>
</tr>
<tr>
<td>Male High ENTER</td>
<td>77.0</td>
</tr>
<tr>
<td>Male Low ENTER</td>
<td>51.3</td>
</tr>
<tr>
<td>VCE ENTER Difference</td>
<td>25.7</td>
</tr>
<tr>
<td>Female High ENTER</td>
<td>88.3</td>
</tr>
<tr>
<td>Female Low ENTER</td>
<td>66.5</td>
</tr>
<tr>
<td>VCE ENTER Difference</td>
<td>21.8</td>
</tr>
<tr>
<td>Female High ENTER</td>
<td>88.3</td>
</tr>
<tr>
<td>Male High ENTER</td>
<td>77.0</td>
</tr>
<tr>
<td>VCE ENTER Difference</td>
<td>11.3</td>
</tr>
<tr>
<td>Female Low ENTER</td>
<td>66.5</td>
</tr>
<tr>
<td>Male Low ENTER</td>
<td>51.3</td>
</tr>
<tr>
<td>VCE ENTER Difference</td>
<td>15.2</td>
</tr>
</tbody>
</table>
In summary, a saturated multiple linear regression was performed on the sample data, to determine if there was a significant relationship between VCE ENTER scores and the combined effects of the understanding emotions trait score, IQ, gender, and their interactions. The F-ratio for the model was significant at the .05 critical alpha level, \( F(7, 361) = 20.01, p = < .0005, SEM = 16.70 \). Thus, Null Hypothesis Two(b) was rejected and it was concluded that there was a positive significant relationship between VCE scores and the understanding emotions trait score, IQ, and gender.

**Null Hypothesis Two(c): The adolescent emotional intelligence trait: emotions direct cognition, IQ, gender and their interactions will not be predictive of academic achievement.**

4.10.4 Model Three: Emotions Direct Cognition, IQ and Gender

A saturated multiple linear regression model was used to regress VCE academic achievement as the dependent variable, onto IQ, gender, and emotions direct cognition as the predictor variables. Analysis was performed using SPSS (Version 21) regression, correlation, and explore for evaluation of the assumptions. The analyses confirmed that the assumptions of normality for emotions direct cognition, linearity, multicollinearity, and homoscedasticity, were not significantly compromised; this confirmed that the data sample was suitable for the GLM saturated multiple linear regression procedure.

The three variables of emotions direct cognition normalised score, IQ (\( gf \)) and gender, including interactions, produced an \( R^2 \) of .263 (\( F(7, 361) = 18.38, p = < .0005 \) (\( SEM = 16.89 \))) for the prediction of VCE score. With \( R^2 \) at .26 and 95% confidence limits from 0.17 to 0.36, the \( R^2 \) indicated that 26% of the model’s variance was accounted for by the predictor variables. IQ, gender, and emotions direct cognition predicted the adjusted \( R^2 \) value of .24, accounting for 24%, or less than a quarter, of the predicted variability in VCE scores.

Table 4.20 displays the predictor variables, with two predictor variables making a unique main effect contribution, and one interaction variable contributing to the statistically significant predictable variance in VCE ENTER scores. IQ (\( \beta = 17.46, t(361) = 5.50, p = < .0005 \)) contributed the largest percentage of the variance (6.2%).

...
second largest predictor was gender ($\beta = -9.52, t (361) = -3.99, p = < .0005$), which explained 3.2% of the variance. The third largest predictor was the interaction of gender with emotions direct cognition ($\beta = 5.76, t (361) = -2.28, p = .023$), which explained 1% of the variance. Females averaged higher scores than males in both academic achievement and emotions direct cognition. These three predictors, with both unique and shared variances, explain 26.3% ($R^2_{adj} = 24\%$) of the variance in the criterion or dependent variable VCE score.

Table 4.20 also presents the emotions direct cognition correlations between the independent variables, the unstandardised regression coefficients ($b_v$), coefficient correlations ($t$), statistical significance ($p = < .05$), the 95% confidence intervals, and the part correlation coefficient, as a percentage of variance. Table 4.21 displays the intercept and slope between the female high group, female low group, male high group, and the male low group. Figure 4.14 displays the interaction pattern for academic achievement, IQ, gender, and AEI trait score: emotions direct cognition. Table 4.22 presents a comparison of VCE score differences for gender and IQ group combinations.

Table 4.20

*Model Three: Summary of Regression Analysis for Emotions Direct Cognition, IQ and Gender Predicting VCE Score*

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>$b$</th>
<th>$b_v$</th>
<th>$t$</th>
<th>$p$</th>
<th>95% CI</th>
<th>$sr^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>$b_0$</td>
<td>70.19</td>
<td>41.45</td>
<td>&lt;0.001</td>
<td>67.41, 74.12</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>$b_1$</td>
<td>17.46</td>
<td>5.50</td>
<td>&lt;0.001</td>
<td>11.22, 23.7</td>
<td>6.2</td>
</tr>
<tr>
<td>G</td>
<td>$b_2$</td>
<td>-9.52</td>
<td>-3.99</td>
<td>&lt;0.001</td>
<td>-14.21, -4.83</td>
<td>3.2</td>
</tr>
<tr>
<td>E_3j</td>
<td>$b_3$</td>
<td>2.58</td>
<td>1.35</td>
<td>0.17</td>
<td>-1.16, 6.34</td>
<td>0.37</td>
</tr>
</tbody>
</table>
Table 4.21

Model Three: Regression of Academic Achievement (VCE Score) on Emotions Direct Cognition ($E_{j3}$), IQ ($R$) and Gender ($G$)

<table>
<thead>
<tr>
<th>Group</th>
<th>Intercept $b_0$</th>
<th>Slope $b_{1a}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V(G = 0, R = 0)$</td>
<td>70.19</td>
<td>2.58</td>
</tr>
<tr>
<td>$V(G = 0, R = 1)$</td>
<td>87.65</td>
<td>0.59</td>
</tr>
<tr>
<td>$V(G = 1, R = 0)$</td>
<td>60.66</td>
<td>-3.17</td>
</tr>
<tr>
<td>$V(G = 1, R = 1)$</td>
<td>81.26</td>
<td>-0.24</td>
</tr>
</tbody>
</table>

Note. $b_0$ and $b_{1a}$ are emotions direct cognition intercept and slope coefficients for each of these groups: female low group; female high group; male low group and male high group.

Table 4.21 presents the relationship between emotions direct cognition and VCE scores, as indicated by the size and direction of the intercepts and the slopes for each of the IQ and gender group combinations. The male low group ($b_0 = 60.66$, $b_{1a} = -3.17$) had a negative association with emotions direct cognition, manifesting in a decrease of approximately 3 VCE ENTER points per standard deviation. In effect, at -2 SD, the male
low group attained an ENTER of 67.0 points and, at $2\,SD$ above the mean, attained an ENTER of 54.4 points. The male high group ($b_0 = 81.26, b_{1a} = -0.24$) also displayed a negative variance, with a decrease of approximately 0.2 ENTER points per standard deviation, attaining an ENTER of 82.1 points at $-2\,SD$, decreasing to 81.1 ENTER points at $2\,SD$. The female low group ($b_0 = 70.19, b_{1a} = 2.58$) made gains of 2.5 ENTER points per standard deviation, attaining an ENTER of 65.0 at $-2\,SD$, increasing to 75.3 ENTER points at $2\,SD$ above the mean. The female high group ($b_0 = 87.65, b_{1a} = 0.59$) showed a positive relationship with academic achievement and emotions direct cognition, increasing by 0.59 ENTER points for each standard deviation. The female high group attained an ENTER of 86.4 at $-2\,SD$, and this increased to an ENTER of 88.8 at $2\,SD$ above the mean. The female high group and the female low group’s positive slopes were in contrast to the male high group and male low group’s negative association with emotions direct cognition. Emotions direct cognition is a trait that was indicative of the extent to which emotions and emotional knowledge are considered during decision making and problem solving.

Figure 4.16 shows the derived effect of emotions direct cognition for each gender and IQ combination, resulting in four groups. There were some disordinal and ordinal interactions between the female high group, female low group, male high group, and male low group.
Figure 4.16 Simple Slopes Data Plot: Linear Predictive Effect of Emotions Direct Cognition Regressed Against VCE Academic Achievement, in the Four IQ and Gender Combination Groups

Table 4.22 presents the emotions direct cognition scores and regression model predicted VCE scores for each group, alongside the comparisons between groups. Emotions direct cognition had a positive effect on the female high group and the female low group. Conversely, it had negative effects for the male high group and the male low group. The findings for each group are now outlined.

4.10.4.1 Male High Group and Male Low Group
A negative ordinal interaction was found between the male high group ($b_0 = 81.26$, $b_{1a} = -0.24$) and the male low group ($b_0 = 60.66$, $b_{1a} = -3.17$). The male high group had a relatively flat slope, making only a single VCE ENTER point decrease from -2 SD
to 2 $SD$. The male low group had a stronger decrease of 12.7 VCE ENTER points, from -2 $SD$ at 67 VCE ENTER points, to 2 $SD$ at 54.3 VCE ENTER points. A review of the difference between the male high group and the male low group, at each standard deviation, revealed increasing VCE ENTER score differences of 15.1 (-2 $SD$), 18.0 (-1 $SD$), 21.0 (0 $SD$), 23.9 (1 $SD$) and 26.8 (2 $SD$).

4.10.4.2 Female High Group and Female Low Group
In contrast to the male groups, a positive ordinal interaction was identified in the female high group ($b_0 = 87.65, b_{1a} = 0.59$) and the female low group ($b_0 = 70.19, b_{1a} = 2.58$). The female low group’s VCE ENTER score was more positively influenced by emotions direct cognition than the female high group, by approximately 2 VCE ENTER points per standard deviation. A review of the differences between the female high group and the female low group at each standard deviation revealed a VCE ENTER score difference of 21.4 (-2 $SD$), 19.40 (-1 $SD$), 17.5 (0 $SD$), 15.5 (1 $SD$), and 13.5 (2 $SD$), which resulted in a gradual reduction in the differences between the female groups.

4.11.4.3 Female High Group and Male High Group
The female high group ($b_0 = 87.65, b_{1a} = 0.59$) and the male high group ($b_0 = 81.26, b_{1a} = -0.24$) displayed an ordinal interaction, with a relatively flat negative slope for males and a gradual positive slope for females. A review of the differences between the female high group and the male high group, at each standard deviation, revealed a small increasing VCE ENTER score difference of 4.3 (-2 $SD$), 5.2 (-1 $SD$), 6.0 (0 $SD$), 6.9 (1 $SD$), and 7.7 (2 $SD$).

4.10.4.4 Female Low Group and Male Low Group
The female low group ($b_0 = 70.19, b_{1a} = 2.58$) and the male low group ($b_0 = 60.66, b_{1a} = -3.17$) presented a disordinal interaction, with the point of intersection lying at approximately -1.75 $SD$. The male low group’s decrease in VCE ENTER score was a distinct contrast to the increases previously shown in AEI traits. As outlined in Table 4.22, a review of the differences between the female low group and the male low group at each standard deviation revealed increasingly large VCE ENTER score differences of 2.0 (-2 $SD$), 3.8 (-1 $SD$), 9.5 (0 $SD$), 15.3 (1 $SD$), and 21.0 (2 $SD$).
Table 4.22

Model Three: Emotions Direct Cognition Trait Score and Predicted VCE Scores for Each Group with Comparisons

<table>
<thead>
<tr>
<th>Group</th>
<th>Emotions Direct Cognition: Standard Deviation (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-2 SD</td>
</tr>
<tr>
<td>Male High ENTER</td>
<td>82.1</td>
</tr>
<tr>
<td>Male Low ENTER</td>
<td>67.0</td>
</tr>
<tr>
<td>VCE ENTER Difference</td>
<td>15.1</td>
</tr>
<tr>
<td>Female High ENTER</td>
<td>86.4</td>
</tr>
<tr>
<td>Female Low ENTER</td>
<td>65.0</td>
</tr>
<tr>
<td>VCE ENTER Difference</td>
<td>21.4</td>
</tr>
<tr>
<td>Female High ENTER</td>
<td>86.4</td>
</tr>
<tr>
<td>Male High ENTER</td>
<td>82.1</td>
</tr>
<tr>
<td>VCE ENTER Difference</td>
<td>4.3</td>
</tr>
<tr>
<td>Female Low ENTER</td>
<td>65.0</td>
</tr>
<tr>
<td>Male Low ENTER</td>
<td>67.0</td>
</tr>
<tr>
<td>VCE ENTER Difference</td>
<td>2.0</td>
</tr>
</tbody>
</table>

To summarise, a saturated multiple linear regression was performed on the sample data to determine if there was a significant relationship between VCE scores and the combined effects of emotions direct cognition trait, IQ, gender, and their interactions.
The F-ratio for the model was significant at the .05 critical alpha level, \( F(7, 361) = 18.38, p = < .0005, \text{SEM} = 16.89 \). Thus, Null Hypothesis Two\( _{(c)} \) was rejected, and it was concluded that there was a significant relationship between VCE ENTER scores and emotions direct cognition trait score, IQ, and gender.

**Null Hypothesis Two\( _{(d)} \): The adolescent emotional intelligence trait: emotional management and control, IQ, gender and their interactions will not be predictive of academic achievement.**

**4.10.5 Model Four: Emotional Management and Control, IQ and Gender**

A GLM saturated multiple linear regression was performed between VCE academic achievement, as the dependent variable, and IQ, gender, and emotional management and control as the predictor variables. Analysis was performed using SPSS (Version 21) regression, correlation, and explore for evaluation of the assumptions. The analyses confirmed that the assumptions of normality for emotional management and control, linearity, multicollinearity, and homoscedasticity, were not significantly compromised; this confirmed that the data sample was suitable for the GLM saturated multiple linear regression procedure.

The three variables emotional management and control normalised score, IQ (\( gf \)) and gender, including interactions, produced an \( R^2 \) of .283 (\( F(7, 361) = 20.34, p = < .0005, \text{SEM} = 16.66 \)) for the prediction of variance in the VCE ENTER score. With \( R^2 \) at .28, and 95% confidence limits from 0.19 to 0.37, the \( R^2 \) value indicated that 28% of the model’s variance was accounted for. The adjusted \( R^2 \) value was .26, which indicated that 26%, or just over a quarter of the variability in VCE ENTER scores, was predicted by emotional management and control, IQ and gender.

At the correlational level of the regression model, seven positive, statistically significant correlations were evident for VCE academic achievement. A significant correlation was identified for VCE academic achievement and:

1. gender (\( r = -.14, F(7, 361), p = < .003 \));
2. IQ (\( r = .45, F(7, 361), p = < .000 \));
3. emotional management and control (\( r = .19, F(7, 361), p = < .000 \));
4. IQ x Gender ($r = .274, F(7, 361), p = < .000$);
5. gender x emotional management and control ($r = .17, F(7, 361), p = < .000$);
6. IQ x emotional management and control ($r = .10, F(7, 361), p = < .025$);
and
7. gender x IQ x emotional management and control ($r = .09, F(7, 361), p = < .036$).

Each of the bivariate correlations was statistically different from zero. However, when using a post hoc correction, the correlation effects did not make a statistically significant contribution to the final regression model. As previously discussed, it is possible that the effects of the five correlations identified were influenced by the relationship between the IQ and gender variables in the regression model.

Table 4.23 presents the emotional management and control correlations between the independent variables, the unstandardised regression coefficients ($b_v$), coefficient correlations ($r$), statistical significance ($p = < .05$), the 95% confidence intervals, and the squared semipartial correlations ($sr^2$), as a unique percentage of variance, which is identified after the common shared variance has been partialled out of the other predictor variables in the model. Further, Table 4.23 presents the predictor variables and how well the set of variables was able to predict VCE ENTER scores for the cohort, outlining unique and shared variance. Two main predictor variables made statistically significant contributions to the predictable variance in VCE ENTER scores. IQ ($\beta = 16.27, t(361) = 5.37, p = < .000$) contributed the largest percentage of the variance (5.7%), in line with the previous regression findings by Neisser et al. (1996), where IQ was positively associated with higher levels of academic achievement. The second largest predictor was gender ($\beta = -10.76, t(361) = -4.56, p = < .0005$), which explained 4.1% of the variance. Males were stronger than females in emotional management and control, although, as previously noted, females were stronger than males in academic achievement. The third largest predictor was emotional management and control, which was not statistically significant in the final model; however, it made a significant contribution to the model ($\beta = 2.38, t(361) = 1.49, p = .135$) and explained 3.6% of the variance. The total variance explained by these predictors or independent variables and interactions, with both unique
and shared variance, explained 28.3\% \left( R^2_{adj} 26\% \right) of the variance in the dependent variable, VCE ENTER score.

Table 4.23

*Model Four: Summary of Regression Analysis for Emotional Management and Control, IQ and Gender Predicting VCE Score*

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>( b )</th>
<th>( t )</th>
<th>( p )</th>
<th>95% CI</th>
<th>( sr^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>70.67</td>
<td>41.45</td>
<td>&lt;0.001</td>
<td>67.41, 74.12</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>16.27</td>
<td>5.37</td>
<td>&lt;0.001</td>
<td>10.31, 22.22</td>
<td>5.7</td>
</tr>
<tr>
<td>G</td>
<td>-10.76</td>
<td>-4.56</td>
<td>&lt;0.001</td>
<td>-15.39, -6.12</td>
<td>4.1</td>
</tr>
<tr>
<td>E_{j4}</td>
<td>2.38</td>
<td>1.49</td>
<td>0.13</td>
<td>-.74, 5.52</td>
<td>0.44</td>
</tr>
<tr>
<td>R x E_{j4}</td>
<td>-3.09</td>
<td>-.92</td>
<td>0.35</td>
<td>-9.69, 3.50</td>
<td>0.16</td>
</tr>
<tr>
<td>R x G</td>
<td>3.78</td>
<td>1.00</td>
<td>0.31</td>
<td>-3.64, 11.21</td>
<td>0.20</td>
</tr>
<tr>
<td>G x E_{j4}</td>
<td>3.11</td>
<td>1.40</td>
<td>0.16</td>
<td>-1.25, 7.49</td>
<td>0.39</td>
</tr>
<tr>
<td>R x G x E_{j4}</td>
<td>-.80</td>
<td>-.19</td>
<td>0.84</td>
<td>-8.79, 7.18</td>
<td>0.008</td>
</tr>
</tbody>
</table>

*Note. (N = 369), \( b \) \text{ = Unstandardised regression coefficients; } \text{ } t \text{ = coefficient correlations; } \text{ } sr^2 \text{ = the squared semipartial correlation coefficient, indicating the unique variance predicted by the independent variable when the shared predictive variance of other predictor variables is partialled out of the predictive effect.}*

Table 4.24 displays the intercept and slope between the groups of high and low IQ males and females.
Table 4.24

Model Four: Regression of Academic Achievement (VCE Score) on Emotional Management and Control (Ej4), IQ (R) and Gender (G)

<table>
<thead>
<tr>
<th>Group</th>
<th>Intercept</th>
<th>Slope</th>
</tr>
</thead>
<tbody>
<tr>
<td>(V(G = 0, R = 0) = b_0 + b_3 E_j4)</td>
<td>71.67</td>
<td>2.38</td>
</tr>
<tr>
<td>(V(G = 0, R = 1) = (b_0 + b_1) + (b_3 + b_4) E_j4)</td>
<td>87.94</td>
<td>-0.70</td>
</tr>
<tr>
<td>(V(G = 1, R = 0) = (b_0 + b_2) + (b_3 + b_6) E_j4)</td>
<td>60.91</td>
<td>5.50</td>
</tr>
<tr>
<td>(V(G = 1, R = 1) = (b_0 + b_2 + b_3) + (b_3 + b_4 + b_6 + b_7) E_j4)</td>
<td>80.97</td>
<td>1.60</td>
</tr>
</tbody>
</table>

*Note. \(b_0^*\) and \(b_{1a}\) are emotional management and control intercept and slope coefficients for each group: female low group; female high group; male low group and male high group.*

Table 4.24 presents the relationship of emotional management and control and VCE ENTER scores, as indicated by the size and direction of the intercepts and slopes for each IQ and gender group combination. The male low group \((b_0 = 60.91, b_{1a} = 5.50)\) had a positive association with emotional management and control, which increased by approximately 5.5 ENTER points per standard deviation. In effect, at 2 SD below the mean, the male low group attained a VCE ENTER of 49.9 points and, at 2 SD above the mean, and they attained a VCE ENTER score of 71.9 points. The male high group \((b_0 = 80.97, b_{1a} = 1.60)\) made more modest gains, of approximately 1.6 ENTER points per standard deviation, attaining an ENTER of 77.7 points at -2 SD and increasing this score to 84.1 ENTER points at 2 SD. The female low group \((b_0 = 71.67, b_{1a} = 2.38)\) made gains of 2.3 ENTER points per standard deviation, attaining an ENTER of 66.9 at -2 SD, increasing this score to 76.4 VCE ENTER points at 2 SD above the mean. The female high group \((b_0 = 87.94, b_{1a} = -0.70)\) showed a negative relationship between academic achievement and emotional management and control, decreasing by 0.70 VCE ENTER
points for each standard deviation. The female high group attained a VCE ENTER score of 89.3 at -2 \textit{SD}, decreasing to a VCE ENTER score of 86.5 at 2 \textit{SD} above the mean.

Figure 4.17 displays the interaction pattern for academic achievement, IQ, gender, and emotional management and control.

\textit{Figure 4.17} Simple Slopes Data Plot: Linear Predictive Effect of Emotional Management and Control Regressed Against VCE Academic Achievement, in the Four IQ and Gender Combination Groups

Figure 4.17 shows the derived effect of emotional management and control for each gender and IQ combination, resulting in four groups. There were some major effects, which encompassed the ordinal and disordinal interactions between the gender and IQ groups. Table 4.25 presents the emotional management and control scores, and
the regression model predicted VCE ENTER scores, for the female high group, female low group, male high group, and the male low group.

4.10.5.1 Male High Group and Male Low Group
A positive ordinal interaction was evident between the male high group \((b_0 = 80.97, b_{1a} = 1.60)\) and the male low group \((b_0 = 60.91, b_{1a} = 5.50)\). A review of the difference between the male high group and the male low group, at each standard deviation, revealed an increasingly smaller VCE ENTER score difference of 27.8 \((-2 SD)\), 23.9 \((-1 SD)\), 20.0 \((0 SD)\), 16.1 \((1 SD)\), and 12.2 \((2 SD)\). The male low group showed the strongest variance out of all groups.

4.10.5.2 Female High Group and Female Low Group
An ordinal interaction was evident between the female high group \((b_0 = 87.94, b_{1a} = -0.70)\) and the female low group \((b_0 = 71.67, b_{1a} = 2.38)\) in the emotional management and control trait. The high group showed a negative relationship of 0.7 VCE ENTER points per standard deviation, and the low group showed a positive relationship of 2.3 VCE ENTER points per standard deviation. A review of the difference between the female high group and the female low group, at each standard deviation, revealed a gradually decreasing VCE ENTER score difference of 22.4 \((-2 SD)\), 19.4 \((-1 SD)\), 16.3 \((0 SD)\), 13.2 \((1 SD)\), and 10.1 \((2 SD)\).

4.10.5.3 Female High Group and Male High Group
A disordinal interaction was evident between the female high group and the male high group, with the intersection lying at, approximately, 2.5 \(SD\). Increasing emotional management and control enhanced the academic achievement for the male high group, but slightly decreased the academic achievement of the female high group. A review of the difference between the female high group and the male high group, at each standard deviation, revealed an increasingly smaller VCE ENTER score difference of 11.6 \((-2 SD)\), 9.3 \((-1 SD)\), 7.0 \((0 SD)\), 4.7 \((1 SD)\), and 2.4 \((2 SD)\). Therefore, at 2 \(SD\), there was very little difference, with only 2.4 VCE ENTER points between the female and male high groups’ ENTER scores.
4.10.5.4 Female Low Group and Male Low Group

A positive ordinal interaction was evident between the female low group and the male low group, until 2.5 SD above the mean. However, even though the interaction is not shown on the graph, the interaction becomes disordinal at 3 SD. A review of the difference between the female low group and the male low group, at each standard deviation, revealed an increasingly smaller VCE ENTER score difference of 17.0 (-2 SD), 13.8 (-1 SD), 10.7 (0 SD), 7.6 (1 SD), and 4.5 (2 SD).

Table 4.25

Model Four: Emotional Management and Control Trait Score and Predicted VCE Scores for Each Group with Comparisons

<table>
<thead>
<tr>
<th>Group</th>
<th>Emotional Management and Control Trait Score</th>
<th>Standard Deviation (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male High ENTER</td>
<td>77.7  79.3  80.9  82.5  84.1</td>
</tr>
<tr>
<td></td>
<td>Male Low ENTER</td>
<td>49.9  55.4  60.9  66.4  71.9</td>
</tr>
<tr>
<td><strong>VCE ENTER Difference</strong></td>
<td><strong>27.8</strong>  <strong>23.9</strong>  <strong>20.0</strong>  <strong>16.1</strong>  <strong>12.2</strong></td>
<td></td>
</tr>
<tr>
<td>Female High ENTER</td>
<td>89.3  88.6  87.9  87.2  86.5</td>
<td></td>
</tr>
<tr>
<td>Female Low ENTER</td>
<td>66.9  69.2  71.6  74.0  76.4</td>
<td></td>
</tr>
<tr>
<td><strong>VCE ENTER Difference</strong></td>
<td><strong>22.4</strong>  <strong>19.4</strong>  <strong>16.3</strong>  <strong>13.2</strong>  <strong>10.1</strong></td>
<td></td>
</tr>
<tr>
<td>Male High ENTER</td>
<td>77.7  79.3  80.9  82.5  84.1</td>
<td></td>
</tr>
</tbody>
</table>


In summary, a saturated multiple linear regression was performed on the sample data to determine if there was a significant relationship between VCE ENTER scores and the combined effects of emotional management and control trait score, IQ, gender, and their interactions. The F-ratio for the model was significant at the .05 critical alpha level, $F(7, 361) = 20.34, p = < .0005, SEM = 16.66$. Thus, Null Hypothesis Two(d) was rejected and it was concluded that there was a positive significant relationship between emotional management and control, IQ and gender for VCE academic achievement.

4.10.6 AEI for VCE Academic Achievement: IQ and Gender Combination Groups

Tables 4.26 to 4.29 present the male low group, male high group, female low group and female high groups AEI mean, standard deviation, total score, trait scores and predicted VCE ENTER score. The Tables 4.26, 4.27, 4.28, and 4.29 are presented to assist the reader in gaining an understanding of the individual differences of each group’s AEI mean score, indicating their total AEI resources in comparison to the AEI, which was predictive of VCE academic achievement. The individual differences identified in the female high group, male high group, female low group and male low group are theorised to reflect the varied experiences of the adolescent students as they adaptively utilise their resources (including their IQ or $gf$, AEI and gender) to meet or cope with the environmental demands of VCE academic achievement (Bronfenbrenner, 1979).

4.10.6.1 Male Low Group

As shown in Table 4.26, when compared to other groups, the male low group was the group most strongly and positively influenced by AEI total ($b_{1a} = 5.53$), emotional recognition and expression ($b_{1a} = 5.30$), understanding emotions ($b_{1a} = 5.30$) and
emotional management and control \( (b_{1a} = 5.50) \) by an average of 5 ENTER points per standard deviation. The exception was emotions direct cognition \( (b_{1a} = -3.17) \), which was negatively predictive of the male low group’s academic achievement.

Table 4.26

**Male Low Group: AEI Total Score, Trait Scores and VCE Score**

<table>
<thead>
<tr>
<th>Male Low Group</th>
<th>( b_0 )</th>
<th>( b_{1a} )</th>
<th>Predicted VCE ENTER Score per SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adolescent Emotional Intelligence</td>
<td>61.58</td>
<td>5.53</td>
<td>5.5</td>
</tr>
<tr>
<td>Emotional Recognition &amp; Expression</td>
<td>61.30</td>
<td>5.30</td>
<td>5.3</td>
</tr>
<tr>
<td>Understanding Emotions</td>
<td>61.54</td>
<td>5.08</td>
<td>5.0</td>
</tr>
<tr>
<td>Emotions Direct Cognition</td>
<td>60.66</td>
<td>-3.17</td>
<td>-3.1</td>
</tr>
<tr>
<td>Emotional Management &amp; Control</td>
<td>60.91</td>
<td>5.50</td>
<td>5.5</td>
</tr>
</tbody>
</table>

### 4.10.6.2 Male High Group

As shown in Table 4.27, the male high group had a similar positive pattern of AEI total and trait scores as the male low group, however they had a lower average of 2 ENTER points per standard deviation. The exception was emotions direct cognition \( (b_0 = 81.26; b_{1a} = -0.24) \), which was negatively predictive of academic achievement for the male high group.

Table 4.27

**Male High Group: AEI Total Score, Trait Scores and VCE Score**

<table>
<thead>
<tr>
<th>Male High Group</th>
<th>( b_0 )</th>
<th>( b_{1a} )</th>
<th>Predicted VCE ENTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adolescent Emotional Intelligence</td>
<td></td>
<td></td>
<td>ENTER</td>
</tr>
</tbody>
</table>
4.10.6.3 Female Low Group

Adolescents within this group have an IQ ranging from 70 to 115 and therefore, the lower range of this group may be under extra pressure to meet the academic demands of the VCE curriculum. As shown in Table 4.28, the female low group had a positive predictive relationship with AEI total and trait scores, with an average increase of 2.3 ENTER points per standard deviation.

Table 4.28

Female Low Group: AEI Total Score, Trait Scores and VCE Score

<table>
<thead>
<tr>
<th></th>
<th>AEI Total Score</th>
<th>Trait Scores</th>
<th>VCE Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adolescent Emotional Intelligence</td>
<td>81.45</td>
<td>2.12</td>
<td>2.1</td>
</tr>
<tr>
<td>Emotional Recognition &amp; Expression</td>
<td>81.4</td>
<td>1.17</td>
<td>1.1</td>
</tr>
<tr>
<td>Understanding Emotions</td>
<td>81.49</td>
<td>2.2</td>
<td>2.2</td>
</tr>
<tr>
<td>Emotions Direct Cognition</td>
<td>81.26</td>
<td>-0.24</td>
<td>-0.2</td>
</tr>
<tr>
<td>Emotional Management &amp; Control</td>
<td>80.97</td>
<td>1.60</td>
<td>1.6</td>
</tr>
</tbody>
</table>

4.10.6.3 Female Low Group

Adolescents within this group have an IQ ranging from 70 to 115 and therefore, the lower range of this group may be under extra pressure to meet the academic demands of the VCE curriculum. As shown in Table 4.28, the female low group had a positive predictive relationship with AEI total and trait scores, with an average increase of 2.3 ENTER points per standard deviation.

Table 4.28

Female Low Group: AEI Total Score, Trait Scores and VCE Score

<table>
<thead>
<tr>
<th>Female Low Group</th>
<th>b₀</th>
<th>b₁a</th>
<th>Predicted VCE Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adolescent Emotional Intelligence</td>
<td>70.62</td>
<td>4.13</td>
<td>ENTER</td>
</tr>
<tr>
<td>Emotional Recognition &amp; Expression</td>
<td>70.76</td>
<td>0.95</td>
<td>0.9</td>
</tr>
<tr>
<td>Understanding Emotions</td>
<td>70.56</td>
<td>2.00</td>
<td>2.0</td>
</tr>
</tbody>
</table>

4.10.6.3 Female Low Group

Adolescents within this group have an IQ ranging from 70 to 115 and therefore, the lower range of this group may be under extra pressure to meet the academic demands of the VCE curriculum. As shown in Table 4.28, the female low group had a positive predictive relationship with AEI total and trait scores, with an average increase of 2.3 ENTER points per standard deviation.

Table 4.28

Female Low Group: AEI Total Score, Trait Scores and VCE Score

<table>
<thead>
<tr>
<th>Female Low Group</th>
<th>b₀</th>
<th>b₁a</th>
<th>Predicted VCE Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adolescent Emotional Intelligence</td>
<td>70.62</td>
<td>4.13</td>
<td>ENTER</td>
</tr>
<tr>
<td>Emotional Recognition &amp; Expression</td>
<td>70.76</td>
<td>0.95</td>
<td>0.9</td>
</tr>
<tr>
<td>Understanding Emotions</td>
<td>70.56</td>
<td>2.00</td>
<td>2.0</td>
</tr>
</tbody>
</table>
4.10.6.4 Female High Group

As shown in Table 4.29, the female high group displayed a small negative relationship to AEI total and trait scores and VCE academic achievement; with the exception of emotions direct cognition \((b_0 = 87.65; b_{1a} = 0.59)\), which positively predicted 0.5 VCE ENTER points per standard deviation.

Table 4.29

*Female High Group: AEI Total Score, Trait Scores and VCE Score*

<table>
<thead>
<tr>
<th>Female High Group</th>
<th>b₀</th>
<th>b₁a</th>
<th>Predicted VCE ENTER Score per SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adolescent Emotional Intelligence</td>
<td>88.06</td>
<td>-0.70</td>
<td>-0.7</td>
</tr>
<tr>
<td>Emotional Recognition &amp; Expression</td>
<td>88.11</td>
<td>-1.30</td>
<td>-1.3</td>
</tr>
<tr>
<td>Understanding Emotions</td>
<td>87.88</td>
<td>-0.23</td>
<td>-0.2</td>
</tr>
<tr>
<td>Emotions Direct Cognition</td>
<td>87.65</td>
<td>0.59</td>
<td>0.5</td>
</tr>
<tr>
<td>Emotional Management &amp; Control</td>
<td>87.94</td>
<td>-0.70</td>
<td>-0.7</td>
</tr>
</tbody>
</table>

4.11 Post Hoc Analyses

Post hoc analyses were conducted in order to investigate the:

- **Multicollinearity**: potential multicollinearity inherent within the simultaneous saturated GLM regression model, specifically within
decomposition of the second and third order independent variables (Tabachnick & Fidell, 2007); and the

- **IQ and gender combination groups:** The rank order of AEI mean trait score in comparison to the predictive effect of AEI for VCE academic achievement: comparing the mean correlational score of AEI as the students’ total resources, with the predictive effect of AEI, in light of their IQ and gender for VCE academic achievement.

The general model analysing AEI total score, IQ and gender for VCE academic achievement as presented in Hypothesis One, was selected for post hoc analysis because it was the most comprehensively representative model in the study. An analysis of the general model revealed that the simultaneous main effects of AEI, IQ and gender were predictive of approximately one-third of the total possible variability in VCE academic achievement ($R^2 = 0.29$). Of the total of variance predicted in the model (29%), the three independent variables collectively accounted for 10.5% of the unique predictive variance and 18.5% of the shared predictive variance. The beta weights for each predictor variable made a separate contribution to the model: IQ contributed the largest unique variance ($\beta = .44$), followed by gender ($\beta = -.22$), and AEI ($\beta = .21$). No statistically significant interactional effects were identified in the beta weight analysis.

However, two significant correlations were identified at the commencement of the regression model, which warranted further analysis to determine their effect within the model. First, the bivariate correlation identified between gender and AEI ($r = -.11, p < .01$) was evident in the regression model, however, it was not statistically significant in the final regression model ($\beta = -.17, p = ns$). The bivariate correlation identified between gender and AEI may potentially be indicative of an underlying relationship in the regression model (Warner, 2007). Second, the statistically significant relationship between gender and IQ at the regression correlational level ($r = .27, p < .01$) was identified in the regression model, however, the correlation did not reach statistical significance ($r = .64, p = ns$) in the final regression model. Consequentially, these correlations were potential indicators of underlying relationship in the regression model (Warner, 2007). Hence, a post hoc analysis was conducted to explore if there were underlying relationships in the regression model that may have influenced the predictive
effect of the three independent variables and/or the predictive variance of VCE academic achievement as the dependent variable in the model.

4.11.1 Multicollinearity: Regression Review

A post hoc analysis was conducted in order to review the Hypothesis One model multivariate statistics for the total cohort, to confirm if the research data met the assumptions of normality required for regression analysis, which included a check for multicollinearity (Tabachnick & Fidell, 2007). As presented in Table 4.30 the study findings included three small to medium correlations between the dependent variable VCE academic achievement and the independent variables IQ ($r = .45$); AEI ($r = .21$); and gender ($r = -.14$). Therefore, these three correlations were not large enough to cause multicollinearity and compromise the results of the model (Tabachnick & Fidell, 2007).

Table 4.30

Summary of Correlations Between Independent Variables Contributing to Regression Effects for the Dependent Variable VCE Academic Achievement

<table>
<thead>
<tr>
<th>Variable</th>
<th>VCE</th>
<th>G</th>
<th>G x AEI</th>
<th>AEI</th>
<th>IQ x AEI</th>
<th>IQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>IQ</td>
<td>.45**</td>
<td>.15*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td></td>
<td>-.14**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AEI</td>
<td>.21**</td>
<td>-.11*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Variable

2nd/3rd Order

| G x IQ   | .27**| .52**| .75** |
| G x AEI  | .17**| .80**|      |
Two small correlations between the independent variables: gender x IQ ($r = .15$) and gender x AEI ($r = -.11$), were identified, however, the correlations were not large enough to cause multicollinearity and therefore significantly impact on the validity of the regression model. In addition, a review of the correlational results in the decomposition of the predictive variables, which included the second order, third order and total model interaction correlations, identified nine correlations, as outlined below:

- Gender x IQ: correlated with IQ ($r = .75$); and gender ($r = .52$);
- Gender x AEI: correlated with AEI ($r = .80$);
- IQ x AEI: correlated with gender ($r = -.10$); gender x AEI ($r = .57$); and AEI ($r = .68$);
- Gender x IQ x AEI: correlated with gender x AEI ($r = .69$); AEI ($r = .55$); and IQ x AEI ($r = .82$).

The nine correlations outlined included one small, five moderate and three relatively highly correlated predictor variables. Relatively highly correlated predictor variables were those considered to be above .70. The three relatively highly correlated predictor variables included two second order correlations and one third order or full model correlation: G x IQ correlated with IQ ($r = .75$); G x AEI correlated with AEI ($r = .80$); and G x IQ x AEI correlated IQ x AEI ($r = .82$). The three relatively high correlations are presented with reference to the relative regression model collinearity statistics in Table 4.31.

### Table 4.31

<table>
<thead>
<tr>
<th>Independent</th>
<th>Tolerance</th>
<th>VIF</th>
<th>Correlation</th>
<th>$r$</th>
</tr>
</thead>
<tbody>
<tr>
<td>IQ x AEI</td>
<td>.07</td>
<td>-.10*</td>
<td>.57**</td>
<td>.68**</td>
</tr>
<tr>
<td>G x IQ x AEI</td>
<td>.04</td>
<td>.69**</td>
<td>.55**</td>
<td>.82**</td>
</tr>
</tbody>
</table>

*Note. AEI = adolescent emotional intelligence; G = gender; IQ = intelligence quotient; VCE = Victorian Certificate of Education; $r$ = zero order correlation; $N = 369$; $p = < .05*$; $p = < .01**$*
### Table 4.31: Summary of Correlation Coefficients

<table>
<thead>
<tr>
<th>Variable</th>
<th>Correlation Coefficient</th>
<th>Tolerance</th>
<th>VIF</th>
<th>Variable</th>
<th>Correlation Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>G x IQ</td>
<td>.255</td>
<td>3.914</td>
<td></td>
<td>IQ</td>
<td>.75**</td>
</tr>
<tr>
<td>G x AEI</td>
<td>.203</td>
<td>4.920</td>
<td></td>
<td>AEI</td>
<td>.80**</td>
</tr>
<tr>
<td>G x IQ x AEI</td>
<td>.178</td>
<td>5.614</td>
<td></td>
<td>IQ x AEI</td>
<td>.82**</td>
</tr>
</tbody>
</table>

*Note. AEI = adolescent emotional intelligence; G = gender; IQ = intelligence quotient; VIF = variance inflation factor; r = correlation; N = 369, p = < .05*; p = < .01**.*

Multicollinearity is evident when the Tolerance levels were below .1 and the Variance Inflation Factor (VIF) was greater than 10 (Pallant, 2007). Multicollinearity has been identified as an issue that increases the complication of the covariance structure when interpreting regression results (Nimon, 2010; Tabachnick & Fidell, 2007). In the three variables presented in Table 4.31, the Tolerance levels were not below .1 and the VIF was not above 10. Therefore, based on the collinearity statistics multicollinearity was not statistically evident in the model. However, the three relatively high correlations presented in Table 4.31 may have incrementally contributed to the relatively low main predictive variance effects in the independent variables and the relatively high proportion of shared variance in the model.

The simultaneous saturated regression model was designed to incorporate a decomposition of the general model, which included the main effects, second order and third order (full model) effects. Therefore, while the saturated regression model in the current study provided a full analysis of the structure and function of the coefficients, the disadvantage of the analysis method was that it may also have increased the potential for a low level of multicollinearity in the second order and third order effects of this study (Heiman, 2001; Nathans, Oswald, & Nimon, 2012; Nimon, 2010). Further, Nathans et al. (2012) suggested the analysis of the beta weights is complemented by the inclusion of analysis of the predictor variables direct effects, partial effects and total effects, which collectively provides a fuller understanding of how the predictor variables contribute to the regression equation. Therefore, the results of the model are reviewed, to determine the unique and shared variance in the predictor variables (Nathans et al., 2012).
**Intelligence:** A review of the regression results using multiple measures (Nathans et al., 2012), confirmed that IQ is the strongest predictor of VCE academic achievement. First, an analysis of the beta weights found IQ has the largest beta weight ($\beta = .44, p < .001$), confirming IQ contributed 6.5% to the regression equation, which was the largest unique contribution to the regression equation, while holding all other predictors constant. Further, the unstandardised B weight for IQ ($B = 17.4$) indicated that an increase or decrease of one standard deviation in IQ, results in an increase or decrease in VCE score of approximately 17 points. The zero order correlation between IQ and VCE academic achievement ($r = .45$) indicated that IQ shared the largest amount of variance with VCE academic achievement, representing ($r^2 = 20$) 20% of the predictive variance. The product measure by Pratt (Nathans et al., 2012), multiplied the IQ beta weight (.44) by the zero order correlation (.45), to obtain a score of 198, which represented 68% of the regression effect ($R^2 = .291$) in the model.

**Gender:** A review of the multiple measures for gender in Table 4.30, showed mixed results for the direct effect, total effect and partial effects of gender for VCE academic achievement. First, based on the direct effect identified in gender’s beta weight ($\beta = -.22, p < .001$), gender was negatively predictive of VCE academic achievement and accounted for the second largest effect in the regression equation, accounting for 3% of the total variance while holding all other predictors constant. Therefore, gender is the second strongest predictor of VCE academic achievement in the model, with adolescent females having higher VCE scores than adolescent males. Gender as a dichotomous independent variable, was coded male = 1 and female = 0; consequently, the negative predictive variance of gender for VCE academic achievement may have potentially been reflective of the nature of the variable coding. The zero order correlation between gender and VCE academic achievement was also negative ($r = -.14$); when the correlation was squared, it showed that gender accounted for 2% of the variance in VCE academic achievement. Further, based on Pratt’s product measure (Nathans et al., 2012), gender accounted for 10.3% of the total effects.

**Adolescent emotional intelligence:** AEI had the third largest beta weight ($\beta = .21, p < .001$), positively predicting 1% of the predictive variance, which suggested AEI played a minor but still significant role in the unique predictive contribution to the
regression equation, while holding all other predictors constant. In contrast to the results of the beta weight analysis, the positive zero-order correlation between AEI and VCE academic achievement \((r = .21)\), when squared accounted for 4.4% of the variance in VCE academic achievement. This indicated that AEI was the second highest variable to explain the overall variance in the dependent variable VCE academic achievement. The results of Pratt’s product measure (Nathans et al., 2012) for AEI found partitioning \(R^2\) by multiplying the beta weight \((\beta = .21)\) by the zero order correlation \((r = .21)\), the product measure was the second highest with a score of .044, representing 15.1% of the predictive variance in the model. Therefore, the regression model findings indicate AEI is ranked third in the model for the direct predictive effect of the beta weight, second in relation to the zero order correlation; and second in relation to the Pratt product measure for \(R^2\) in the model.

**Comparison of gender and adolescent emotional intelligence:** A comparison of the beta weights for gender \((\beta = -.22, p = < .001)\) and AEI \((\beta = .21, p = < .001)\) indicated a difference of one point between beta weights. In addition, the beta weights lead to gender predicting 3% of the unique predictive variance in the regression model, which was higher in comparison to 1% uniquely predicted by AEI. Gender was also found to have a negative unique predictive variance and correlational relationship for VCE academic achievement. However, Pratt’s product measure found gender had a positive relationship to the variance encompassed \(R^2\), potentially suggesting gender may be suppressor variable (Nimon, 2010). This sits in contrast to the negative unique predictive variance and negative correlational relationship between gender and VCE academic achievement. AEI had a positive relationship with VCE academic achievement in the three measures of beta weight, zero order correlation and Pratt’s product measure. Further, the results of Pratt’s product measure (Nathans et al., 2012) found gender accounted for 10.3% of the total effects in \(R^2\), which was less than the 15.1% accounted for by AEI in the variance for \(R^2 = .291\).
4.11.2 IQ and Gender Combination Groups: Rank Order of AEI Mean Scores in Comparison to the Predictive Variance of AEI for VCE Academic Achievement

When analysing the simultaneous saturated regression model beta weights for the predicative variance of AEI in each IQ and gender group, the AEI mean score was reviewed. In Table 4.32, the four IQ and gender groups are listed in rank order; first based on their AEI mean percentile score, and second, based on predictive variance of AEI for VCE academic achievement in each group, which is subject to incremental increase or decrease of one standard deviation. The AEI mean score was representative of the students’ total AEI resources and the predictive variance of AEI was representative of the AEI utilised in accounting for the variance in VCE scores.

Table 4.32

IQ and Gender Combination Groups: The Rank Order of Groups based on (A) AEI Mean Percentile Scores; and (B) the Predictive Effect of AEI on VCE Academic Achievement

<table>
<thead>
<tr>
<th>Rank</th>
<th>Group</th>
<th>n</th>
<th>M</th>
<th>SD</th>
<th>Rank</th>
<th>Group</th>
<th>VCE (1 SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Female High</td>
<td>48</td>
<td>56.3</td>
<td>18.5</td>
<td>1</td>
<td>Male Low</td>
<td>5.5</td>
</tr>
<tr>
<td>2</td>
<td>Female Low</td>
<td>97</td>
<td>51.6</td>
<td>16.9</td>
<td>2</td>
<td>Female Low</td>
<td>4.1</td>
</tr>
<tr>
<td>3</td>
<td>Male High</td>
<td>106</td>
<td>48.9</td>
<td>18.0</td>
<td>3</td>
<td>Male High</td>
<td>2.1</td>
</tr>
<tr>
<td>4</td>
<td>Male Low</td>
<td>116</td>
<td>48.9</td>
<td>17.7</td>
<td>4</td>
<td>Female High</td>
<td>-0.7</td>
</tr>
</tbody>
</table>

*Note. AEI = adolescent emotional intelligence; R = rank order of IQ and gender combination groups; Group = female high group, female low group, male high group, male low group. The rank order of groups based on (a) the Mean scores of AEI; and (b) the predictive variance of AEI for VCE academic achievement, in the GLM saturated multiple regression model.*
As shown in Table 4.32, when the four groups were compared, the female high group had the highest AEI mean score (56). In contrast, the female high group was ranked the lowest group in utilising AEI in VCE academic achievement. Further, the female high group’s predicative variance of AEI had a negative relationship with VCE academic achievement (-0.7). The female low group had the second highest AEI mean score and was also ranked second for utilising the predictive variance of AEI in VCE academic achievement.

The common variable between the female high group and the female low group was gender. Conversely, the female high group and the female low varied in their IQ, AEI mean scores and the predictive variance of AEI for VCE academic achievement. Plausibly, the female high group’s higher intellectual acumen would enable them to cope with the academic rigor of the VCE curriculum more effectively than the female low group. Therefore, the female low group would be more likely to experience more difficulties in meeting the academic and associated psychosocial demands of VCE than the female high group. In addition, it is possible that their higher mean AEI skills could provide the female high group with traits that were generalised into their emotions and behaviours, which are estimated to support or enhance their VCE academic achievement. Consequently, due to higher intellectual acumen and higher AEI it is plausible that the female high group did not need to utilise their AEI to directly adapt to or cope with the academic and psychosocial demands of VCE, as much as the female low group did.

In contrast, the male low group had a low mean AEI score, which was equivalent to the male high group’s mean score. However, the male low group’s VCE academic achievement was the most strongly influenced by their utilisation of AEI, when compared to all the other groups. While the male low group and the male high group had two variables that were consistent with each other, their mean AEI score and their gender, their IQs were differentiated. Therefore, it is plausible that the differences in the predictive variance of AEI for VCE academic achievement in the male high group and the male low group were in response to the differences in general fluid intelligence between the groups. The differences in the intellectual abilities or resources of the male high group and the male low group may have impacted on their ability to adapt or cope with the
academic and psychosocial demands associated with VCE. Therefore, lower levels of intellectual resources identified in the male low group, potentially stimulating more emotions in the construct of AEI. Potentially, the emotions stimulated in the male low group may have been in the form of worry and stress, requiring higher levels of AEI in the perception, appraisal and eventually management or regulation of the strong emotional arousal experienced by the male low group; hence, contributing to the male low group’s having the highest level of predictive variance of AEI for VCE academic achievement when compared to the other groups in the study.

In summary, an examination of the rankings presented in Table 4.32, whereby the beta weight indicating the predictive variance of AEI for the variance in VCE academic achievement is more comprehensively understood when contextualised against the groups’ mean AEI score. As opposed to analysing the individual differences in the predictive variance of AEI without reference to the individual developmental differences in the groups’ mean AEI scores. The mean AEI score provides an indication of the individual’s total resources or capacities that are available to be utilised to varying degrees, subject to the contextual stimulation or need, which is experienced and appraised by the individual.

4.12 Summation of Results

Chapter Four has presented the univariate, bivariate, and multivariate analyses based upon Null Hypotheses One and Two\(a, b, c, d\). The findings confirmed that Null Hypotheses One and Two\(a, b, c, d\) were both rejected. Post hoc analysis was conducted to: (1) review potential multicollinearity, the findings of which confirmed that the model was robust and did not breach the guidelines for multicollinearity; and (2) examine the individual differences in the IQ and gender combination groups’ rank order, with respect to their mean scores for AEI and the predictive variance of AEI for VCE academic achievement.

4.12.1 Model Main Effects

Model E represented the main effects and interactions of all variables for AEI total score, IQ, and gender, and was predictive of 29% of the variance in VCE scores. The four subsequent saturated multiple linear regression models were representative of
the AEI trait scores, with each model demonstrating the associated decomposition for IQ and gender. The emotional recognition and expression model was predictive of 27% of the variance. The understanding emotions model was predictive of 28% of the variance. The emotions direct cognition model was predictive of 26% of the variance. The emotional management and control model was predictive of 28% of the variance. Hattie (2003, 2005) conducted a meta-analysis to determine the predictive effect of a wide range of variables for academic achievement. The results indicated that the individual student’s traits were the strongest predictors and typically accounted for approximately 50% of the predictive variance in academic achievement. The current model accounted for 29% of the predictive variance of students’ traits for VCE academic achievement, which was considered to be a valid model relative to Hattie’s (2003, 2005) findings.

The post hoc analysis confirmed that Model E did not reach a statistically significant level, therefore did not reach an unacceptable level of multicollinearity (Nathans et al., 2012). It is possible that the relatively small component of unique predictive variance and the larger component of shared predictive variance found in Model E, may be partially attributed to the saturated regression analysis methodology inherent in a simultaneous saturated regression model (Nimon, 2010). Consequently, Model E and the ensuing research findings were confirmed to be psychometrically valid and statistically reliable sources of information on which to base the current discussion (Tabachnick & Fidell, 2007).

An examination of the beta weights for Model E, confirmed that the independent variables IQ, gender and AEI provided statistically significantly main predictive effects in the model, which accounted for the variance in VCE academic achievement. The main effects for the independent variables’ statistical order of importance was first—IQ (gf), second—gender; and third—AEI. There were no interactional effects of statistical significance in the beta weights of the saturated regression model. However, the saturated regression model analysis identified two correlations (G x IQ; and G x AEI), which were not significant in the final GLM saturated multiple regression model. The correlation between gender and IQ and the correlation between gender and AEI provided potential evidence of underlying relationships in the saturated regression model, which warranted further investigation.
As previously outlined, an examination of the direct, partial and total effects of the model found that the regression model beta weights indicated IQ was the strongest predictor of unique predictive variance, followed by gender and AEI. The zero order correlations found that IQ had the strongest correlation with VCE academic achievement as a dependent variable, followed by AEI and then gender. Finally, the Pratt product measure partitioned $R^2$ by multiplying the beta weight by the zero order correlation; the results of which found IQ was again the strongest predictor of variance in $R^2$, followed by AEI and gender (Nathans et al., 2012; Nimon, 2010).

### 4.12.2 Model Individual Group Effects

A review of the beta weight intercepts and slope coefficients of the equations provide insight into the unique combination of AEI, IQ, and gender characteristics that were predictive of VCE scores. The recognition of individual differences in AEI, IQ, and gender in relation to VCE academic achievement was evident. AEI traits predictive of the VCE scores varied for student subgroups, indicating that each group had unique characteristics that warranted consideration in order to optimise their VCE score.

A post hoc review of the rank order of four IQ and gender groups examined their AEI mean score rank in comparison to the groups’ AEI predictive variance for VCE academic achievement. The investigation indicated that a more comprehensive understanding of the contribution of the predictive variance of AEI for the variance in VCE academic achievement is attained when contextualised against the groups’ mean scores, as a representation of their total AEI traits or resources.

Further, higher IQ scores were estimated to represent higher intellectual processing skills and therefore higher skills to cope with the academic rigor in VCE. Therefore, with reference to the discussion presented by Petrides et al. (2004) it is plausible that higher IQ scores may have provided the individual with an increased capacity to address the academic demands in VCE, potentially reducing the distress associated to the academic demands of VCE. Consequently, higher intellectual resources were anticipated to reduce the strain on the individual and stress associated to the fear or threat of academic failure when confronted with the demands of VCE academic achievement. Hence, higher intellectual resources may have influence students’ appraisal of their chances of success or failure in VCE and consequently stimulate one’s AEI and
subsequently stimulate individual differences in the degree to which they needed to utilise their AEI in VCE academic achievement. Finally, gender differentiation was also identified in the analysis of the individual differences in the predicative variance of AEI for the variance in VCE academic achievement between the four IQ and gender combination groups.

4.12.3 Conclusion: Chapter Four

Therein, the presentation of results in Chapter Four is finalised. The findings are discussed in Chapter Five and Chapter Six. The findings for Hypothesis One are discussed in Chapter Five. The findings for Hypothesis Two \((a, b, c, d)\) are discussed in Chapter Six. The study findings are discussed in relation to the previous theoretical structures and research findings regarding the relationship between AEI and academic achievement. The study findings for the total cohort are discussed, followed by a discussion of the individual differences in the predictive effect of AEI for VCE academic achievement, subject to developmental differences in IQ and gender. The findings and implications of the study are presented within the context of adolescent development and the antecedents of AEI in contemporary western society. The limitations of the study are considered and recommendations for future research are summarised. The contribution of this study to the current research findings and theory in AEI is outlined. Chapter Seven concludes the study with an outline of the main conclusions, which lead to the subsequent recommendations that are proposed for psychoeducational policy and practice.
CHAPTER FIVE

Discussion: Hypothesis One
Chapter Five discusses the psychometric research results from Hypothesis One, which led to three major findings and 12 key findings. The research results are discussed with reference to the study’s aim, Hypothesis One, the current study’s research questions and previous research findings. First, the research results for the GLM simultaneous saturated regression model for the total cohort confirmed AEI accounted for a positive predictive effect in VCE academic achievement, which was beyond the simultaneous predictive effect of IQ and gender. Second, based on the decomposition of the simultaneous saturated regression equation in the four IQ and gender combination groups, AEI was heterogeneously predictive of VCE academic achievement; subject to developmental differences in AEI, IQ, and gender. The study findings outlined for Hypothesis One are formative to the discussion of Hypothesis Two(a, b, c, d) as presented in Chapter Six, and to the related conclusions presented in Chapter Seven.

Hence, Chapter Five presents:

5.1 Null Hypothesis One
5.2 Study Research Questions
5.3 Major Finding One: AEI Positively Predicts VCE Academic Achievement Beyond the Simultaneous Predictive Variance of IQ and Gender
5.4 Regression Model E: Main Predictive Effects of IQ, Gender and AEI
5.5 Study Significance
5.6 Major Finding Three: The Predictive Effect of AEI for VCE Academic Achievement in IQ and Gender Combination Groups was Heterogeneous
5.7 Conclusion: Chapter Five

5.1 Null Hypothesis One

Null Hypothesis One: The combined effects of adolescent emotional intelligence total, IQ, gender and their interactions will not be predictive of academic achievement.
5.2 Study Research Questions

The following seven research questions directed this study and are therefore discussed:

(a) Were AEI, IQ and gender simultaneously predictive of academic achievement?
(b) Was IQ associated with AEI?
(c) Was AEI associated with academic achievement?
(d) Was AEI differentiated by gender?
(e) When IQ was included in the analysis, did AEI remain significantly associated to academic achievement?
(f) When gender was included in the analysis, did AEI remain significantly associated to academic achievement?
(g) Were there individual differences in the simultaneous predictive effects of AEI, IQ and gender for academic achievement?

5.3 Major Finding One: AEI Positively Predicts VCE Academic Achievement
Beyond the Simultaneous Predictive Variance of IQ and Gender

*Research Question: Are AEI, IQ and gender simultaneously predictive of academic achievement?*

Null Hypothesis One investigated the simultaneous predictive variance of AEI, IQ(gf) and gender, with their interactions for VCE academic achievement. A review of the regression model showed that the model was statistically robust $R^2 = .291$, accounting for 29% of the variance in VCE academic achievement ($N = 369$). The GLM saturated multiple linear regression model found each variable provided a main effect and there were no interactional effects of any significance in the final model (Tabachnick & Fidell, 2007). Therefore, it was concluded that the simultaneous predictive variance of AEI, IQ and gender were predictive of VCE academic achievement. Consequently, the research results lead to the rejection of Null Hypothesis One. The importance of the positive predictive effects of AEI, IQ and gender for VCE academic achievement are briefly discussed from a (1) psychometric, (2) practical, and (3) theoretical perspective.
5.3.1 Psychometric Perspective: The Unique and Shared Variance of AEI, IQ
and Gender in the Regression Model

The discussions of the study findings are contextualised within the framework of the unique and shared variance accounted for in the study model. An examination of the regression model, found the three predictor variables simultaneously accounted 10.5% of the unique variance in VCE academic achievement; indicating 18.5% of the predictive variance in VCE academic achievement was shared variance in VCE academic achievement. Given the comparatively small percentage of unique variance and large percentage of shared variance identified in the GLM model, a post hoc analysis was conducted to ensure the regression model was statistically robust and did not reach unacceptable levels of multicollinearity, which would invalidate the study results (Tabachnick & Fidell, 2007). The post hoc analysis confirmed the final model did not reach unacceptable levels of multicollinearity and therefore, the model was statistically reliable and valid (Nathans et al., 2012; Nimon, 2010). While it is beyond the scope of this study to determine the reason for the relatively small unique variance and larger shared variance in the model, it is possible that the psychometric methodology in the saturated regression model may have influenced the degree of shared variance in the model.

It is plausible that the comparatively larger percentage of shared variance and smaller percentage of unique variance found between the variables AEI, IQ and gender in the regression model, may have been partially attributed to the statistical process of analysis inherent in the simultaneous saturated regression model methodology (Nathans et al., 2012). The simultaneous saturated regression model methodology characteristically includes second and third order variables in the regression, which consequently increase the percentage of shared variance in the model (Nimon & Reio, 2011). Nonetheless, the advantage of using the saturated regression model in this study was also that the analysis of all possible combinations of each variable and their interactions distilled the essential unique elements of each variable (Nathans et al., 2012), which refined the research into the simultaneous complex phenomena of AEI, IQ and gender in adolescent learning. The statistically valid research results drawn from the saturated regression model are now
discussed in light of the univariate, bivariate and multivariate analyses of AEI, IQ and gender for VCE academic achievement.

The predictor variables IQ, gender and AEI each simultaneously accounted for a statistically significant main effect in the unique variance of VCE academic achievement. Intelligence ($gf$) simultaneously accounted for 6.5% of the unique variance in VCE academic achievement. Of the three variables in the model, IQ made the largest unique contribution ($\beta = .44$, $p < .001$), and therefore was the strongest predictor in the model. This finding was consistent with previous research confirming IQ based on Spearman’s theory of general intelligence “$g$” (Spearman, 1904), and was positively predictor of academic achievement (Calvin, Fernandes, Smith, Visscher, & Deary, 2010; Deary et al., 2007; Neisser et al., 1996; Nisbett et al., 2012). There was not a statistically significant difference between the IQ of the male and female adolescents in this study, which was consistent with previous research findings (Jensen, 1998). Therefore, gender differences in IQ did not account for the gender effect in VCE academic achievement found in this study.

Gender accounted for 3% of the unique variance in VCE academic achievement. Gender provided a negative predictive effect, which made the second strongest unique contribution in the model ($\beta = -.22$, $p < .001$), with adolescent females attaining a higher VCE academic achievement average score when compared to adolescent males. The gender effect identified in the current study was consistent in an overall assessment of Year 12 students completing their final year of secondary school by the Australian Bureau of Statistics (ABS), which also found that Year 12 females’ academic achievement was higher than males (ABS, 2011). Further, the predictive effect of gender for academic achievement found in the current study was coherent with previous research in the adolescent population (Deary et al., 2007; Kaufman et al., 2012).

The positive predictive effect for AEI in VCE academic achievement accounted for 1% of the total variance, which was beyond the predictive effect of the variance accounted for by IQ and gender. Therefore, AEI made the third strongest unique contribution to the model ($\beta = .21$, $p < .05$), however the effect size was small. This finding was consistent with previous research by Mayer, Salovey, and Caruso (2000a) who asserted that apart from IQ, a new variable such as EI should predict between 1%
and 4% of the variance in a significant factor, such as academic achievement. The positive linear predictive variance of AEI in VCE academic achievement indicated an increase of one standard deviation in AEI was predictive of an increase of 4.13 VCE points, $p = .02$, 95% CI [.46, 7.80] in VCE academic achievement. The positive predictive effect of AEI for VCE academic achievement identified in the current study, was coherent with previous research in the adolescent population (Chong Abdullah et al., 2004; Di Fabio & Palazzeschi, 2009; Downey, Mountstephen, et al., 2008; Fannin, 2001; Farooq, 2003; Gil-Olarte et al., 2006; Joibari & Mohammadtaheri, 2011; Menzie, 2005; Parker, Creque, et al., 2004; Petrides et al., 2004; Qualter et al., 2012; Stottlemyer, 2002).

Therefore, as AEI competencies increased, so too did VCE academic achievement; conversely, as AEI competencies declined, so too did VCE academic achievement. Further, AEI was also differentiated by gender with adolescent females having a higher average AEI total score in comparison to their male peers, which was consistent with previous research findings in the adolescent population attending secondary school (Chong Abdullah et al., 2004; Ciarrochi et al., 2001; Downey, Mountstephen, et al., 2008; Harrod & Scheer, 2005; Hassan et al., 2009; Petrides & Furnham, 2000a; Salguero et al., 2012; Stottlemyer, 2002; Tapia & Marsh, 2006).

Hence, the first major finding of this study was that AEI was positively predictive of the variance in VCE academic achievement, beyond the predictive effect of IQ and gender. The simultaneous positive predictive effect of AEI uniquely accounted for an increase of 4.13 VCE rank points per standard deviation, which had a significant practical effect on the Victorian statewide ranking of the VCE academic achievement of Year 12 students.

5.3.2 Practical Perspective: Positive Predictive Effect of AEI for VCE

Academic Achievement

As previously acknowledged, the unique positive predictive effect of AEI, which accounted for 1% of the variance in VCE academic achievement was a statistically small effect (Tabachnick & Fidell, 2007). Nonetheless, the significance of the predictive effect of AEI for VCE academic achievement was considered important from a practical educational perspective. The results of the study indicated AEI ($M = 50^{th}$ percentile, $SD = 17$) predicted an average increase or decrease of 4.13 VCE rank points per standard
deviation, which was statistically significant beyond the simultaneous predictive effects of IQ and gender.

When considered from an individual secondary school student’s perspective, VCE academic achievement was negatively associated to lower AEI skills. Whereas, for Year 12 students who had higher AEI skills, VCE academic achievement was positively associated to lower AEI skills. Therefore, lower AEI skills were considered a significant vulnerability or risk factor (Holmbeck & Shapera, 1999), while higher AEI skills were considered a significant promotive or protective factor (Holmbeck & Shapera, 1999) for VCE academic achievement. The VCE rank score is a statewide standardised academic assessment that is commonly used as a prerequisite for entry into tertiary education (VTAC, 2011). The practical effect of an increase or decrease in VCE points has a noteworthy impact on an individual student’s likelihood of meeting the entrance criteria into tertiary education, in addition to impacting on their subsequent entry into specific courses within tertiary education. The completion of tertiary education is a key predictor of adult employment from an Australian national perspective (ABS, 2011), therefore an individual’s VCE score is of significant practical importance to their tertiary educational options, adult employment and human capacity (COAG, 2011).

When considered from an educator’s perspective the positive predictive variance of AEI for VCE academic achievement is particularly important as EI is a variable that, to a degree, has been found to be malleable. For example, the increase of 4.13 points in VCE academic achievement for an increase of one standard deviation in AEI is discussed with reference to the RULER EI program by Reyes, Brackett, Rivers, Elbertson, and Salovey (2012). A pre-test and post-test of students in Year 5 and 6 over seven months of implementing the RULER EI program found improvements in social and emotional competence and academic achievement for the students who took part in the program, when compared to the control group (Reyes et al., 2012). The research evidence confirming improvements in EI after working on the RULER program support the concept that EI is, to a degree, malleable (Reyes et al., 2012). Therefore, the positive predictive variance of AEI for VCE academic achievement identified in the current study is a particularly significant finding, in light of the potential for EI to be improved with a classroom EI program (Reyes et al., 2012).
Further, currently there are 2,706 secondary schools in Australia (ABS, 2014), which are aiming to improve their current levels of VCE academic achievement and completion rates. Based on the findings of the current study an improvement of one standard deviation in AEI for a VCE cohort of students could equate to an improved median VCE score by 4.13 VCE points; therefore, an improvement in the school’s VCE statewide school ranking. For example, based on the 2013 Victorian VCE score school ranking for Victorian schools (Better Education, 2014), an improvement of 1 $SD$ in AEI in a secondary school currently ranked at 414th for VCE academic achievement, with a student enrolment of 337 and a median VCE score of 26, is anticipated to improve the median VCE score by approximately 30 VCE points. Therefore, the positive predictive effect of AEI for VCE academic achievement, beyond the simultaneous predictive effect of IQ and gender found in the current study has practical significance for Victorian schools aiming to improve their current median VCE academic achievement score at a statewide level. The importance of AEI for VCE academic achievement will now be discussed from a theoretical perspective in relation to the efficacy of including both AEI and IQ in models of intelligent behaviour.

5.3.3 Theoretical Perspective: Legitimacy of Including AEI in the Assessment of Intelligent Behaviour

From a theoretical perspective, the study finding provides evidence for the legitimacy of an integrative framework including both AEI and IQ for the assessment models of intelligent behaviour. The predictive and incremental validity of AEI for VCE academic achievement, beyond the effect of IQ and gender found in the current study, was supportive of the theoretical models of intelligent behaviour presented by a range of theorist such as Binet (1907), E. L. Thorndike (1920a), Wechsler (1943), (Sternberg et al., 2000), (H. Gardner, 1993a), and (Leuner, 1966).

The simultaneous predictive effect of AEI for VCE academic achievement, beyond that of IQ was also supportive of the assertion made by Binet (1907), that the individual’s psychological being was more effectively understood by including both one’s intellectual functioning and motive power. “Let us not separate the will from intelligence…” (Binet, 1907). The findings in this study confirmed the predictive variance of VCE academic achievement was more effectively accounted for with the
inclusion of both IQ and AEI in the adolescent population. This finding was consistent with Binet’s (1907) theoretical model, which asserted that an individual’s psychological function was more comprehensively accounted for by including both their intelligence and their will or desire, rather than focusing on intelligence in isolation.

Similarly, E. L. Thorndike (1920a) asserted the importance of dividing intelligence into abstract, mechanical and social intelligence, at the same time affirming the difficulty in measuring social intelligence, which was described as the “ability to understand and manage people”. Therefore, from a theoretical perspective the incremental validity of AEI, beyond the predictive effect of IQ (gf) in VCE academic achievement was also partially supportive of the model presented by Thorndike (1920a), who considered a person’s social and cognitive intelligence to be an integral factors in directing intelligent behaviour.

Wechsler (1943) also asserted that both intellective and the non-intellective factors were complementary rather than contradictory factors, which both contributed to intelligent behaviour. The simultaneous positive predictive variance of IQ and AEI for VCE academic achievement identified in the current study, was reflective of the importance of both intellective and non-intellective or AEI factors, which were evident in an “individual’s capacity for intelligent behaviour” (Wechsler, 1943). With reference to the model of intelligent behaviour outlined by Wechsler (1943), the current study’s finding indicated that two Year 12 adolescent students with identical IQ (gf), but with a difference of one standard deviation in their AEI, would differ in their VCE academic achievement by 4.13 points. Of the two students with comparable intelligence, the student with higher skills in AEI would attain a higher VCE score than their peer with lower AEI skills.

In addition, the simultaneous positive predictive effect of AEI and IQ for academic achievement is also, to a degree, supportive of contemporary intelligence models such as the theory of Practical Intelligence by Sternberg et al. (2000) and the theory of Multiple Intelligences presented by Gardner’s (1993b). The theoretical framework of practical intelligence outlined by Sternberg et al. (2000) asserted that intelligence encompassed the adaptive application of one’s intellect and learning from prior experience to optimise an individual’s goals. Further, the current findings are also
theoretically reflective of the valence of Gardner’s (1993a, 1993b) intrapersonal and interpersonal intelligence, as the ability to understand one’s own thoughts and to understand other people in social situations, respectively, and to use this to optimise one’s performance of actions, which has been formative to the development of models of EI (Salovey & Mayer, 1990).

Finally, from an EI theoretical perspective the psychometric validity of the positive main predictive effects of both AEI and IQ for VCE academic achievement identified in the total cohort, reflected the model of EI presented by Leuner (1966); whereby, higher competence in both EI and abstract reasoning were required in order for the individual to reach their optimal development or “emancipation”. Leuner (1966) described emancipation as the integration of an individual’s higher level of both EI and abstract reasoning, which enabled the individual to reach an optimal developmental level of integrated functioning.

In sum, the psychometric legitimacy of including the predictive effects of AEI and IQ (gf) for VCE academic achievement is affirmed in the current study. This finding is coherent with intelligence theorists who have asserted that abstract intelligence or gf and traits encompassed in emotional intelligence have the potential to provide a more comprehensive model of intelligent human behaviour; rather than through including abstract intelligence only (Binet, 1907; H. Gardner, 1993a; Leuner, 1966; Sternberg et al., 2000; E. L. Thorndike, 1920a; Wechsler, 1943). The main predictive effects of IQ, gender and AEI identified in the regression model will now be discussed in more detail.

5.4 Regression Model E: Main Predictive Effects for IQ, Gender and AEI

The current study found AEI provided a small and statistically significant positive predictive effect in VCE academic achievement for the total cohort, which was beyond the predictive effect of IQ and gender. The predictive effect of AEI accounted for an increase of 4.13 VCE score points per standard deviation in Year 12 students, who were in the late stage of adolescent development. The positive predictive variance of AEI for VCE academic achievement identified in the current study, was reflective of previous research on EI for academic achievement in the adolescent population (Downey, Mountstephen, et al., 2008; Fannin, 2001; Menzie, 2005; Parker, Creque, et al., 2004; Silveri et al., 2004; Stottlemyer, 2002; Szuberla, 2005). However, the findings from the
current study were only partially consistent with the previous research findings presented by Mestre et al. (2006).

Mestre et al. (2006) examined Spanish adolescents’ EI (N = 127) with two measures, trait and ability EI, and then investigated the relationship between EI and teacher ratings of academic achievement. The positive predictive effect of AEI for VCE academic achievement in the current study was consistent with the findings by Mestre et al. (2006) that indicated ability EI, measured by the MSCEIT: YV, was associated with academic achievement for males and females. In the current study, the relationship between AEI and academic achievement remained significant when taking into account the simultaneous predictive effect of IQ and gender. However, after Mestre et al. (2006) controlled for IQ and the Big Five personality traits, only the ability to understand and manage emotions remained significantly related to academic achievement in adolescent males, which was inconsistent with the findings in the current study.

Further, findings from the current study were in disparity with another section of research results presented by Mestre et al (2006), which found trait EI was not associated with academic achievement. In addition, the findings of this study for the total cohort were also in contrast to the research findings presented by Woitaszewski (2000), which did not find an association between EI and academic success in gifted students.

5.4.1 GLM Saturated Regression Model Main Effect: Intelligence

The main predictive effects of IQ, gender and AEI for VCE academic achievement are now discussed in more detail with reference to the total cohort, in light of the EI theoretical models and previous research findings.

5.4.1.1 Intelligence Key Finding 1: IQ Positively Predicts VCE Academic Achievement

The study findings confirmed that gf (Cattell, 1963; Spearman, 1923) as a measure of IQ, had a beta weight of .44 (β = .44, p < .001), which was higher than that of both gender (β = -.22, p < .001) and AEI (β = .21, p < .05); therefore, IQ (gf) was the strongest unique positive predictor of VCE academic achievement in the saturated regression model. Based on the findings from the current study, an increase in IQ (gf) of one standard deviation was predictive of an increase in VCE academic achievement by approximately 17 VCE points (B = 17.43). This finding was consistent with an extensive
body of research that has previously confirmed the positive predictive effect of Spearman’s (1904) “g” as representing the general common factor of intelligence, for academic achievement (Binet, 1916; Deary et al., 2007; Jensen, 1998; Kaufman et al., 2012; Neisser et al., 1996; Nisbett et al., 2012).

Research by Nisbett et al. (2012) and Jensen (1998) found the median validity coefficient of intelligence for educational achievement was approximately $r = .50$, accounting for 25% of the variance in academic achievement. In the current study a strong zero order correlation $r = .59$, p < .01 (two-tailed) was identified, which accounted for 35% of the variance in VCE academic achievement. The positive predictive effect of IQ for VCE academic achievement found in this study was also consistent with the neural efficiency hypothesis presented by Neisser et al. (1996). The neural efficiency hypothesis asserted that the higher the individual’s intelligence the more efficient they were at utilising their brain functionality in processing information (Neisser et al., 1996).

Research by Deary et al. (2007) found the correlation between intelligence (Spearman’s g) as measured by verbal, quantitative, and a non-verbal reasoning ability, with general educational achievement was $r = .81$ (65%). More recently, Kaufman et al. (2012) investigated the relationship between cognitive ability tests (COG-g) as measured by both verbal and non-verbal abilities in children and adolescents with academic achievement tests (ACH-g). The analysis confirmed that verbal (gc) and non-verbal (gf) tests of cognitive ability measured separate constructs, which were also highly related, with an overall mean correlation coefficient of $r = .83$ (68%) ($Mdn = .80$, [CI .77, .88]). Kaufman et al. (2012) found measures of intelligence that incorporated gc with verbal components, generally had higher correlations with factors such as verbal comprehension, which are fundamental to academic achievement. Therefore, it is possible that the discriminant validity of IQ and its relationship to AEI may be influenced by the verbal (gc) or non-verbal (gf) construct of IQ selected for the analysis, which is now discussed in the following section.

5.4.1.2 Intelligence Key Finding 2: A Discriminate Validity Between IQ and AEI

An analysis of the beta weights confirmed AEI and IQ (gf) contributed main effects to the predictive variance of VCE academic achievement, with no significant
interactional effects between the variables evident in the GLM saturated regression model. Hence, in this study the main effect of IQ as measured by $gf$ and the main effect of AEI based on the trait model of EI (Luebbers et al., 2007), independently contributed main effects to the positive predictive variance of VCE academic achievement. Therefore, findings from this study confirmed the discriminant validity between IQ ($gf$) and AEI, with unique main effects for each construct and a small component of shared variance.

The discriminant validity between IQ and AEI identified in the current study concurred with the research by Woitaszewski (2000), which also found there was discriminant validity between IQ and EI in the adolescent population. Three other studies in the adolescent population found moderate correlations between IQ and EI, but nonetheless, concluded the correlations were low enough to ensure there was significant discriminant validity between the constructs. First, Di Fabio and Palazzeschi (2009) noted IQ was discriminable from EI, as it was moderately correlated to both EI based on the ability model (MSCEIT Total Score) $r = 31, p < .01$ and the trait model (Bar-On Total Score) $r = 22, p < .05$ measures. Second, Gil-Olarte et al. (2006) also identified discriminant validity between the variables IQ and EI as measured by the MSCEIT, with a moderate correlation between verbal intelligence $r = 31, p \leq .05$, however, not with general intelligence. Third, Peters et al. (2009) found the correlation between EI (MSCEIT Total Score) and IQ to be moderate $r = 35, p \leq .05$; while the correlation between the EQi: YV and IQ was unreported. Further, the findings from the current study were also consistent with the adult population, which reported correlations that ranged from non-significant to moderate while confirming the discriminant validity of IQ and EI (Bar-On, 1997b; Derksen, Kramer, & Katzko, 2002; Mayer, Caruso, et al., 1999; Newsome, Day, & Catano, 2000; Saklofske, Austin, & Minski, 2003; Schutte et al., 1998).

The small component of shared variance reflected weak correlational relationship between identified IQ ($gf$) and AEI, which was statistically insignificant ($r = .07, p = ns$) and hence did not make a psychometrically significant contribution to the final GLM saturated regression model. It is plausible that the weak correlational relationship between IQ ($gf$) and AEI found in the current study may be understood in light of the
research by Austin (2005). In an examination of the relationship between self-report EI, emotional task performance, non-emotional task performance and psychometric intelligence measured by \( gf \), Austin (2005) found the associations between these variables was accounted for by two correlated factors entitled a “speed” factor and an “emotional” factor, which suggested that performance on emotion-related tasks could be associated to information-processing approach to psychometric intelligence. Therefore, it is possible that the statistically insignificant shared variance between IQ \( (gf) \) and AEI in VCE academic achievement in the current study may have been reflective of a weak but underlying correlational relationship between AEI and IQ \( (gf) \) that was not strong enough to be evident in the final regression model. The relationship between IQ and gender in the GLM saturated regression model is now discussed.

5.4.1.3 Intelligence Key Finding 3: IQ Is Not Differentiated by Gender

In this study, IQ was measured with the Raven’s Standard Progressive Matrices (De Lemos, 1995), which provided a measure of \( gf \). A Pearson product-moment correlation was conducted between the \( gf \) of adolescent males \( (M_{IQ} = 110, n = 224) \) and adolescent females \( (M_{IQ} = 107, n = 145) \). The results of the correlation indicated there was not a statically significant difference between the mean IQ scores of the males and females \( (r = .09, p = ns) \). However, the simultaneous saturated regression analysis identified a significant correlation between IQ x Gender \( (r = .15, p < .05, r^2 = 22.5\%) \), which did not subsequently prove strong enough for inclusion in the final regression model. The insignificant correlation found between IQ and gender in the regression model may have been reflective of an underlying relationship between gender and \( gf \) in the model, which may have contributed to the shared variance between IQ and gender in the model. Therefore, it is concluded there was not a significant difference between the mean intelligence levels of the males and females in this study.

In the current study the lack of gender differentiation in Year 12 adolescent \( gf \) was consistent with the research presented by Jensen (1998), which concluded the overall intellectual capacity of males and females was not significantly differentiated by gender. However, Jensen (1998) also concluded intelligence scores for adolescent males and females were contextualised by the cognitive developmental differences in gender. Jensen (1998) found males had stronger spatial/visualisation skills than females, while
females had stronger verbal skills than males. In addition, females typically had higher verbal, perceptual, fluency, memory and literacy skills than males (Nisbett et al., 2012). Males also typically had higher levels of stuttering, dyslexia and autism, relative to females (Nisbett et al., 2012). Ramsden et al. (2011) also found adolescent sensorimotor development associated with the development of verbal IQ and performance IQ was differentiated. It was speculated that the differences in sensorimotor development may be reflective of some of the variance found between measures of crystal intelligence ($g_c$) and fluid intelligence ($g_f$) in adolescent development. Hence, Ramsden et al. (2011) found that there were developmental differences in adolescent verbal IQ and performance IQ, which were consistent with the differences in intellectual skills found in adolescent males and females. Therefore, while there was not a significant gender difference in the IQ ($g_f$) scores of the adolescents in the current study, it is acknowledged that adolescent developmental differences in males and females may uniquely contribute to their IQ total score.

5.4.2 Model Main Effect: Gender

The second strongest predictor in the saturated regression model was gender, which was negatively predictive of 3% of the unique variance in VCE academic achievement. Gender was a dichotomous variable, therefore, dummy coding for males = 1 and females = 0 was utilised, in order to incorporate the variable gender into the simultaneous saturated regression equation (Calvin et al., 2010). The inclusion of gender in the current saturated regression model would necessarily identify any shared predictive effects of gender with AEI and IQ. As previously discussed, at the correlational level of the simultaneous saturated regression analysis, there were two small correlational interactions between Gender x AEI ($r = -.11, p < .05$), and Gender x IQ ($r = .15, p < .05$), which did not reach a statistically significant level for inclusion in the final model, and provided potential evidence of underlying relationships in the saturated regression model. Therefore, the saturated regression model excluded the shared gender effects from the unique predictive effect of AEI and IQ for VCE academic achievement. A review of the beta weight for gender ($\beta = -.22, p < .001$) confirmed its main negative predictive effect that uniquely accounted for the variance in VCE academic achievement, beyond that of simultaneous predictive effects of IQ and AEI.
5.4.2.1 Gender Key Finding 4: Gender Predicts VCE Academic Achievement and Females Outperform Males

In the current study, female adolescents were found to have higher VCE academic achievement than males. An independent samples t-test found the adolescent females’ mean VCE rank score of 76.47 was statistically significantly higher than the adolescent males mean VCE rank score of 70.8. The simultaneous predictive effect of gender for VCE academic achievement found in this study also concurred with previous research from the ABS (2011) that confirmed the current trend of adolescent females attaining a higher level of academic achievement than adolescent males. The gender differences among students in secondary school found in this study suggest that relative to adolescent females, adolescent males are at an increased educational risk for academic under-performance. This finding is reflective of a wider Australian trend for adolescent males, in comparison to adolescent females, experiencing high levels of academic, social/emotional and behavioural problems in secondary school (Van de gaer et al., 2009).

In addition, an OECD analysis of 34 countries educational results found gender differences in their secondary school completion rates whereby, for the first time in history, females were more likely to complete their secondary education than males (OECD, 2014). Gender differences in tertiary educational attainment rates have also followed this trend; in 2012, 34% of females had attained a tertiary education in contrast to 31% of males (OECD, 2013a). This finding was contextualised with the Australian OECD Programme for International Student Assessment’s (PISA) 2009 scores for 15-year-olds, which indicated males scored 37 points less than females in Reading, but had higher academic performance in Mathematics (OECD, 2013b). Hence, the gender differentiation found in the current study was consistent with previous research that also identified a trend for females to outperform males in academic achievement. The discriminant validity of gender and AEI in the current study is now discussed.

5.4.2.2 Gender Key Finding 5: IQ Does Not Account for Gender Differences in VCE Academic Achievement

As previously outlined, an examination of the Australian Year 12 students’ VCE academic achievement in the current study identified a significant gender difference.
However, an analysis of the male and female Year 12 students’ IQ measured by $gf$ did not find a significant gender effect. Therefore, it was concluded that IQ ($gf$) did not adequately account for the gender differences in VCE academic achievement of the students in this study. This finding was consistent with the previous research results for British adolescents by Calvin et al. (2010), who investigated the relationship between IQ and academic achievement of 11-year-old-students ($N = 175,599$) in the United Kingdom. Calvin et al. (2010) found adolescents’ academic achievement was differentiated by gender. However, a review of the British students’ IQ did not find evidence of gender differentiation. Therefore, Calvin et al. (2010) noted that the adolescent gender differentiation in academic achievement, could not be explained by gender differentiation in the intelligence of British adolescent students in their final year of secondary school and noted the variance in the educational gender gap was yet to be adequately accounted for. The discriminate validity between gender and AEI in the current study is now discussed.

5.4.2.3 Gender Key Finding 6: The Discriminate Validity Between Gender and AEI

In the current study an analysis of the model partial effects also found VCE academic achievement was most strongly and positively correlated with IQ ($r = .45, 20\%$); the second strongest positive correlation was with AEI ($r = .21, 4.4\%$); and the third strongest negative correlation was with gender ($r = -.14, 2.0\%$). A comparative analysis of predictive effects of gender and AEI are outlined. An analysis of the effects of AEI in the GLM model found the small predictive variance of 1% accounted for by AEI was inconsistent with the larger effect sizes identified in the beta weight effect ($\beta = .21$), correlational effect ($r = .21, 4.4\%$), and total effect accounting for 15.1% of the variance in $R^2$ in the model. In contrast, an analysis of the effects of gender in the GLM model found the medium predictive variance of 3% accounted for by gender was inconsistent with the smaller effect sizes identified in the beta weight effect ($\beta = -.22$), correlational effect ($r = -.14, 2\%$), and total effect accounting for 10.3% of the variance in $R^2$ in the model. Therefore, future research should continue this exploration in more detail. The predictive effect of AEI for VCE academic achievement is now considered.
5.4.3 Model Main Effect: AEI

Research Question: Is AEI Associated with Academic Achievement?

The simultaneous positive predictive effect of AEI uniquely accounted for 1% of the variance in VCE academic achievement, which was beyond the unique predictive effect of IQ and gender. AEI had a beta weight of .21 ($\beta = .21, p < .05$), which was lower than that of gender ($\beta = -.22, p < .001$) and IQ ($\beta = .44, p < .001$). Therefore, AEI was the third strongest predictor of VCE academic achievement in the saturated regression model. AEI also contributed to the shared variance in the model. A positive zero-order correlation between AEI and VCE academic achievement of $r = .21$ was identified and when squared, AEI accounted for 4.4% of the variance in VCE academic achievement; this relationship was reduced by 3.4% in the final regression model. The unique variance accounted for by AEI in the model of 1%, was relatively smaller but consistent with previous research in the adolescent population that identified a small to moderate association between EI and academic achievement (Downey, Mountstephen, et al., 2008; Farooq, 2003; Menzie, 2005; Parker, Creque, et al., 2004). The positive predictive effect of AEI for VCE academic achievement in the current study $\beta = .21$, was also positively consistent with the meta-analysis findings for trait EI in academic achievement $r = .30$ identified by Perera and DiGiacomo (2013).

5.4.3.1 AEI Key Finding 7: AEI Positively Predicts VCE Academic Achievement

The degree to which AEI uniquely predicted VCE academic achievement in the current study was in contrast to the earlier assertion by Goleman (1995) that EI was a stronger predictor of academic achievement than IQ. Typically, intelligence has been found to typically be predictive of 25% of the variance in academic achievement (Jensen, 1998). The current study findings did not examine academic achievement based on individual curriculum subjects; therefore, the findings from the current study were partially supportive of the mixed findings identified by Peters et al. (2009). The positive predictive effect of AEI for VCE academic achievement identified in the current study was consistent with research by Peters et al. (2009) that found a positive correlation between EI measured by the MSCEIT: YV and Reading. Nonetheless, the positive predictive effect of AEI for VCE academic achievement in the current study was
inconsistent with the insignificant correlation found between EI measured by the MSCEIT: YV and Mathematics found by Peters et al. (2009).

Further, an examination of the coefficient found AEI was positively predictive of VCE academic achievement ($\beta = .21, p < .05$), which was comparable to that of gender ($\beta = -.22, p < .001$), and was in disparity to the predictive effect of AEI and gender accounting for 1% and 3%, respectively, in the final regression model. The predictive effect of AEI for academic achievement in the final model was statistically reliable, however, the possibility of gender providing an underlying confounding effect on the predictive effect of AEI for academic achievement in the regression model is considered and warrants further research to determine the nature of this relationship.

5.4.3.2 AEI Key Finding 8: AEI is Differentiated by Gender

Research Question: Are there differences in male and female AEI?

An independent samples $t$-test found there was a statically significant difference in the mean AEI of the males ($M = 48.74_{AEI}$) and females ($M = 53.33_{AEI}$) in this study, with females having a higher AEI than males. The gender difference in AEI found in the current study indicating females had higher average AEI than males was consistent with previous research on the adolescent population (Chong Abdullah et al., 2004; Ciarrochi et al., 2001; Harrod & Scheer, 2005; Hassan et al., 2009; Luebbers et al., 2007; Murphy, 2005; Parker et al., 2005; Salguero et al., 2010; Stottlemyer, 2002; Tapia & Marsh, 2006). While the gender effect found in VCE academic achievement could not be attributed to IQ, a consistent gender effect was identified in AEI. A review of the regression equation indicated the beta weights for gender ($\beta = -.22$) and AEI ($\beta = .21$) were comparable. In contrast, the main predictive effect of gender 3% was larger than AEI 1%. Therefore, a discrepancy was identified and the similarity between the beta weights of gender and AEI was in disparity with the difference between the larger unique negative predictive effect of 3% for gender and the smaller unique positive predictive effect of 1% for AEI. This discrepancy in predictive effects could be reflective of a number of factors. One plausible explanation is that the variable gender provided a partial confounding or suppressive effect on the predictive variance of AEI for VCE academic achievement in the model (Nathans et al., 2012). Another plausible explanation is that there was a large shared variance between gender and AEI (Field, 2009). While it is
beyond the scope of the current study to determine the efficacy of these possibilities, the relationship between gender and AEI is subsequently discussed in more detail and warrants consideration in future research.

In addition, Jaušovec and Jaušovec (2005) reviewed psychological and neural correlates of EI, and the research findings also found females had slightly higher EI scores than males. Tapia and Marsh (2006) suggested the gender differentiation found in EI may be understood with reference to the “Empathizing-Systemizing Theory” by Baron-Cohen (2005). The Empathizing-Systemizing Theory suggests both personality and individual gender differentiation in brain activity were correlated to individual differences in EI, as manifested differentially in males and females. In addition, gender differentiation may be influenced by cultural and social norms for gender roles in Western societies. Therefore, the gender differentiation identified in AEI in the current study, was consistent with previous research findings in the adolescent population, neurological research by Jaušovec and Jaušovec (2005) and the Empathizing-Systemizing Theory by Baron-Cohen (2005). Further, the gender differences found in the adolescent population were also found in the adult population, with females having higher EI skills than males (Brackett, Warner, & Bosco, 2005; Mayer, Caruso, et al., 1999; Mayer et al., 2002b; Palmer, Gignac, Manocha, & Stough, 2005; Petrides & Furnham, 2000a; Saklofske et al., 2003).

5.4.3.3 AEI Key Finding 9: AEI Main Predictive Effect vs. AEI Interaction with IQ

The positive predictive variance of AEI for VCE academic achievement, beyond the simultaneous unique predictive variance of IQ and gender, is now considered in relation to previous research findings. A comparison of the current study with the seminal research by Petrides et al. (2004) found that the findings of both studies shared commonalities, however, they also differed in some respects. Both studies included a measure of trait EI, the current study used the SUEIT: A and Petrides et al. (2004) used the TEIQue. The positive predictive effect of AEI and IQ for VCE academic achievement identified in the current study was supportive of the positive predictive effect of trait EI and IQ for English and the GCSE academic achievement in British secondary school students seminally identified by Petrides et al. (2004). However, the positive main effect
found for AEI and IQ in the current study contrasted with the positive bilinear interaction effect found by Petrides et al. (2004), where the effects of trait EI on academic achievement varied as a bilinear function of adolescent IQ scores. The similarities and differences in the predictive effects of AEI and IQ for academic achievement found in both studies may be explained by a number of possible factors.

First, in light of the research presented by Kaufman et al. (2012) that indicated the differentiation in measures of \(gf\) and \(gc\) for academic achievement, it is possible that the different measures of intelligence used in each study may have impacted on the nature of the relationship between IQ and academic achievement. Petrides et al. (2004) used a measure of verbal intelligence (\(gc\)) to determine IQ in British adolescents, whereas the current study used a measure of fluid intelligence (\(gf\)) to determine IQ in Australian adolescents. Petrides et al. (2004) found \(gc\) correlated very highly with the two measures of academic achievement: the KS3 (84%) directly and the GCSE (76%) indirectly. Whereas, in the current study, a zero-order correlation indicated \(gf\) accounted for 35% of the variance VCE academic achievement, and therefore was moderately correlated with academic achievement. Therein, it is possible that the different measures of \(gf\) and \(gc\) partially influenced the differences in the predictive variance of IQ for the Year 12 Australian and British students’ academic achievement.

Second, it is possible that the different measures of intelligence used in each study may have also impacted on the nature of the relationship between AEI and IQ, which consequently differentiated the nature of the predictive effect of AEI and IQ for adolescent academic achievement. In the current study \(gf\) was not significantly correlated to AEI \((r = .07, p = ns)\), hence confirming the independent validity of both constructs. In contrast, Petrides et al. (2004) conducted a hierarchical regression analysis and found a statistically significant interaction between IQ(\(gc\)) and trait EI for both English and GCSE.

Third, in the current study a GLM simultaneous saturated regression model was used to analyse the data. In contrast, in the study developed by Petrides et al. (2004) a hierarchical regression model was utilised to the analyse the data. The differences between the simultaneous saturated regression model used in the current study and the hierarchical regression model used by Petrides et al. (2004) for the data analysis, may
also have partially contributed to the differences in the main predictive effect of AEI and IQ for academic achievement in secondary school students.

Di Fabio and Palazzeschi (2009) also used a hierarchical regression model to examine the role of EI in adolescent academic achievement in secondary school students. Di Fabio and Palazzeschi (2009) examined Italian adolescents \( (N = 124) \) who were completing the last two years of secondary school. The study aimed to determine the role of fluid intelligence \((gf)\), personality traits and EI (with both EI ability and trait measures) for academic achievement determined by their GPAs, which were derived from teachers’ grades. A hierarchical regression was conducted and confirmed IQ \((gf)\), as measured by the Advanced Progressive Matrices, was positively predictive of academic achievement and accounted for 10% of academic success in the first step of the model; personality traits accounted for an incremental 5% of the variance in the second step of the model; the MSCEIT total score accounted for an incremental 7% of the variance and the Bar-On EQ-i:S total score accounted for an incremental 5% of the variance in the third step of the model. Therefore, in contrast to the interactive effect identified by Petrides et al. (2004) in British secondary school students, both the current study using a simultaneous saturated regression model in Australian adolescents attending secondary school and the study by Di Fabio and Palazzeschi (2009) using a hierarchical regression in Italian adolescents in secondary school, found AEI had a main predictive effect for secondary school academic achievement, which was incremental to the predictive effect of IQ measured as \(gf\).

In addition, Gil-Olarte et al. (2006) investigated the role of EI and IQ for academic achievement in Spanish secondary school students \((N = 77)\) who were aged between 14 years and 17 years old. Zero-order correlations and partial correlations were used to analyse the data, therefore it was not possible to determine if there was an interaction effect in the relationship between AEI and IQ for academic achievement. However, Gil-Olarte et al. (2006) included a measure of \(gc\), which enabled this discussion to compare the findings to that of Petrides et al. (2004) who also used a measure of \(gc\) to determine IQ. Intelligence was measured with the test of Factorial General Intelligence, which incorporated verbal, numerical and spatial reasoning, therefore using a measure of IQ that incorporated both \(gf\) and \(gc\). EI was based on the
ability model and was measured using the MSCEIT V. 20 (Spanish version). Final grades were obtained from the school and were utilised as the GPA as a measure of students’ academic achievement. The Big Five personality traits and a social competence inventory were also measured. The MSCEIT was moderately correlated to verbal intelligence or gc ($r = .31, p = < .05$); however, it was not correlated to general intelligence, which included measures of both $gf$ and $gc$. The MSCEIT was correlated with adolescent students’ GPA ($r = .46, p = < .01$) and remained correlated to adolescent students’ GPA when verbal intelligence was controlled ($r = .43, p = < .01$). The results of the partial correlation indicated that $gc$ did not have an overtly strong relationship with AEI, and therefore did not really provide any further insight into the interaction between AEI and IQ previously identified by Petrides et al. (2004). Nonetheless, the results found in the current study of Australian adolescents was consistent with the research results obtained by Gil-Olarte et al. (2006) for Spanish adolescents, Di Fabio and Palazzeschi (2009) for Italian adolescents, and Petrides et al. (2004) for British adolescents; finding AEI was a significant factor in academic achievement beyond the predictive effect of IQ, in secondary school students.

Fourth, there was a difference in the age and grade level of the current Australian study and the British cohort investigated by Petrides et al. (2004); the Australian cohort was in Year 12 and the British cohort in Year 11, which was equivalent to an Australian Year 9 level. Steinberg (2011b) suggested the structure and the function of the brain change during adolescence led to changes in adolescent thinking, feeling, learning and behaviour. With reference to the gradual maturation of the adolescent brain, the disparity in the maturation of the emotional system, i.e. stimulating heightened sensation-seeking, in comparison to the slower maturing cognitive system, i.e. stimulating impulse control and reasoning (Steinberg, 2011b) is at the greatest when students are in Year 9 in the Australian educational system or in Year 11 in the British educational system. The British students ($M_{age} = 16.5$ years) were approximately a year younger than the Australian students ($M_{age} = 17.7$ years). Therefore, it is possible the British adolescents’ cognition was more strongly influenced by their AEI due to the larger disparity in the maturation of cognitive system and emotional system at their stage of adolescent development, which may have partially contributed to the interaction effect identified between IQ and EI.
Whereas, the Australian adolescents in the current study were approximately a year older than the British cohort and completing their final year of secondary school, therefore the Australian students may have been marginally more mature with less disparity between the maturation of their cognitive system and emotional systems. Hence, it is possible that the differences in adolescent brain maturation and stages of adolescent development may have partially contributed to the differences in the predictive effect of EI and IQ for academic achievement found between the bilinear interaction effect discovered by Petrides et al. (2004) and the main predictive effect of AEI and IQ found in the current study.

5.5 Major Finding Two: Psychometric Validity is Increased by Including Both IQ and AEI to Predictive VCE Academic Achievement

The research findings confirmed the psychometric validity of including both IQ (gf) and AEI to determine the predictive variance of VCE academic achievement, rather than by using a psychometric measure of g (Spearman, 1904) in isolation, which has traditionally been the case (Nisbett et al., 2012). Therefore, the second major finding in this study was that VCE academic achievement was more effectively and meaningfully predicted with the inclusion of both IQ (gf) and AEI, which positively predicted 17.43 and 4.13 VCE rank percentile points per standard deviation, respectively. This finding was coherent with previous research by Bar-On (2006), who also asserted that including both EQ and IQ presented a model that was more comprehensive in providing a balanced estimation of an individual’s general intelligence.

In addition, the psychometric validity of including both IQ and AEI to predict academic achievement found in the current study was consistent with the meta-analytic review by Perera and DiGiacomo (2013), who also found academic achievement was more effectively predicted with the inclusion of both IQ and trait EI in the childhood, adolescent and adult populations. Importantly, as suggested by Perera and DiGiacomo (2013), the failure to include both an affective measure and a measure of IQ would impede the identification of students who were academically or emotionally at risk. In the current study, the failure to include the predictive effect of both of AEI and IQ would prevent the early detection of students educationally at risk in VCE due to low AEI.
competence, low IQ or both low AEI and IQ. The identification of students with lower AEI competencies and/or low IQ may plausibly enable the teacher to specifically target and support each student’s AEI and IQ developmental needs in the VCE curriculum, thereby optimising their potential engagement in the learning process and optimise their VCE academic achievement.

In particular, the General Achievement Test (GAT) has traditionally incorporated measures of \( gf \) and \( gc \) to provide a psychometric assessment of a student’s intelligence and, therefore, their potential level of academic achievement in VCE (VCAA, 2014). Based on the predictive variance of AEI identified in this study, which was beyond the simultaneous effect or IQ and gender, the psychometric validity of the current GLM of the GAT could be improved by including a measure of AEI with the current measures of IQ (\( gf \) and \( gc \)). The inclusion of both AEI and IQ (\( gf \) and \( gc \)) was anticipated to improve the psychometric validity of the current GAT model and to provide a measure, which had increased real-world relevance, and functional information that could be utilised diagnostically by teaching staff. Educators have been increasingly challenged to provide evaluation and assessment policy to improve educational outcomes by “…providing clear information on the strengths and weaknesses of schools and on best practices to help achieve objectives” (OECD, 2013b). The psychometric validity of incorporating both IQ and AEI identified in the current study has implications for the current regime of psychoeducational assessment policy and practice in Australian curriculum and diagnostic assessment methodological approach to assess academic achievement (OECD, 2013b). Similarly, the psychometric validity of including both AEI and IQ in the assessment of VCE academic achievement in Year 12 students is relevant to the current assessment practices in the OECD countries that are comparable to Australia (OECD, 2013a).

The discussion of the main effects of AEI, IQ and gender for VCE academic achievement for the total study cohort is now complete. The individual differences in the predictive effect of AEI for VCE academic achievement will now be discussed in the four IQ and gender combination groups.
5.6 Major Finding Three: The Predictive Effect of AEI for VCE Academic Achievement in IQ and Gender in Combination Groups Was Heterogeneous

**Research Question:** Are there individual differences in the simultaneous predictive effects of AEI, IQ and gender for academic achievement?

An examination of the individual differences in the predictive variance of AEI for VCE academic achievement, subject to developmental differences in IQ and gender, was conducted. The simultaneous predictive effect of AEI for VCE academic achievement was positively predictive of 5.5 VCE points per $SD$ in the male low group; 4.3 VCE points per $SD$ in the female low group; and 2.1 VCE points per $SD$ in the male high group. Therefore, as AEI scores increased in the male low group, female low group and male high group, so too did their VCE academic achievement. In contrast, the female high group’s AEI was negatively predictive of VCE academic achievement, indicating a subtle decline of -0.7 VCE points per $SD$, as AEI increased. Consequently, the study findings did identify individual differences in the simultaneous predictive effect of AEI, IQ and gender for VCE academic achievement.

Therefore, the **third major finding** of this study was that the predictive effect of AEI was heterogeneous for VCE academic achievement in the IQ and gender combination groups.

**5.6.1 AEI Key Finding 10: Heterogeneous Predictive Effect of AEI**

Based on the regression model main effect for AEI, IQ and gender, it was predicted that the highest academic achievers in VCE would be Year 12 students who had the highest intelligence, were female and had the highest AEI. Further, based on the regression main effects, it was predicted that the lowest academic achievers in VCE would be Year 12 students who had the lowest intelligence, were male and had the lowest AEI. An analysis of the main simultaneous positive predictive effects of AEI for VCE academic achievement in the IQ and gender groups were both consistent and inconsistent with the predicted effects determined by the regression model.

The positive predictive variance of AEI for VCE academic achievement in the male low group was 5.5 VCE points per $SD$, which was approximately 1.2 VCE points
above the predicted average of 4.13 VCE points per SD for the total cohort. The female low group attained 4.3 VCE points per SD, which was only 0.2 VCE points above the total cohort predicted average of 4.13 VCE points per SD. However, the predictive effect of AEI for VCE academic achievement in the male high group of 2.1 VCE points per SD was approximately 2 VCE points lower than 4.13 VCE points per SD, which was expected based on the model main effect. In addition, the female high group was inconsistent with the positive main effects in the model of 4.13 VCE points per SD, showing a slight decline of -0.7 VCE points per standard deviation increase in AEI, which was approximately 4.3 VCE points lower than predicted based on the cohort average. The pattern of findings in the current study were compared to the pattern of results identified by Petrides et al. (2004), and the comparison revealed both consistent and inconsistent findings, which are discussed further.

Petrides et al. (2004) found that the positive bilinear interaction effect between IQ and trait EI (where the effects of trait EI differed as a linear function of IQ), reversed at approximately 1 SD above the mean for the cohort for the English Exam Mark (IQ128.2) and for GCSE Marks (IQ130.9); thereafter, the trait EI scores became negative. Therefore, based on the bilinear Simple Slopes Data Plots, Petrides et al. (2004) concluded trait EI scores beyond the intersections of IQ128 for English and IQ130 for GCSE were irrelevant to academic performance. The findings from the current study also identified similar trends to those identified in the research by Petrides et al. (2004).

First, the findings for the male and female low group were consistent with the seminal research by Petrides et al. (2004). These results were supportive of the assertion made by Petrides et al. (2004) that those with less intellectual acumen would potentially experience higher levels of stress and consequently utilise higher levels of AEI in addressing the demands of their academic achievement. The inclusion of gender in the current study extended the seminal research by Petrides et al. (2004), finding the predictive effect of AEI was differentiated by gender with AEI having a stronger predictive effect in adolescent males than in adolescent females with fluid intelligence ≤ IQ 114.

Second, research by Petrides et al. (2004) identified a negative predictive effect for AEI commencing at IQ 128–130. The current findings also identified a negative
predictive effect for AEI in VCE academic achievement, however this was only the case for the female high group with fluid intelligence ≥ IQ115. While the male high group had a weaker positive predictive effect for VCE academic achievement than the average predictive effect for the cohort, it was not negative, which was inconsistent with the previous research findings presented by Petrides et al. (2004). The current research findings partially supported the negative trend in the predictive effect of trait EI identified by Petrides et al. (2004), while further clarifying the negative predictive effect of AEI for academic achievement to be differentiated by gender, which was most significantly evident in the female high group.

Therefore, the consistencies and inconsistencies found in the individual differences in the IQ and gender combination groups when analysed with the total cohort main effects and the previous research by Petrides et al. (2004) led the researcher to review the data pertaining to the predictive effect of AEI for VCE academic achievement in the current study. The data was reviewed in order to identify possible patterns in the data, pathways or mechanisms underlying the positive predictive effect that was strongest in the male low group, then incrementally declined in the female low group, male high group and female high group.

5.6.2 AEI Key Finding 11: AEI Mean Score as a Possible Antecedent for the Predictive Effect of AEI for VCE Academic Achievement

There could be a range of plausible explanations that may have partially contributed to the heterogeneous differences identified in the predictive effect of AEI for VCE academic achievement in the IQ and gender combination groups. One possible explanation stems from the interesting finding that while the predictive effect of AEI in the female high group’s VCE academic achievement was the lowest of the four groups, in contrast the female high group’s AEI mean score was the highest of the four groups. With reference to the cognitive-motivational-relational theory of emotion developed by Lazarus (1993b), this AEI developmental pattern may be suggestive that the female high group’s AEI mean score was indicative of their AEI capacity, acting as an antecedent to reflect the adolescent’s psychosocial wellbeing, which indirectly influenced the direct predictive effect of AEI for VCE academic achievement. Speculatively, if the female high group’s AEI mean score was taken into consideration, this pattern would be more
consistent with the positive predictive effect of AEI for VCE academic achievement, which was identified in the regression model for the total cohort.

The pattern of results found in the female high group led to a review of the AEI mean scores and the AEI predictive effect in the four IQ and gender combination groups. Table 5.1 presents the four groups: (a) AEI mean score and (b) the predictive variance of AEI for VCE academic achievement. The four groups are ranked in order of highest to lowest, first by their AEI mean score and second by the degree to which AEI was significantly predictive of their VCE academic achievement.

Table 5.1.
IQ and Gender Combination Groups: Ranked Highest to Lowest AEI Mean Score and AEI Predictive Effect for VCE Academic Achievement

<table>
<thead>
<tr>
<th>AEI Mean Percentile Score</th>
<th>AEI Predictive Variance for VCE Academic Achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Female High Group</td>
<td>1. Male Low Group</td>
</tr>
<tr>
<td>((n = 48, M = 56.3, SD = 18.5))</td>
<td>Predicted VCE Score per (SD) 5.5</td>
</tr>
<tr>
<td>2. Female Low Group</td>
<td>2. Female Low Group</td>
</tr>
<tr>
<td>((n = 97, M = 51.6, SD = 16.9))</td>
<td>Predicted VCE Score per (SD) 4.1</td>
</tr>
<tr>
<td>((n = 106, M = 48.99, SD = 18.0))</td>
<td>Predicted VCE Score per (SD) 2.1</td>
</tr>
<tr>
<td>4. Male Low Group</td>
<td>4. Female High Group</td>
</tr>
<tr>
<td>((n = 116, M = 48.50, SD = 17.7))</td>
<td>Predicted VCE Score per (SD) -0.7</td>
</tr>
</tbody>
</table>

As presented in Table 5.1 the pattern of individual differences in the AEI mean score and simultaneous predictive effect of AEI for VCE academic achievement is more clearly contextualised when referenced in the rank order of each group’s (a) AEI mean
trait score (as a stable factor encompassing the adolescents’ total competencies, which act as an antecedent and a component of the adolescents’ appraisal); and (b) the simultaneous predictive variance of AEI for VCE academic achievement (as a proportion of the individual’s AEI mean score, a state factor that varies over time and is stimulated by the outcome of the individual’s appraisal of their ability to utilise their resources to meet the demands of VCE academic achievement in a secondary school setting) based on what an individual sees as harmful, threatening or beneficial (Lazarus, 1993b) to their survival (Darwin, 1872). The individual differences in the simultaneous predictive variance of AEI for VCE academic achievement in the IQ and gender combination groups, were further informed with a review of the pattern in the AEI mean score and the AEI predictive variance for VCE academic achievement for each group. While there is not a psychometric relationship between the IQ and gender combination groups AEI mean score and the predictive effect of AEI for VCE academic achievement, a review of the AEI mean scores provides further developmental information in the adolescent cohort to contextualise the role of the predictive effect of AEI in VCE academic achievement.

5.6.2.1 AEI Mean Score

The IQ and gender combination group’s AEI mean score was theorised to be indicative of the students’ total AEI competency (Ciarrochi et al., 2001; Mayer, Salovey, et al., 2000c; Petrides & Furnham, 2000b; Schutte, Malouff, Simunek, McKenley, & Hollander, 2002). Based on the ecology of human development by Bronfenbrenner (1977) AEI mean score was classified as a personal resource, which may be adaptively utilised in the individual’s appraisal of their ability to use their resources to meet the demands of VCE academic achievement. Further, with reference to the appraisal process outlined by Frijda (1988) the IQ and gender combination groups’ AEI mean score was theorised to act as first, an antecedent of the adolescents’ appraisal and second, as a component of the adolescents’ appraisal; which collectively may potentially have indirectly influenced the predictive effect of AEI for VCE academic achievement.

Higher levels of CEI and AEI have been positively associated with pro-social behaviours (Charbonneau & Nicol, 2002b), resiliency (Edward & Warelow, 2005), children’s positive school peer relationships (Petrides et al., 2006), happiness (Furnham & Petrides, 2003), and wellbeing and health (Austin, Saklofske, & Egan, 2005).
Collectively, the individual’s level of AEI competency may have acted as a positive antecedent, which indirectly supported the adolescent students’ psychosocial wellbeing and their ability to be ready to learn (Vygotsky, 1978) and therefore, to engage in learning processes to build upon their current level of competency by increasing their mastery or understanding of concepts or skills, formative to the attainment of VCE academic achievement.

Conversely, lower levels of AEI in adolescence have been negatively associated with lower levels of psychological health (Day, Therrien, & Carroll, 2005), problem behaviours in adolescents (Siu, 2009), anxiety and depression (Fernández-Berrocal et al., 2006), alexithymia (Fukunishi, Wise, & Sheridan, 2001), tobacco and alcohol use (Trinidad & Anderson Johnson, 2002), and subject fatigue (Brown & Schutte, 2006). Therefore, lower levels of EI have been associated with psychological constructs that have the potential to negatively influence adolescent psychosocial wellbeing, adolescent psychological development and consequently act as a negative antecedent that could indirectly inhibit the Year 12 students’ readiness to engage in the process of learning (Vygotsky, 1931a) and therefore attain an adequate standard of VCE academic achievement.

Therein, in this analysis of individual differences the AEI mean score is speculated to effect factors such as the adolescents’ psychological wellbeing, therefore, enabling or inhibiting the adolescents’ ability to and engagement in the academically rigorous Year 12 teaching and learning processes (Vygotsky, 1931a) inherent in VCE academic achievement. Thereby, based on the appraisal model presented by Frijda (1988), the AEI mean score was theorised to have indirectly contributed to the model and subsequently AEI arousal, AEI appraisal and finally the AEI response, which is evident in the individual differences in the simultaneous predictive effect of AEI for VCE academic achievement in the four IQ and gender combination groups.

5.6.2.2 AEI Mean Score Relative to the Predictive Variance of AEI for VCE

Academic Achievement

The individual differences in the simultaneous predictive variance of AEI for VCE academic achievement, were more consistent with the predicted main effects in the
model for the total cohort when considered within the context of the AEI group mean score. The AEI group mean score was hypothesised to be representative of the students’ total AEI resources or competencies, which were theorised to impact on the students’ biopsychosocial wellbeing, subject to the adolescents’ gender and stage of adolescent development. Hence, the AEI group mean score was hypothesised to represent a generally stable factor that contextualised the predictive effect of AEI on VCE academic achievement.

The review of the four groups found a pattern of variation between the four groups’ AEI mean scores, (representing their total AEI competencies or resource “supply” available to indirectly influence VCE academic achievement) and the predictive variance of AEI (representing the portion of the total resource supply that was directly utilised to meet their appraised demand of VCE academic achievement). The IQ and gender combination groups’ causal predictive variance of AEI for VCE academic achievement was theorised to be stimulated, in response to the individual’s appraisal of their ability to meet the demands of VCE. Subsequently, the predictive effect of AEI was directly utilised for VCE academic achievement.

Therein, one possible and plausible explanation for the pattern of individual differences identified in the current study is that the AEI group mean score was representative of the adolescents’ total AEI resources or competencies, which reflected their biopsychosocial development and psychosocial wellbeing. The review of the four IQ and gender combination groups found a pattern of variation between the groups’ AEI mean scores, (representing their total AEI or resource “supply” available to indirectly influence VCE academic achievement) and the predictive variance of AEI, (representing the portion of the total resource supply that was directly utilised to meet their appraised demand of VCE academic achievement). The IQ and gender combination groups’ predictive variance of AEI for VCE academic achievement was theorised to be a response to the individual’s appraisal (Arnold, 1960b) of their ability or inability to meet the demands of VCE. Therefore, it is plausible that the predictive effect of AEI was dynamically and directly utilised for VCE academic achievement.
5.6.3 AEI Key Finding 12: The Heterogeneous Predictive Variance of AEI as a Dynamic Adaptive Response

The individual differences in the predictive variance of AEI for VCE academic achievement are discussed in the four IQ and gender combination groups, subject to adolescent developmental differences in AEI, IQ and gender from an ecological human developmental perspective (Bronfenbrenner, 1977). The study model and the individual differences in the predictive variance of AEI for VCE academic achievement in each IQ and gender combination group are discussed with reference to the groups’ developmental resources, which include their AEI, IQ and gender. Based on the assumption that the goal of all students is to optimise their VCE academic achievement in their final year of secondary school, the academic and psychosocial demands inherent in VCE are conceptualised as a stimulus or stressor (Holmbeck, Devine, Wasserman, Schellinger, & Tuminello, 2012).

Further, the heterogeneous individual differences in the predictive variance of AEI for VCE academic achievement identified in the IQ and gender combination groups were understood with reference to the ZPD, as conceptualised by Vygotsky (1978). Within the context of the social cultural environment of the individual student learning within the classroom with their peers and secondary school teacher, the ZPD is considered as, “the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers” (Vygotsky, 1978, p. 86). Therein, an adolescent learns and then develops with the process of learning based on the learner’s current developmental traits and the interventions and support of a more competent other, such as a teacher or another student, scaffolding the student to working towards developing increased mastery or an understanding of a concept, skill or task. Therefore, the individual’s current potential or readiness to learn is formative in the learning process and the attainment of academic achievement (Vygotsky, 1978). Hence, when the VCE curriculum is within a student’s ZPD, the range or level of curriculum that is presented in the classroom is challenging for the learner, but achievable with support, and possibly leads the individual to work in a state of “flow” (Csikszentmihalyi, 1990).
The adolescents’ resources (AEI, IQ and gender) (Hobföll, 1989) are discussed as risk/promotive or vulnerability/protective factors (Rutter, 1987) in their ability to engage in the VCE curriculum, based on their ZPD (Vygotsky, 1978). In addition, the adolescents’ appraisal of their resources as risk and protective factors (Arnold, 1960b) is anticipated to influence how their AEI was utilised adaptively in the coping process (Salovey et al., 1999) to meet the demands of internal and external stressors inherent in VCE academic achievement. Collectively, the adolescents’ cognitive development, gender, AEI and stage of adolescent development is anticipated to influence the dynamic processes stimulating the individual differences in the predictive variance of AEI for VCE academic achievement.

The degree of stress or emotional stimulus experienced by each Year 12 student was potentially influenced by their resources and the strength of the environmental demands associated to VCE, which was subject to the individual’s appraisal of their own ability to meet their subjective and objective goals; therefore to utilise the predictive variance of AEI to varying degrees to adapt or cope with the academic and psychosocial demands inherent in completing VCE successfully within a secondary school environment. As the cohort in this study were in the late stage of adolescent development, it was anticipated the students’ goal for academic achievement in a secondary school environment would also be influenced by their need to meet their psychological drives for identity, autonomy, intimacy, sexuality and achievement (Steinberg, 2011a). Further, the adolescents’ engagement in the learning process was understood with reference to the ZPD (Vygotsky, 1978). Therefore, if a student was working: (a) below their ZPD, they were likely to experience boredom; (b) above their ZPD, they were more likely to experience frustration; and (c) within their ZPD, they were more likely to be fully engaged and learning (Vygotsky, 1978). Consequently, Year 12 adolescents had the potential to experience stressful emotions ranging from distress to eustress (Lazarus, 1993b). Hence, in order to discuss the individual differences in the predictive variance of AEI for VCE academic achievement the adolescent developmental variables in the current study are considered to be risk/promotive factors and vulnerability/protective factors (Holmbeck et al., 2006), as outlined below:
**AEI mean score:** As the individual’s total AEI competencies based on their epigenetic development and current stage of development in the human lifecycle. The AEI mean score is anticipated to be a formative factor in the individual’s appraisal process.

**AEI predictive variance:** As a dynamic response to the individual’s appraised need to utilise a component of their AEI mean score in order to meet the academic and psychosocial demands of VCE. The predicative variance of AEI for academic achievement was the third strongest predictor in the model and therefore considered the third strongest predictive factor in the study.

**IQ (gf):** High intelligence was considered a promotive/protective factor for academic achievement. Low intelligence was considered a risk/vulnerability factor for academic achievement. Intelligence was the strongest predictor of academic achievement in the model and therefore considered the strongest predictive factor in the study.

**Gender:** The female gender was considered a promotive/protective factor for academic achievement in this study. Further, the male gender was considered a risk/vulnerability factor for academic achievement in this study. Gender was the second strongest predictor in the model and therefore considered the second strongest predictive factor in the study.

From an ecological human developmental perspective (Bronfenbrenner, 1977) individual differences in the predictive effect of AEI in VCE academic achievement, identified in the female high group, male high group, female low group and male low group are now discussed as the individual is nested within their environment. The processes that are theorised to have impacted on the heterogeneous individual differences in the predictive effect of AEI for VCE academic achievement identified in the IQ and gender groups and based on the ecological model of human development (Bronfenbrenner, 1977), encompassed the following mechanisms:

1. **AEI Antecedent:** An individual’s AEI mean score is based on their epigenetic development and current stage of adolescent development reflected in their AEI mean trait score as an antecedent.

2. **AEI Stimulus:** The psychological and academic load or demand attached to the stimulus of VCE academic achievement may be influenced by how important VCE is
to the individual. The individual’s desire to optimise their academic achievement may be influenced by a range of factors, such as the degree of academic or psychosocial difficulty in VCE, the cultural significance of VCE for the individual and their family, and the strength/load of the individual’s subjective and objective goals for VCE academic achievement. Collectively, a range of psychological and academic factors may contribute to the individual differences in the arousal level experienced by the individual student.

(3) **AEI Adolescent Appraisal:** AEI mean score is argued to be formative to the appraisal process, influencing the individual’s evaluation of their ability/inability to successfully utilise their resources to meet their subjective and objective goals, stemming from the academic and psychosocial demands of VCE, which further influences or modifies the individual’s arousal level experienced.

(4) **AEI Response:** The predictive effect of AEI for VCE academic achievement may be used adaptively/maladaptively in response to the individual’s appraised risks, threats or challenges to assist the individual to survive or to thrive, and build or protect their resources in order to maintain their homeostasis. Predictive effect of AEI in VCE academic achievement may also be considered as an adaptive response as the individual “focuses on the progressive accommodation, throughout the life span, between the growing human organism and the changing environments in which it actually lives and grows” (Bronfenbrenner, 1977).

This discussion theoretically speculates how the pattern of results could plausibly be explained in light of how a developing adolescent’s personal resources (AEI, IQ and gender) were appraised and the predictive effect of AEI adaptively utilised relative to the individual’s ZPD (Vygotsky, 1978) in VCE academic achievement for the male low group, female low group, male high group and the female high group. It is possible that the predictive effect of AEI for VCE was used adaptively to varying degrees by each IQ and gender combination group, in order for the Year 12 students to cope with the internal and the external environmental psychosocial and academic demands associated with VCE within a secondary school environment (Bronfenbrenner, 1977).
5.6.3.1 Male Low Group

The male low group had the lowest intercept of 61 VCE points, however, it had the highest positive predictive variance of AEI for VCE academic achievement \((b_{1a} = 5.53)\) of the four groups, which was consistent with the research findings outlined by Petrides et al. (2004). A review of the male low group also identified three main effects that were consistent with the regression model for the total cohort when predicting VCE academic achievement. First, the male low group’s intellectual capacity \((M_{IQ} = 98)\) was positively predictive of VCE academic achievement, which was coherent with previous research (Deary et al., 2007; Herrnstein & Murray, 1994; Nisbett et al., 2012). While the male low group’s IQ was within the average range to address the academic demands of VCE, the group’s IQ was the lowest of the four groups indicating they had the least cognitive capacity or resources to address the demands of VCE. Second, the male low group’s gender was negatively predictive of VCE academic achievement in this model.
This finding was consistent with previous research, which found adolescent males were more likely to have lower language skills, higher rates of learning difficulties, higher rates of problem behaviours and higher rates of expulsion from school than females (Commonwealth of Australia, 2002). Third, the male low group’s AEI mean score was on the 48th percentile, which was indicative of their AEI capacity or resources that were available to potentially utilise adapt and cope with the stressors and challenges inherent in meeting the demands of completing VCE. The positive predictive effect of 5.5 VCE points per standard deviation for the male low group was above the average of 4.13 VCE points for the total cohort in the regression model. Therefore, the main positive predictive effect of AEI for VCE academic achievement beyond that of IQ and gender in the male low group was consistent with the main effects in the regression model for the total cohort.

Consequently, the study findings suggested the male low group adaptively utilised the predictive effect of AEI as a positive protective adjustment (Thurstone, 1924b) to assist them to adapt and cope with the demands of VCE academic achievement. In addition, the predictive effect of AEI in VCE academic achievement found in the male low group was consistent with previous research that also identified a main positive predictive effect of AEI students attending secondary school (Downey, Mountstephen, et al., 2008; Joibari & Mohammadtaheri, 2011; Parker, Creque, et al., 2004) and was beyond the predictive effect of IQ (Ferrando et al., 2011; Gil-Olarte et al., 2006) in academic achievement. Further, the findings for the male low group identified direct effects in AEI and IQ for VCE academic achievement, which was partially consistent with the positive predictive effect, but inconsistent with the of the bilinear relationship of AEI with IQ for academic achievement in adolescents (≤ IQ 128–130) identified by Petrides et al. (2004). Similarly, the findings in the current study were consistent with the positive predictive effect of CEI and academic achievement and in children attending primary school identified by Agnoli et al. (2012). However, the direct main effects of AEI and IQ in the current study, were inconsistent with the bilinear relationship of AEI with IQ for academic achievement in adolescents by Agnoli et al. (2012). The findings for the male low group were also consistent with previous results that found EI had a stronger positive predictive effect for academic achievement for students who were
considered educationally at risk or more educationally vulnerable due to lower intellectual resources or learning difficulties (Petrides et al., 2004; Reiff et al., 2001). However, the positive predictive effect of AEI for VCE academic achievement in the male low group was inconsistent with previous studies that did not find a statistically significant relationship between EI and academic achievement in the students attending secondary school (Amelang & Steinmayr, 2006; Lawler, 2012; Woitaszewski, 2000) and university (Barchard, 2003; Kashani, Azimi, & Vaziri, 2012).

The individual differences in the predictive effect of AEI for VCE academic achievement were also understood in light of the differences in intellectual resources in the male low group and the male high group. The AEI mean total score as an antecedent in the male high group ($M_{AEI} = 48.9$) and the male low group ($M_{AEI} = 48.5$) were virtually the same, suggesting they had comparable AEI resources to draw upon when facing the challenges of VCE academic achievement. In addition, both the male low group and the male high group shared common male biopsychosocial developmental characteristics (Gemelli, 2013), including their psychological drive for achievement, identity, autonomy, sexuality and intimacy (Steinberg, 2011a). However, in contrast the fluid intelligence of the male low group ($M_{IQ} = 98$) was 24 IQ points lower than and the male high group ($M_{IQ} = 123$). Consistent with previous research asserting the formative predictive effect of abstract reasoning for academic achievement (Deary et al., 2007; Jensen, 1998; Nisbett et al., 2012), in the current study, as IQ incrementally fell below or rose above the 50th percentile, so too did the respective incremental risk and protective factor of IQ for VCE academic achievement.

Therefore, the comparatively lower intellectual capacity of the male low group to that of the male high group was anticipated to lead to higher levels of intellectual strain and distress (Lazarus, 1991), relative to the degree to which the VCE curriculum was objectively and subjectively appraised (Arnold, 1960b) as being above the male low group’s ZPD (Vygotsky, 1978). As theorised by Petrides et al. (2004), the relative level of distress experienced by the male low group may be reflected in the compensational use of the predictive effect of AEI to cope and adapt to the psychosocial and academic demands of VCE academic achievement. The male low group may have particularly been distressed by the threat or fear of academic failure in VCE, which may have threatened
their drive for achievement, autonomy and identity (Steinberg, 2011a). Hence, it is plausible that the differentiated predictive effect of AEI for VCE academic achievement in the male low group of 5.5 VCE points and in the male high group of 2 VCE points, may be partially explained by the differences in the intellectual capacity of the male low group and the male high group, which subsequently differentiated the predictive effect of AEI for VCE academic achievement. The predictive effect of AEI in the male low group was consistent with the longitudinal research findings by Qualter et al. (2012), who found trait AEI had a direct effect on Year 11 males’ performance and in secondary school. In addition, the current research findings also found the direct predictive effect of AEI on Year 12 males’ academic achievement in secondary school was differentiated by IQ, which was coherent with the findings by Qualter et al. (2012).

In sum, in this study the individual differences in the predictive effect of AEI for VCE academic achievement in the male low group were considered to be a developmentally adaptive predictive effect based on the Ecological Theory of Human Development (Bronfenbrenner, 1977). The adaptive predictive effect of AEI for VCE academic achievement in the male low group was dynamically utilised subject to the male low group’s appraisal of their ability to utilise their developmental resources including their AEI mean score, intellectual capacity and gender to successfully meet the academic and psychosocial demands of VCE academic achievement. It is plausible that AEI could be utilised by each group adaptively or maladaptively as a protective adjustment (Thurstone, 1924b) in response to the stressors inherent in meeting the academic and psychosocial demands of VCE academic achievement. In comparison to the other three IQ and gender combination groups in the current study, the male low group had the lowest resources to address the demands of VCE. Therefore, the male low group was estimated to have the highest risk for academic underachievement and the potential for a heightened fear of academic failure, which would threaten their adolescent psychosocial need for drive for achievement, autonomy and identity (Steinberg, 2011a). Consequently, relative to the four IQ and gender combination groups it is argued that the male low group were under the highest level of strain, stress and frustration when working above their estimated ZPD (Vygotsky, 1978) in attempting to meet the academic demands of VCE. Accordingly, the male low group was theorised to be subject to the
highest subjective and objective distress (Lazarus, 1991) of the four groups, which adaptively stimulated the highest degree of the positive predictive effect of AEI in VCE academic achievement, which was beyond the predictive effect of IQ and gender.

5.6.3.2 Female Low Group

In comparison to the four groups, the female low group had the second highest intercept of 70 VCE rank points and had the second largest positive predictive variance of AEI ($b_{Ia} = 4.13$), accounting for 4.1 VCE points per standard deviation. A review of the female low group found three main effects that were consistent with the regression model in predicting VCE academic achievement. First, the female low group had an average IQ ($M_{IQ} = 100$), which was comparable to that of the male low group ($M_{IQ} = 98$) and considered to be adequate to cope with the academic demands of VCE. In the current study, as IQ incrementally fell below or above the mean of IQ 100 or the 50th percentile, so too did the incremental risk or protective factor of IQ for VCE academic achievement (Jensen, 1998). Second, the female low group’s gender was positively predictive of academic achievement, which was consistent with previous research that indicated females had a higher grade point average than males in secondary school (OECD, 2014). Third, the female low group had a higher AEI mean score ($M_{AEI} = 51$st percentile) than the AEI mean score in the male low groups ($M_{AEI} = 48$th percentile). This finding was consistent with the neurological research by Jaušovec and Jaušovec (2005), confirming gender differences in EI. The predictive effect of AEI in the female low group accounted for 4.1 VCE points per standard deviation, which was identical to the predictive variance of AEI in the regression model for the total cohort. Therefore, the main positive predictive effect of AEI for VCE academic achievement beyond the predictive effect of IQ and gender in the female low group was also consistent with the main predictive effect of AEI for VCE academic achievement in the regression model for the total cohort. Relative to the four groups in this study, the female low group were considered to have the second highest risk for educational achievement. This finding inferred the female low group adaptively utilised the predictive effect of AEI as a positive protective adjustment (Thurstone, 1924b) in order to cope with the demands of VCE academic achievement.

The predictive effect of AEI accounting for 4.1 VCE points per $SD$ for VCE academic achievement in the female low group was consistent with the seminal research
presented by Petrides et al. (2004). This finding offered support for the contention that the positive predictive effect of AEI was strongest in adolescents who were educationally vulnerable or disadvantaged, and were therefore more stressed in managing the load associated to using their resources to successfully meet the academic and psychosocial demands inherent in completing VCE. As previously stated, the current study analysing Year 12 Australian adolescents ($M_{\text{age}} = 17$ years and 7 months) in their final year of secondary school found main predictive effects in the model for AEI, IQ and gender, which were inconsistent with the bilinear interaction of AEI on IQ in the British adolescents ($M_{\text{age}} = 16$ years and 5 months) (Petrides et al., 2004). Further, the simultaneous predictive effect of AEI in both the male low group accounting for 5.5 VCE points and the female low group accounting for 4.1 VCE points, beyond the predictive effect of IQ and gender; extended the seminal research by Petrides et al. (2004) by confirming the predictive effect of AEI for VCE academic achievement was differentiated by IQ and gender. The AEI predictive effect in VCE academic achievement was stronger in the male low group than in the female low group, despite having comparable intellectual acumen. Possible mechanisms that have contributed to the pattern of results in the male low group and the female low group are now considered.

The study findings indicated that the male gender was a risk factor in VCE academic achievement and that the female gender was a protective factor. In reference to the female low group and the male low group, it was also plausible that the gender differences directly influenced the main predictive effect of gender variance in VCE academic achievement and/or directly influenced the gender variance in AEI, which subsequently provided a main predictive effect on VCE academic achievement beyond that of IQ and gender. The individual differences in the predictive effect of AEI in VCE academic achievement in the male low group and the female low group were subject to gender differences, which partially influenced the development of: (1) the AEI mean score as an antecedent of adolescent psychological wellbeing for both genders; (2) AEI appraised stress of meeting the demands of VCE based on the individual’s resources in both genders; (3) AEI stimulus associated with the degree of strain and stress in VCE for both genders; and (4) the AEI predictive effect in VCE academic achievement for both genders.
First, the AEI mean score in the female low group was higher than the male low group. This finding was consistent with the gender differences found in AEI for the total cohort, and was consistent with previous research (Harrod & Scheer, 2005; Petrides & Furnham, 2000a; Salguero et al., 2012; Sánchez-Núñez et al., 2008), whereby females had significantly higher AEI skills than males. Salguero et al. (2010) examined the development of AEI with the Trait Meta-Mood Scale (TMMS) in adolescents with a focus on three dimensions of attention to feelings, clarity of feelings and mood repair in Spanish secondary school students. Their findings confirmed a significant difference in the three dimensions. In particular, increasing gender differences in the development of the attention to feelings in adolescent males and females were identified: a small to moderate effect size in 12 to 13-year-old students, which increased to an average effect size in 14 to 15-year-old students, and reached a high effect size in 16 to 17-year-old students (N = 1,497). The research findings presented by Salguero et al. (2010) were consistent with the current research results, which found AEI was differentiated by gender with the female low group having a higher AEI mean score than the male low group.

Previous research has demonstrated that the predictive validity of AEI was significantly and positively associated with better psychological wellbeing and negatively associated with deviant behaviour, anxiety and depression. In the adolescent population AEI was negatively associated to deviant behaviour at secondary school (Petrides et al., 2004). Further, Fernández-Berrocal et al. (2006) found that AEI was negatively associated with anxiety and depression; however, adolescents’ ability to discriminate among feelings and self-regulation was significantly associated with better psychological adjustment. Extremera, Durán, and Rey (2007) found that adolescents with higher AEI, particularly high perceptions of emotional abilities, demonstrated higher life satisfaction and lower perceived stress. While Campbell and Ntobedzi (2007) found that AEI was predictive of coping style and that copying style predicted psychological distress in adolescents. In addition, Downey et al. (2010) identified mediating effects of AEI and coping on adolescent problem behaviours.

Therefore, in the current study it was plausible that the AEI mean score was indicative of adolescents’ psychological wellbeing (Fernández-Berrocal et al., 2006),
perceived stress (Extremera et al., 2007) and coping style (Campbell & Ntobedzi, 2007). As the female low group had a higher AEI mean score than the male low group, it was anticipated the females would have more robust psychological wellbeing than the males. Salguero et al. (2012) also found gender moderated the relationship between AEI and depression in secondary school and undergraduate students ($N = 620$, $M_{age} = 19$ years of age), with low levels of EI related to depression in males but not in females. This finding highlighted the gender differences in the emotional development of adolescent males and females, which could be understood from an evolutionary developmental perspective (Gluckman et al., 2009).

The commencement of adolescence, marked by the onset of puberty, occurs earlier in females (between 7 and 12 years of age) than males (between 8 and 13 years of age), with differentiated hormonal changes in males and females stimulating physical and psychological growth leading to reproductive competence (Gluckman et al., 2011b). Further, while adolescents develop similar physical and cognitive traits to adults, they have less psychosocial maturity in their ability to self-regulate or control their problem solving, decision making, risk-taking behaviours and impulse control (Gluckman et al., 2009). With adolescent females maturing faster than adolescent males, adolescent males were increasingly sensitive to the perception of risk and reward, further their less mature self-regulation led to increased stress, risk-taking behaviours and acting out behaviours, which had the potential to exceed their emotional maturity or their emotional capacity for control, adjustment or adaptation, which was more likely to lead to depression (Gluckman et al., 2009). This finding is particularly relevant to the male low group and the female low group, who were anticipated to be under particularly high pressure when meeting the academic and psychosocial demands of VCE.

Adolescent females mature earlier than adolescent males and are subject to gender-specific neuropsychological development (Blakemore, 2010; Burnett et al., 2011) and biological growth and maturation (Gluckman et al., 2009). Therefore, in some instances, adolescent males may be more strongly influenced by their social/emotional reactivity and have less self-regulation in decision making than adolescent females (Blakemore & Robbins, 2012). This adolescent developmental pattern of gender differentiation was consistent with the gender differences found in the AEI mean scores.
for the male and female low groups. In the current study, the higher AEI mean score in the female low group in comparison to the male low group was theoretically indicative of their relative level of psychological wellbeing (Fernández-Berrocal et al., 2006), which was subsequently anticipated to influence their ability to cope (Campbell & Ntobedzi, 2007; Downey et al., 2010) and adapt to the stressful demands of VCE. Hence, it is plausible that the AEI mean score acted as an antecedent that was a promotive factor regardless of the presence or absence of VCE as a stressor (Holmbeck et al., 2006). Consequently, in comparison to the female low group, the male low group may be at an incrementally higher educational risk due to their relatively less developed AEI resources.

Second, the adolescent females in this study had a higher average VCE score than the adolescent males, which was consistent with previous research (Buchmann, DiPrete, & McDaniel, 2008; Calvin et al., 2010). An independent samples t-test for gender and VCE academic achievement found a moderate difference (Cohen’s $d = 0.29$) between the VCE academic achievements of the Year 12 adolescent male and female students. The effect size for gender in VCE academic achievement $d = 0.29$ was comparative to the effect size of $d = 0.30$ found by Deary et al. (2007), indicating females outperformed males in academic achievement. In the current study, the total score for IQ ($gf$) did not account for the gender differences, which was consistent with previous research (Calvin et al., 2010; Deary et al., 2007). However, it was possible that gender differences in components of adolescent verbal and non-verbal intelligence may have changed during the adolescent stage of development (Ramsden et al., 2011), and therefore may have influenced the gender variance in VCE academic achievement.

In comparison to the male low group, the female low group was anticipated to have had a relatively stronger verbal/literacy skills (Ramsden et al., 2011), which may support their verbal communication, reading, spelling and writing (Lipka & Siegel, 2006). In contrast to the female low group, the male low group was anticipated to have stronger visual/spatial skills (Ramsden et al., 2011), which may support their mathematical skills, and have a higher rate of learning difficulties (Lipka & Siegel, 2006).
Consequently, in comparison to the female low group, the male low group with relatively lower AEI skills coupled with the possibility of increased learning difficulties creating extra stress in VCE, may have been at increased risk of exceeding their emotional adaptive capacity (Gluckman et al., 2009) when faced with multiple stressors in VCE academic achievement. Hence, it is noted Buchmann et al. (2008) found males had an increased rate of learning difficulties and lower literacy skills when compared to females. Further, adolescent students with learning difficulties were considered to be at increased risk at secondary school, with increased rates of academic failure, dropping out of school, grade retention, emotional problems and behavioural problems in comparison to the general population (Lipka & Siegel, 2006). In particular, males have been identified as having higher rates of reading disabilities, anti-social behaviour, attention disorders, dyslexia, stuttering and delayed speech (Buchmann et al., 2008). Students with reading difficulties were also at increased risk of dropping out of school in comparison to those without reading difficulties (Daniel et al., 2006). In addition, after controlling for the effect of socio-demographic and psychiatric factors the students with reading difficulties were more likely to experience suicidal ideation and make attempts to suicide when compared to students without reading difficulties (Daniel et al., 2006). These findings highlight the extremely negative impact of the emotional distress that students have experienced as a result of their learning and academic difficulties. Given that adolescent males have a higher rate of learning difficulties than adolescent females, they are considered to be at increased educational risk for emotional distress leading to dropping out of school and suicidal ideation/attempts, which is also reflective of the assertion made by Gluckman et al. (2009) that adolescent males could be particularly vulnerable to exceeding their emotion capacity, leading to pathological depression.

Third, the female low group’s appraisal of their ability to meet the academic and psychosocial demands of VCE was potentially influenced by their AEI mean score and past learning experiences. The female low group’s relatively higher AEI mean score in comparison to the male low group, in addition to the decreased likelihood of learning difficulties and externalised behaviours, was anticipated to have led to less challenges and negative learning experiences in a secondary school environment than the male low group. Hence, the female low group’s appraisal of their ability to meet the academic and
psychosocial demands of VCE was anticipated to be influenced by their level of resources, including their AEI skills, IQ and gender to address the demands of VCE and led to an incremental level of strain and stress that stimulated the predictive effect of AEI for VCE academic achievement, beyond the predictive effect of IQ and gender.

Fourth, the female low group and the male low group had very similar IQs, therefore it was anticipated they would face comparable intellectual challenges and would potentially, be working above their ZPD in the VCE curriculum, consequently creating comparable levels of worry, anxiety and distress. Therefore, the variance in the predictive effect of AEI for VCE academic achievement in the female low group (4.1 VCE points) and the male low group (5.5 VCE points) could plausibly be attributed to gender differences in AEI. Adolescent gender differences encompassed different rates of biopsychosocial maturation and executive functioning in males and females that may have potentially impacted on the development of AEI skills. In addition, differences in males’ and females’ literacy skills, rates of learning disabilities and behavioural problems in school could have inhibited or enhanced the ability of the male low group and the female low group to adapt and cope with the academic and psychosocial demands of VCE. Hence, it is plausible that the differences in the predictive effect of AEI in VCE academic achievement in the male low group and the female low group were partially influenced by gender differences, particularly in AEI, which was utilised based on the degree of stress appraised by each group to adapt and cope with the demands of VCE as outlined in the compensation hypothesis by Petrides et al. (2004).

In summary, the positive predictive effect of AEI for VCE academic achievement in the female low group (≤ IQ114), was supportive of the findings presented by Petrides et al. (2004). In addition, the individual differences in the predictive effect of AEI for VCE academic achievement, beyond the predictive effects of IQ and gender, were compared in the male low group and the female low group. The predictive effect of AEI in VCE academic achievement in the male low group accounted for 5.5 VCE points per $SD$, which was higher than the predictive effect of AEI equating to 4.1 VCE points per $SD$ in the female low group. While it is not possible to establish a causal effect for these results, a plausible explanation for these findings was outlined. First, the male low group had a lower AEI mean score than the female low group, which was theorised to be
indicative of their respective psychological wellbeing. Second, the male low group was anticipated to have experienced a higher level of stress due to their comparably lower AEI resources when compared to the female low group, and the increased possibility of adolescent males experiencing learning difficulties and externalising behaviours in secondary school. It was apparent this may have lowered the male low group’s ZPD (Vygotsky, 1978), relative to the female low group’s ZPD, leading to incrementally higher anxiety or stress. Based on the male low group’s appraisal of their ability to meet the academic and psychosocial demands of VCE, it was anticipated they experienced more stress incrementally than the female low group. This consequently led to the larger predictive effect of AEI in VCE academic achievement in the male low group, when compared to the female low group. These findings supported and extended the seminal research by Petrides et al. (2004) through finding that the predictive effect of AEI was differentiated by gender and IQ and had a stronger predictive effect for VCE academic achievement in the male low group than the female low group. This finding provided further support to the contention that the predictive effect of AEI was strongest in adolescents who were educationally at risk as previously suggested by Petrides et al. (2004).

5.6.3.3 Male High Group

The male high group had the second lowest intercept with a VCE score of 70 and made the third largest gain of 2 VCE points per standard deviation increase in AEI, when compared to the other IQ and gender combination groups. A review of the male high group found three factors that were consistent with the regression model for predicting their VCE academic achievement. First, the male high group had a high IQ ($M = IQ 123$), which was a strong predictor of VCE academic achievement in the model and equivalent to that of the female high group. Second, the male high group’s gender was negatively predictive of academic achievement in the current regression model and therefore was anticipated to have slightly detracted from their academic achievement. Third, the predictive effect of AEI for the male high group accounted for 2.1 VCE points, which was consistent with but lower than the positive main predictive effect of AEI of 4.13 VCE points in the regression model. As previously outlined, this finding further clarified the seminal findings by Petrides et al. (2004), indicating that the negative predictive
effect of AEI for those with higher intellectual abilities was differentiated by gender. Further, the current study found the predictive effect of AEI for VCE academic achievement was positive in the male high group and negative in the female high group. This finding will be discussed in relation to the predictive effects of IQ, gender and AEI in order to determine the developmental factors that led to the predictive effect of 2.1 VCE points in the male high group, which was lower than the average predictive effect of 4.13 for the total cohort. Three plausible explanations that may have contributed to the predictive effect of AEI accounting for 2.1 VCE points in the male high group will now be discussed.

First, two common factors were identified in the male high group ($M_{AEI} = 48.9$) and the male low group ($M_{AEI} = 48.5$): both groups had the same AEI mean score and the same gender, which could be utilised to manage the challenges of VCE academic achievement. The male high group ($M_{IQ} = 123$) had a higher intellectual capacity than the male low group ($M_{IQ} = 98$), which was reflective of the male high group’s comparatively higher intellectual ability to successful manage the academic demands of VCE (Jensen, 1998). Therefore, it was possible that the relatively smaller predictive effect of 2.1 VCE points found in the male high group, compared to the male low group’s 5.5 VCE points, was reflective of the lower level of distress experienced by the male high group due to their higher intellectual capacity.

Second, as the male high group and female high group had the same intellectual capacity of IQ 123, it seemed probable that both groups experienced similar periods of frustration and boredom when they were working below their ZPD (Vygotsky, 1978), which may have negatively impacted on their engagement in learning and have caused stress. Yet, both the male and female high groups differed in the predictive variance of AEI in their VCE academic achievement. An independent samples $t$-test found there was a statistically significant difference between the AEI mean scores for the male high group ($M_{AEI} = 48.9$) and the female high group ($M_{AEI} = 56.3$), which equated to a moderate effect size. Therefore, the male high group and female high group had the same intellectual capacity of IQ 123 to cope with the challenges of VCE academic achievement, however, the male high group had moderately lower AEI skills than the female high group to cope with VCE academic achievement. Conversely, when challenged by the psychosocial and
academic demands of the VCE curriculum, the predictive effects of AEI in the male and female high group accounted for 2.1 VCE points and -0.7 VCE points, respectively. Therefore, despite having a lower AEI total score, it is possible positive predictive effect of AEI in the male high groups may have been indicative of their increased skills in their ability to cope and adapt to the academic demands of VCE in comparison to the female high group. This finding is considered in relation to research findings by Petrides and Furnham (2000a), which revealed that despite females scoring higher than males on the social skills in EI, males believed they had higher EI scores than females. Therefore, in the current study it may be possible that the female high group underestimated their own AEI skill to cope with the demands of VCE academic achievement and may also have been more sensitive to their subjective or objective perceptions of social isolation or rejection from their peers, when compared to the male high group.

Chan (2005a) examined the relationship of EI, social coping and psychological distress in Chinese gifted students aged 9 to 19 years of age (N = 624). Intellectually gifted students are noted to have heightened emotional sensitivities that are stimulated from their asynchronous development (Piechowski, 1997, 2002), which can lead to social isolation from peers and distress. The research findings suggested that to reduce psychological distress in gifted students, EI skills regarding self-management and utilisation needed to be linked to reducing avoidant coping in addressing their giftedness; while the EI skills of empathy and social skills needed to be increased with social interactions with peers, in order to promote gifted students’ psychological wellbeing. Based on Chan’s (2005a) findings, the importance of enhancing AEI in the female high group and male high group through adaptive social coping to improve gifted students’ psychological wellbeing and reducing the use of avoidant coping behaviours is evident. Hence, it is possible the developmental issues associated with being gifted as outlined by Chan (2005a) may have negatively impacted on the female high group more strongly than the male high group in the current study.

Third, it is plausible that when the intellectual capacity of the male high group and the female high group were matched with the academic challenges in VCE academic achievement, the students’ experienced ‘flow’ (Csikszentmihalyi, 1990) when optimally challenged in their ZPD and engaged in the process of learning the VCE curriculum. The
neurological research by Gray, Braver, and Raichle (2002), identified both the independence of the constructs of emotion and cognition and the interaction that occurs between emotion and cognition in brain function. Video stimulus was used to induce emotional states: pleasant/approach, unpleasant/withdrawal, and neutral \( N = 14; 19 \) to 27 years of age). Functional Magnetic Resonance Imaging (fMRI) assessed brain function, with a focus on the lateral prefrontal cortex, to target cognitive working memory tasks following the emotional video stimulus. Emotional states were noted to enhance or impair some cognitive functions but not others, therefore these findings illustrated that not all emotion and cognition were intrinsically integrated (Gray et al., 2002).

The findings by Gray et al. (2002) confirmed both the neurological independence of the emotional and cognitive constructs and the loss of specialisation of constructs at higher levels of cognition functioning. In addition, the findings identified a cognitive stimulus and emotion crossover interaction, which, at higher cognitive functional levels, produced no main effect in emotion or cognition. The discontinuation of the main effects represented by emotion and cognition at higher levels of cognition represented the integration of both constructs; indicating emotion and cognition conjointly contributed to thought and behaviour at this higher cognitive level and were inseparable variables (Gray et al., 2002). Consequently, Gray et al. (2002) found emotional states could selectively influence cognition-related neural activity in the prefrontal cortex; specifically, that emotion and higher cognition can be integrated. The integration of emotion and higher functioning cognition may have partially affected the female and male high groups and contributed to the negative predictive effect of EI identified in the current study.

In summary, the male high group adaptively utilised the predictive effect of AEI to enhance their VCE academic achievement. A range of plausible explanations have been presented that may have independently or collectively contributed to the predictive effect of AEI in accounting for 2.1 VCE points in the current study. The male high group’s high IQ may have been a protective factor for their academic achievement and reduced the distress they experienced when engaging in VCE academic achievement (Jensen, 1998). Therefore, a relatively low level of AEI was stimulated in the predictive effect of AEI for VCE academic achievement. Alternatively, consistent with the ZPD in social learning theory (Vygotsky, 1978), the male high group (IQ 123) may have
experienced periods of time when they were not adequately challenged by the academic demands in the VCE curriculum, thereby reducing the positive predictive effect of AEI on VCE academic achievement. Further, Chan (2005a) highlighted the unique and complex role of EI in intellectually gifted students psychological distress and psychological wellbeing when coping socially. The research by Chan (2005a) is particularly relevant to the female and male high groups in the current study. While the male high group had lower AEI skills than the female high group, they may have used their AEI skills more adaptively to manage their asynchronous cognitive, emotional and social developmental characteristics (Piechowski, 1991; Silverman, 1992, 1993), which may have positively impacted on the predictive effect of AEI in VCE academic achievement. Finally, the male high group and the female high group may also have experienced periods of high cognitive function where emotion integrated with cognition and merged to the degree that a main effect was no longer evident for emotion or cognition (Gray et al., 2002), which partially explains the negative predictive effect of AEI in the female high group and the small positive predictive effect of AEI found in the male high group for VCE academic achievement.

5.6.3.4 Female High Group
A review of the four IQ and gender combination groups found that the female high group had the highest intercept with a VCE score of 88. In contrast, the negative predictive effect of AEI for the variance in VCE academic achievement resulted in a decline of -0.7 VCE points per standard deviation increase in AEI. The female high group’s AEI mean score was the highest of the four groups ($M_{AEI}$ 56th percentile), however, unexpectedly the predictive effect of AEI for VCE academic achievement in the female high group accounted for the lowest predictive variance in VCE academic achievement (-0.7 VCE points). Consequently, at two standard deviations below the mean the female high group had a VCE rank score of 89. While at two standard deviations above the mean, the female high group’s VCE score declined to 86 indicating an increase of four standard deviations in AEI skills equated to a decrease of 3 VCE points. This finding for the female high group was problematic as it was contrary to the simultaneous positive predictive main effect for AEI in VCE academic achievement identified in the regression model for the total cohort.
The female high group had two factors that were consistent with regression model for the total cohort in predicting their high VCE academic achievement. First, the female high group had a high IQ ($M_{IQ} = 123$), which was higher than the total cohort average IQ of 109 and was the strong positive predictor of VCE academic achievement in the regression model. Second, the female high group’s gender was also positively predictive of academic achievement, with females attaining a higher average VCE score than their male peers. Further, the female high group had the highest AEI mean score of the four groups. Based on the model entitled Conservation of Resources by Hobföll (1989), of the four groups, the female high group had the highest level of resources (high IQ, high AEI mean score and the positive predictive effect of the female gender) to access in meeting the demands of VCE academic achievement. With reference to the GLM regression model for the total cohort it would be logical to anticipate AEI to have a positive predictive effect on VCE academic achievement in the female high group. However, based on the negative predictive effect of AEI in VCE academic achievement, this was not the case in the female high group.

As previously acknowledged, the negative predictive effect of AEI for VCE academic achievement identified in the female high group was consistent with the negative predictive effect identified by Petrides et al. (2004), for adolescents $\geq$ IQ 128–130. In contrast to the negative predictive effect of AEI in the female high group, AEI in the male high group had a small yet still positive predictive effect for VCE academic achievement. Therefore, the current study findings extended the research presented by Petrides et al. (2004) by confirming the negative predictive effect of AEI for VCE academic achievement was differentiated by gender. However, the negative predictive effect found in the female high group was not entirely consistent with the research findings by Woitaszewski (2000), who found EI was not a significant factor in gifted students’ academic achievement in secondary school. Nonetheless, to a degree, the negative predictive effect of AEI for academic achievement in the female high group was somewhat supportive of the lack of a positive relationship between AEI and academic achievement found by Woitaszewski (2000).

The high AEI mean score identified in the female high group has been positively associated with pro-social factors (Petrides et al., 2006), happiness (Furnham & Petrides,
2003) psychological wellbeing, and includes adaptive copying and peer-rated social competence (Mavroveli et al., 2007), therein it was anticipated that the score may act as an antecedent to learning and being a protective factor in the female high group’s psychological readiness to engage in the process of learning required to meet the academic demands in VCE. Further, a t-test found the AEI mean scores in the female high group ($M_{AEI} 56$th percentile) and the female low group ($M_{AEI} 51$th percentile), were not statistically significantly different. Therefore, given the gender and the mean AEI total score was comparable in the female high and low groups, it would seem logical to deduce that the differences in intellectual capacity may have stimulated the differentiated negative and positive predictive effects of AEI found in each group, respectively. While it is beyond the scope of the current study to definitively determine why the negative predictive effect of AEI for VCE academic achievement was identified in the female high group, three potential explanations are provided which may have partially accounted for the negative predictive effect of AEI for academic achievement found in the current study.

First, one plausible explanation is that the negative predictive effect of AEI for VCE academic achievement in the female high group may have been reflective of their adaptive response to the lack of intellectual stimulation in the VCE curriculum, which limited their ability to work in their ZPD (Vygotsky, 1978). Assuming that the VCE curriculum was at a level that was consistently below what the female high group as “learners” could already intellectually understand independently, without support from a competent teacher, adult or peer, the female high group may have been working below their ZPD (Vygotsky, 1978). Consequently, the adolescents with a level of competence beyond the level of the VCE curriculum were anticipated to experience periods of boredom and frustration (Vygotsky, 1931b), as they were not consistently engaging in the learning process for a significant period or at an intellectual level that would improve or develop their current knowledge, skills, understanding or mastery of new concepts (Vygotsky, 1978). Accordingly, it would seem logical that the intellectually advanced students who were bored and frustrated were consequently distressed, therefore the small negative predictive effect of AEI for VCE academic achievement found in the female
The high group may have been an arguably adaptive negative response (Darwin, 1874) to the limits of the VCE curriculum.

Mayer, Perkins, Caruso, and Salovey (2001) examined the relationship between emotional giftedness and EI in intellectually gifted adolescents ($N = 11$). EI was measured with the Multifactor Emotional Intelligence Scale for Adolescents (MEIS-A). Descriptions of the adolescents’ social interactions were analysed and assessed based on the MEIS-A. The findings indicated that higher EI was consistent with descriptions of emotional giftedness by Dabrowski (1966). Therefore, the high AEI mean scores in the female high group are framed within the literature relating to intellectually gifted students (Gagné, 2003; Morelock, 1997; Renzulli, 1986; Silverman, 1993; Tannenbaum, 1983).

Second, it is also plausible that the negative predictive effect of AEI in the female high group was partially influenced by the heightened emotional sensitivity that has been characteristic of intellectually gifted adolescents (G. A. Davis & Rimm, 2000; Renzulli, 1986), particularly females (Kerr, 1985). Silverman (1998) explained that gifted individuals have asynchronous development relative to their chronological age, whereby their advanced intellectual ability and heightened emotional sensitivity qualitatively influences their concept of self and internal experiences. Research by Mayer et al. (2001) explored EI and emotional giftedness ($N = 11$), with emotional giftedness defined as high scores on the Multifactor Emotional Intelligence Scale (MEIS) in relation to adolescent social behaviour. The findings indicated that general intelligence and EI interacted, resulting in adolescents with higher EI being more competent in identifying information, organising the information and problem solving when related to themselves or others. Emotionally gifted students identified more subtle complexity and contradictions in social/emotional situations compared to those with lower EI (Mayer, Perkins, et al., 2001). Therefore, the high AEI developmental traits of the female high group may have been “over-thinking” the emotional challenges associated with the psychosocial and academic demands associated to their personal high goals and expectations of their academic performance in VCE.

Silverman (1993) also explained that gifted individuals may hold high expectations of themselves and aspire to untenable goals, which may be unrealistic and perfectionistic and therefore cause intense personal frustration, feelings of inadequacy
and disappointment. This frustration and feeling of never living up to one’s own expectations can be very self-defeating and negatively impact on one’s cognitive and emotional growth (Clark, 1992). The findings for the female high group were also consistent with the developmental traits of gifted students described by Piechowski (1991), affirming that increased cognitive acuity in intellectually gifted students often resulted in in-depth perception of emotional information. It is possible that the negative predictive effect in AEI for VCE academic achievement identified in the female high group, was reflective of the heightened emotional sensitivity of gifted females that may be coupled with perfectionistic traits and untenable personal goals, which may lead to academic underachievement (Reis, 2000; Rimm, 1986; Silverman, 1993).

Third, it is also plausible that the negative predictive effect of AEI in the female high group was influenced by their experiences of emotional/social isolation. Silverman (1998) noted gifted students were also found to experience psychological isolation from their peers relative to the to the degree their intelligence increases from approximately IQ 120, which was further exacerbated when their asynchronous developmental differences were acknowledged by their peers. Gross (1989) asserted that intellectually gifted students differ from their chronologically aged peers in both their intellectual and social/emotional development. Gifted students were uniquely faced with the dilemma of the psychosocial drive to fit in with their peers and meet their need for intimacy, which was contrasted with their drive for achievement, with high levels of academic achievement leading to the decreased ability to “fit in” with their peers (Gross, 1989). Consequently, the female high group’s AEI may have facilitated their heightened self-awareness of their social isolation, and their need to meet their drive for intimacy and social acceptance with their peers may have been reflected in the negative predictive effect of AEI on VCE academic achievement.

In summary, while the female high group’s VCE academic achievement was the highest of the four groups in the study, they were still academically underachieving in comparison to their high intellectual potential (Alsop, 1992; Rimm, 1986) due to the negative predictive effect of AEI. This finding provided further clarification to the research findings presented by (Petrides et al., 2004), through identifying a gender differentiation in the negative predictive effect of AEI for academic achievement for
students with an intellectual capacity of approximately IQ 128–130. While it is not possible to establish a causal reason for the negative predictive effect of AEI for the female high group’s VCE academic achievement, a range of plausible explanations have been outlined. The female high group had the highest AEI mean score of the four groups, which has been positively associated with psychological wellbeing (Mavroveli et al., 2007) and was anticipated to have been a protective factor for their readiness to learn. Despite the female high group’s AEI mean skills, their negative utilisation of AEI in their VCE academic achievement detracted them from reaching their academic potential based on the predictive effect of their IQ, which was evident in the small but negative predictive effect of AEI on VCE academic achievement. It is possible that the female high group’s emotional distress, which potentially stimulated the negative predictive effect of AEI for VCE academic achievement, may have stemmed from one or a combination of multiple factors, such as: periods of frustration and boredom experienced when they were working below their ZPD as theorised by Vygotsky (1978); their emotional sensitivity coupled with their inability to meet their own high standards of academic achievement driven by their own perfectionism (Silverman, 1993); or their inability to meet their own drive for intimacy with their peers that led to “dumbing down” in order to gain peer acceptance (Gross, 1989). Nonetheless, the negative predictive effect of AEI on VCE academic achievement in the female high group highlights the importance of acknowledging, understanding and addressing the unique individual differences in the predictive effect of AEI on VCE academic achievement.

5.7 Conclusion: Chapter Five

Chapter Five has discussed the major findings resulting from the analysis of Hypothesis One. Based on individual level data analysis from VCE students attending four Australian secondary schools, empirical evidence has demonstrated that AEI does indeed exist in VCE academic achievement. AEI, IQ and gender accounted for the unique and shared variance in the saturated regression model. The study results confirmed that AEI positively accounted for the unique variance in VCE academic achievement, beyond the simultaneous predictive effects of IQ and gender. This finding was consistent with previous research examining the relationship between EI in the adolescent population and academic achievement in secondary school (Chong Abdullah et al., 2004; Di Fabio &
Further, an examination of the individual differences in the IQ and gender groups found the predictive effect of AEI was heterogeneous subject to developmental differences in AEI, IQ and gender. The influence of AEI for the IQ and gender combination groups was heterogeneous: A positive predictive effect was found in the male low group (5.5 VCE points), female low group (4.1 VCE points), and the male high group (2.1 VCE points). However, the female high group (-0.7 VCE points) had a negative predictive effect, which was in contrast to the other three groups. The pattern in these results is consistent with the individual student’s appraisal of their developmental resources (AEI, IQ and gender) needed to meet the academic and psychosocial demands of VCE. Therefore, the individual differences in the predictive variance of AEI for VCE academic achievement identified in this model were conceptualised as a developmental, dynamic, and adaptively utilised by Year 12 VCE students based on their ZPD (Vygotsky, 1978). The heterogeneous predictive effect of AEI in VCE academic achievement identified in the current study necessitated a theoretical shift from conceptualising AEI as a unidimensional static construct that primarily focused on the degree of activation observed, to a multi-dimensional developmental framework which encompasses the dynamic and adaptive nature of AEI, based on individual adolescent developmental differences in the predictive variance of AEI in VCE academic achievement. In addition, the AEI mean score was discussed as a potential antecedent to the predictive effect of AEI in VCE academic achievement.

These results suggested the need to review the conclusions presented in the seminal research findings by Petrides et al. (2004). In the original study, positive bilinear interaction effect between IQ and trait EI, where the effects of trait EI differed as a linear function of IQ, was identified up to approximately one SD above the mean of the cohort. The current findings supported those of Petrides et al. (2004) and further clarify the predictive effects of AEI by gender and IQ. In this study, AEI was most strongly predictive of VCE academic achievement in the male low group followed by the female low group. Further, Petrides et al. (2004) found the positive predictive effect of trait AEI...
reversed beyond approximately IQ 128–130, after that point AEI became negatively predictive of academic achievement. The current study also found a negative predictive effect for AEI in the female high group, however a positive but incrementally smaller predictive effect was identified for AEI in the male high group. Chapter Six completes the discussion with a review of the major findings resulting from the analysis of Hypothesis Two_{(a, b, c, d)}.
CHAPTER SIX

Discussion: Hypothesis Two_{(a, b, c, d)}

Chapter Six discusses the research results from Hypothesis Two_{(a, b, c, d)}, which identified two major findings and eight key findings related to the investigation of the simultaneous predictive effect of IQ, gender and one of the AEI traits entitled: emotional recognition and expression, understanding emotions, emotion directs cognition and emotional management and control. The research results are discussed with reference to the study’s aim, Hypothesis Two_{(a, b, c, d)}, the study’s research questions and previous research, which subsequently led to the key findings in Chapter Six. The theoretical and methodological discussion presented in Chapter Five will not be reiterated in Chapter Six. First, the four GLM simultaneous saturated AEI trait regression models for the total cohort are discussed. Second, the individual differences in the decomposition analysis of the simultaneous predictive effect of the AEI trait regression models in the four IQ and gender combination groups are examined. The research results confirmed that the four AEI trait regression models were statistically robust and significantly predictive of the variance in VCE academic achievement. A statistically significant interactional effect was identified between emotions direct cognition and gender. An examination of the IQ and gender combination groups found the predictive effects of the AEI traits for VCE academic achievement were heterogeneous, subject to developmental differences in AEI traits, IQ and gender. The key findings identified in Chapter Six led to the conclusions presented in Chapter Seven.

Therein, Chapter Six discusses the research findings and outlines:

6.1 Null Hypothesis Two_{(a, b, c, d)}
6.2 Major Finding One: The Four AEI Trait, IQ and Gender Regression Models Predicted VCE Academic Achievement
6.3 Key Finding 1: Emotional Recognition and Expression, IQ and Gender Predicted VCE Academic Achievement
6.4 Key Finding 2: Understanding Emotions, IQ and Gender Predicted VCE Academic Achievement
6.5 Key Finding 3: Emotions Direct Cognition, IQ Gender Predicted VCE Academic Achievement

6.6 Key Finding 4: Emotional Management and Control, IQ and Gender Predicted VCE Academic Achievement

6.7 Major Finding Two: The Predictive Effects of AEI Traits is Heterogeneous in IQ and Gender Combination Groups

6.8 Conclusion: Chapter Six

6.1 Null Hypothesis Two\(_{(a, b, c, d)}\)

The combined effects of each of the adolescent emotional intelligence traits: emotional recognition and expression\(_{(a)}\), understanding emotions\(_{(b)}\), emotions direct cognition\(_{(c)}\) and emotional management and control\(_{(d)}\), IQ, gender and their interactions will not be predictive of academic achievement.

6.2 Major Finding One: The Four AEI Trait, IQ and Gender Regression Models Are Predictive of VCE Academic Achievement

Null Hypothesis Two\(_{(a, b, c, d)}\) investigated the predictive variance of AEI traits, IQ and gender for VCE academic achievement. A review of the four AEI trait regression models showed that the models were robust, with a predictive range of between 28% and 26% for VCE academic achievement for the total cohort. Therefore, Null Hypothesis Two\(_{(a, b, c, d)}\) was rejected.

The four regression models were representative of the AEI trait scores, with each model representing decomposition for IQ and gender. In the four saturated simultaneous regression models IQ, gender and the AEI traits accounted for the following percentage of variance in VCE academic achievement: emotional recognition and expression\(_{(a)}\) 27% \((r^2 = .279)\); understanding emotions\(_{(b)}\) 28% \((r^2 = .280)\); emotions direct cognition\(_{(c)}\) 26% \((r^2 = .263)\); and emotional management and control\(_{(d)}\) 28% \((r^2 = .283)\). The first key finding was that in each regression model the main positive effect for IQ was evident in each of the four models, which was consistent with previous research (Nisbett et al., 2012). In addition, main predictive effect for gender was evident in each model. A statistically significant interactional effect was identified between emotions direct cognition and gender. While not statistically significant, emotional recognition and
expression accounted for 1% of the variance, understanding emotions 2% of the variance, emotions direct cognition accounted for 2.5% of the variance, and emotional management and control accounted for 2.3% of the variance in VCE academic achievement.

The GLM saturated regression model predictive effects for the four AEI traits, IQ and gender for VCE academic achievement will now be discussed in more detail with reference to the relevant univariate and bivariate statistics. The predictive effect of each AEI trait is developmentally contextualised with reference to the formative biopsychosocial development (Gemelli, 2013), the changes that occur throughout the adolescent period (Sawyer et al., 2012) and, when relevant, the adolescent primary drives (Steinberg, 2011a). As discussed in Chapter Five, the four mean scores for each AEI trait are considered as an antecedent to the predictive effect of the AEI traits in VCE academic achievement. The predictive effect of each AEI trait is considered to be a response in the context of the academic and psychosocial demands of VCE as a potential stressor. The role and predictive effect of each AEI trait, IQ and gender for VCE academic achievement are considered with reference past research findings.

6.3 Key Finding 1: Emotional Recognition and Expression, IQ and Gender Predicted of VCE Academic Achievement

The GLM saturated regression model for emotional recognition and expression, IQ and gender predicted 27% ($R^2 = .279$), or approximately one-quarter of the variance in the VCE scores for academic achievement. Consistent with the other three AEI trait regression models, IQ provided the strongest main predictive effect in the emotional recognition and expression regression model. The second strongest main predictive effect was provided by gender, with females having higher VCE academic achievement scores than males. Emotional recognition and expression was positively predictive of 1% of the variance VCE academic achievement; however, this effect was not statistically significant in the final regression model. Further, an interactional effect was identified in the regression model between emotional recognition and expression and gender that accounted for a beta weight of 4.3 VCE points per standard deviation ($\beta = 4.35, p = 0.07$, ns); however, this interactional effect was not statistically significant in the final saturated regression model. In order to explore the plausible reasons for the statistically
insignificant predictive effect of emotional recognition and expression, particularly in regard to the interaction with gender in the saturated regression model, the univariate and bivariate analyses are discussed.

An analysis of the regression model found that the AEI trait emotional recognition and expression was not significantly associated to IQ, which was consistent with previous research by Saklofske et al. (2003). Further, in the current study a significant relationship between gender and IQ was not evident. However, there was a statistically significant relationship between gender and emotional recognition and expression, which did not remain significant in the final regression mode but was indicative of an underlying relationship in the model. In the current study a Pearson product-moment correlation coefficient found gender was significantly correlated with emotional recognition and expression \( (r = .11) \), which accounted for 1.2% of the shared variance in the relationship between emotional recognition and expression and gender. Emotional recognition and expression skills were higher in adolescent females \( (M_{ERE} = 52) \) than males \( (M_{ERE} = 47) \), accounting for a small variance of 1.1% between scores; however, in the current study an independent \( t \)-test indicated the variance between the males’ and females’ emotional recognition and expression skills was not significantly different. Nonetheless, the gender differentiation in emotional recognition and expression was consistent with previous research by Ciarrochi et al. (2001) and the review conducted by Sánchez-Núñez et al. (2008), who also found females had higher skills than males in perceiving emotions.

Stottlemyer (2002) examined the relationship between AEI and academic achievement, particularly Reading and Spelling in Year 11 and Year 12 secondary students in Texas. The result led Stottlemyer (2002) to conclude that it was likely that the AEI skills explicated the academic achievement difference accredited to gender. Further, females’ higher AEI skills, which typically encompass compassion/empathy, may have influenced females’ higher skills in Reading (Stottlemyer, 2002). Therefore, in light of the findings by Stottlemyer (2002), it is plausible that the gender effect identified in the current study also reduced or confounded the unique predictive effect of emotional recognition and expression in the final regression model. In addition, it is also plausible that emotional recognition and expression contributed to a relatively large component of
the shared variance in the final regression model (Nathans et al., 2012; Tabachnick & Fidell, 2007).

The relationship between emotional recognition and expression and VCE academic achievement was investigated using Pearson product-moment correlation coefficient. The results identified a small positive correlation between the two variables \( r = .12, N = 369, p < .05 \), with high levels of emotional recognition and expression associated with high levels of VCE academic achievement. Therefore, Year 12 students’ emotional recognition and expression helped to explain 1.4% of the shared variance in their VCE scores. As outlined, this finding was not evident in the final regression model; nonetheless, it provides an understanding of the relationships underlying the regression equation that impacted on adolescent students completing their VCE. This correlational finding suggested that Year 12 students with higher competencies in emotional recognition and expression, that is, those adolescents’ who had the ability to be aware of their emotional states, identified their emotions, expressed their emotions to others and recognised others’ emotions effectively, were also able to achieve higher scores in VCE academic achievement.

The correlational relationship between emotional recognition and expression and VCE academic achievement was consistent with previous research findings and theoretical models of EI. These findings were consistent with those presented by Parker, Creque, et al. (2004), who found EI intrapersonal abilities, such as the ability to recognised and label one’s feelings, were positively correlated to academic achievement \( r = .32 \). Further, those with higher interpersonal skills had higher academic achievement while those with lower interpersonal skills had lower academic achievement (Parker, Creque, et al., 2004). Research by Gil-Olarte et al. (2006) also found EI was moderately related to social competence and high school academic achievement. The findings in the current study were also consistent with that of Petrides et al. (2006), who examined the relationship between trait EI in children’s peer relationships at school. Children with high EI were rated higher on pro-social factors, received more nominations for co-operation and leadership and less nominations for disruption, aggression and dependence than those with lower CEI scores. Similarly, Elias (2006) also asserted that the first step in developing the essential skills for social/emotional and academic learning was to develop
the skills to identify feelings and to be able to recognise and label one’s feelings. This explanation is also theoretically consistent with the EI model developed by Mayer, Salovey, et al. (2000c), which conceptualised AEI as having four classes or branches, the first branch encompassing the individual’s perception and appraisal of emotion. Therefore, it is possible that adolescent students with more skills in emotional recognition and expression would be more skilled at developing positive relationships with their peers, teachers and others in their learning environments. These positive relationships were anticipated to assist their wellbeing and their ability to effectively engage in the process of learning in the classroom. Hence, it is possible that higher skills in emotional recognition and expression were adaptive as they enabled effective communication skills that could assist adolescents to express their own needs to others, to work more effectively in a group and therefore build positive relationships to increase their learning opportunities and support from others as they faced the psychosocial and academic demands inherent in VCE.

In contrast, the current study also found that Year 12 adolescent students with lower skills in emotional recognition and expression, who therefore had less awareness of their own emotional states and had more difficulty in identifying their own emotions and adaptively expressing their emotions to others, had low levels of VCE academic achievement. In addition, Moriarty, Stough, Tidmarsh, Eger, and Dennison (2001) utilised the Trait Meta-Mood Scale (TMMS) to examine AEI of a group of adolescent sex offenders (14 to 17 years of age) in comparison to a normative control group of adolescents. The results indicated the sex offenders had heightened attention to their feelings, however, they were less able to identify their emotions than the control group. Further, the adolescent sex offenders had higher levels of aggression and had more difficulty in repairing their unpleasant moods and extending their positive moods, relative to the control group. In light of the findings from the current study and the previous research outlined, it is possible that for some of the adolescents who had lower skills in emotional awareness, their weaker skills to accurately identify their own emotions consequently also reduced the effective or adaptive expression of their emotions to others. Therefore, it is plausible that adolescents’ lower skills in emotional self-awareness also contributed to their limited ability to express their emotions to others, which
subsequently had the potential to also reduce the possibility of getting the adaptive support they required from others, such as peers, adults or teachers.

Therefore, based on the findings in the current study, adolescents with lower skills in emotional recognition and expression attained lower scores in VCE academic achievement. Whereas, the findings from the current study found Year 12 students with higher skills in emotional recognition and expression attained higher scores in VCE academic achievement. Based on the decomposition of the GLM saturated regression model for emotional recognition and expression, IQ and gender for VCE academic achievement, the individual differences in the IQ and gender combination groups will be discussed.

6.3.1 Heterogeneous Individual Differences in Emotional Recognition and Expression

An analysis of the individual difference in the predictive variance of emotional recognition and expression for VCE academic achievement confirmed that the effect differed for each IQ and gender combination group, based on their developmental characteristics of AEI, IQ and gender, as illustrated in Figure 6.1. The ability for an adolescent to recognise their own subjective feelings and emotions, then to adaptively express their emotions to others, is a formative task for most Year 12 students in the late stage of adolescent development (Sawyer et al., 2012) who are subject to the structural and functional neurological changes that impact on how adolescents perceive, process and respond to emotional and cognitive information (Steinberg, 2011b). First, an examination of the IQ and gender combination groups found the predictive effect of emotional recognition and expression was strongest in the male low group \( b_{1a} = 5.30 \), positively predictive of 5.3 VCE points per standard deviation. Second, the strongest positive predictive effect for emotional recognition and expression was identified in the male high group \( b_{1a} = 1.17 \), with an increase of approximately 1.1 VCE points per standard deviation. Third, emotional recognition and expression was positively predictive of VCE academic achievement in the female low group \( b_{1a} = 0.95 \), accounting for approximately 1 VCE point per standard deviation increase in emotional recognition and expression skills. Fourth, in contrast to the other groups, emotional recognition and expression was negatively predictive of VCE academic achievement in the female high
group \((b_{1a} = -1.3)\), reflecting a decrease of approximately 1.3 VCE point per standard deviation. As presented in the Simple Slopes Data Plot, when emotional recognition and expression increased from -2 SD to 2 SD the positive predictive effects led to a reduction in the differences in VCE scores between the three IQ and gender combination groups, with the exception of the female high group.

![Emotional Recognition and Expression: Predictive Effect for VCE per SD](image)

**Figure 6.1** Predictive Effect of Emotional Recognition and Expression for VCE in Four IQ and Gender Combination Groups

A review of the emotional recognition and expression mean scores found the highest skills were identified in the female high group \((M_{ERE} = 54)\), followed by the female low group \((M_{ERE} = 52)\), male low group \((M_{ERE} = 48)\), and the male high group \((M_{ERE} = 46)\). This pattern of results was consistent with the gender differentiation identified for emotional recognition and expression in the total cohort, whereby adolescent females had higher scores than males. An examination of the mean scores for emotional recognition and expression in the female high group \((M_{ERE} = 54)\) and the
female low group \( M_E = 52 \) confirmed the results were not statistically significantly different. Similarly, an examination of the mean scores for emotional recognition and expression in the male low group \( M_E = 48 \) and the male high group \( M_E = 46 \) also established the results were not statistically significantly different. The gender differentiation with males having lower skills than females in emotional recognition and expression as found in the current study was consistent with previous research (Brackett, Mayer, & Warner, 2004; Downey, Mountstephen, et al., 2008; Parker, Creque, et al., 2004). The individual differences in the predictive effect of emotional recognition and expression in VCE academic achievement for the four IQ and gender combination groups are now outlined.

### 6.3.1.1 Male Low Group

Both the male low group and the male high group had the same gender and comparable skills in emotional recognition and expression; however, they differed in intellectual acumen. The predictive effect of emotional recognition and expression for VCE academic achievement in the male low group had the strongest predictive effect of 5 VCE points per \( SD \). While the positive predictive effect of emotional recognition and expression for VCE academic achievement in the male high group increased by approximately 1.2 VCE points per \( SD \). Therefore, the variance in the degree to which emotional recognition and expression was positively predictive effect of VCE academic achievement, was attributed to the comparative differences in intellectual capacity of the male low group and the male high group. The comparatively lower intellectual resources of the male low group plausibly stimulated the higher degree to which their emotional recognition and expression skills were directly utilised in VCE academic achievement. Therein, both the male low and male high groups directly utilised their emotional recognition and expression skills to differing degrees in VCE academic achievement. Further, the male low group \( M_E = 48 \) and the male high group \( M_E = 46 \) had the lowest emotional recognition and expression mean scores, however, they were also the two groups most strongly and positively influenced by the predictive variance of emotional recognition and expression for VCE academic achievement, accounting for 5.3 and 1.2 VCE points, respectively.
The male low group had the strongest predictive effect of emotional recognition and expression of the four IQ and gender combination groups, which accounted for 5.3 VCE points per standard deviation. Therefore, the male low group utilised the highest proportion of their resources as measured by their emotional recognition and expression mean score of 48, in optimising their VCE academic achievement. The individual differences in the predictive effect of emotional recognition and expression in the male low group were consistent with the intellectual compensation theory as described by Petrides et al. (2004); whereby the males low group’s intellectual capacity was comparatively lower than the male high group’s, which was estimated to place them under more stress than the male high group when attempting to meet the academic demands (Jensen, 1998) of VCE. Consequently, the positive predictive effect of emotional recognition and expression was subject to the male low group’s appraisal (Arnold, 1960b) of their ability to utilise their resources to meet the potentially stressful (Lazarus, 1993b) demands of VCE. Higher skills in emotional recognition and expression were predictive of higher VCE academic achievement and therefore acted as a protective factor for the male low group in times of stress.

Further, in the male low group’s lower skills in emotional recognition and expression were predictive of lower VCE academic achievement, with a decrease of 5.3 VCE points per standard deviation and therefore acted as a vulnerability factor for the male low group when meeting the demands of VCE. This finding is consistent with the theoretical model presented by Payne (1985), who also noted that maintaining present awareness of one’s own emotions was challenging and individuals would need support in developing these skills. Further, some individuals, particularly males who struggled to understand their own emotions, were more likely to be at risk of suppressing their emotions or by being overwhelmed by their emotions (Payne, 1985). The predictive effect of emotional recognition and expression is also understood with reference to the previous research by Brackett et al. (2004) who investigated EI in college students (N = 330) and found males had lower EI than females. Further, for males with lower skills in AEI, their lower skills in perceiving emotions and subsequently utilising emotion to facilitate thought was associated with increased drug use, alcohol use, deviant behaviour and poor relationships with friends in the college (Brackett et al., 2004).
6.3.1.2 Male High Group
In the male high group, the positive predictive effect of emotional recognition and expression accounted for 1.17 VCE points per standard deviation. This finding was also consistent with the intellectual compensation theory as described by Petrides et al. (2004). In light of the male high group’s advanced intellectual resources, they were anticipated to experience less stress than the male low group in utilising their intellectual resources to meet the academic demands of VCE. Therefore, the comparatively lower levels of stress were addressed with a smaller predictive effect of emotional recognition and expression in VCE academic achievement. Consistent with the findings in the male low group, higher skills in emotional recognition and expression in the male high group were predictive of higher VCE academic achievement; while lower skills in emotional recognition and expression in the male high group were predictive of lower VCE academic achievement. This finding was also consistent with the research by Trinidad and Anderson Johnson (2002) who found a negative correlation between AEI and substance use of tobacco and alcohol in middle school adolescent students ($M_{age} = 12.63$ years, $N = 205$). The findings for the predictive effect of emotional recognition and expression for VCE academic achievement in the female low group and the female high group are now discussed.

6.3.1.3 Female Low Group
The female low group ($M_{ERE} = 52$) and the female high group ($M_{ERE} = 54$) had the higher mean scores for emotional recognition and expression than the male low group and the male high group. Yet the predictive effect of emotional recognition and expression in the female low group and female high group were lower than that of the corresponding male groups, accounting for 1 VCE point and -1.3 VCE points per standard deviation, respectively. Potential mechanisms that underlie the pattern of results in the female low group and the female high group are now outlined.

First, there was not a statistical difference between the mean scores of emotional recognition and expression in the female high group and the female low group. Therefore, both female groups had the same gender and comparable skills in emotional recognition and expression, while differing in their intellectual acumen. It is plausible
that the higher emotional recognition and expression mean scores in both female groups acted as a promotive factor, which supported the adolescent females’ wellbeing and was a resource that could be utilised as required when engaging in the learning processes encompassed in VCE academic achievement. Second, the individual differences in the predictive effect of emotional recognition and expression for VCE academic achievement in the female low group and the female high group are explained with reference to developmental differences in intellectual acumen, gender and emotional recognition and expression.

The degree to which emotional recognition and expression was predictive of VCE academic achievement was lower in the female low group (accounting for 1 VCE point), than the male low group (accounting for 5.3 VCE points). There might be a range of plausible reasons for this pattern of results. Three plausible contributing factors are outlined:

First, both groups had comparable intellectual resources, suggesting they would both face relatively similar high levels of stress in meeting the academic demands of VCE, when compared to the male and female high groups. Second, the biopsychosocial adolescent gender differences in each group may have partially contributed to the 4.3 VCE point difference between the female and male low group. Female adolescents commence puberty approximately two years before adolescent males, with the adolescent growth spurt occurring on average at 12 years of age in females and 14 years of age in males (Steinberg, 2011a). The earlier maturation of adolescent females suggests females may be more mature in identifying and understanding their own emotions relative to their chronologically aged male peers. Gender differences in neurological processing have also been identified, with females having higher skills in the EI domain and males having higher skills in the visuospatial ability domain (Jaušovec & Jaušovec, 2008). Neurological gender differences that are partially influence by hormones are explained within the framework of the Empathizing–Systemizing Theory (E–S); with females showing a preference for empathising with others by 12 months of age (Baron-Cohen, 2005). Baron-Cohen (2005) found females had a stronger drive for empathising with others emotions and thoughts, which also required them to understand their own emotions. While males had a stronger drive for systemising, which required them to
deduce the underlying rules that influence the behaviour of a system (Baron-Cohen, 2005). Further, the socialisation of emotionality in adolescent males and females may also be influenced by cultural norms, whereby, females are socialised to express their emotions and males are socialised to suppress or moderate their emotional expression, relative to the socially accepted norms in Western society (Payne, 1985; Sánchez-Núñez et al., 2008). Therefore, the female low group’s biopsychosocial development may have influenced their drive and motivation to utilise and further develop their skills in recognising their own emotions and adaptively expressing their emotions to others, in comparison to the male low group.

Third, the positive predictive effect of emotional recognition and expression for VCE academic achievement found in the female low group was consistent with the positive predictive effect found in the male low group—the differences between the groups were not statically significant. However, it is possible that the female low group may have more readily utilised their skills in emotional recognition and expression than the male low group, which may have acted as a positive antecedent to reduce the female low group’s appraised stress level associated to successfully meeting the academic demands of VCE. Therefore, it is possible that the female low group’s utilisation of their emotional recognition and expression skills as an antecedent indirectly reduced the degree to which emotional recognition and expression was directly utilised in the predictive effect of VCE academic achievement, in comparison to the male low group. This possible explanation is considered with reference to research examining the moderator role of gender in the relationship between EI (ability model) and depression by Siegling, Vesely, and Saklofske (2013) in high school and university students (N = 620). The results indicated that low EI was related to depression in males but not in females (Siegling et al., 2013). Consequently, it is possible that the male low group had more difficulty than the female low group in actually identifying and expressing their emotions as an antecedent. Therefore, the male low group had a stronger need to actually utilise their emotional recognition and expression skills in the process of learning in Year 12, which was evident in the positive predictive effect of emotional recognition and expression accounting for 5.3 VCE points per standard deviation.
6.3.1.4 Female High Group

The female high group had the highest mean score of emotional recognition and expression of the four groups, yet also had the lowest negative predictive effect of emotional recognition and expression of the four groups accounting for -1.3 VCE points per standard deviation. Therefore, the female high group’s results indicate that: (a) their developmental characteristics were reflected in their resources (high intellectual potential, female gender, and high skills in emotional recognition and expression), their personal goals and their appraisal; (b) the female high group may have been overly sensitive to other peoples’ emotions; and (c) the psychosocial and academic demands of their VCE environment may have included the mechanisms underlying the negative predictive effect of emotional recognition and expression on their VCE academic achievement. While the mechanisms underlying the negative predictive effect of emotional recognition and expression for VCE academic achievement cannot be established in the current study, a range of possible explanations for this finding are discussed. Silk, Steinberg, and Morris (2003) examined adolescents’ emotional regulation and adjustment in secondary school students in Years 7 and 10 (N = 152). Gender differences were found in the intensity of emotions reported, as females reported higher levels of anger, sadness and anxiety than males. Females also reported higher mood fluctuations for sadness and anxiety than males. Research by Silk et al. (2003) that found female adolescents had more intense and fluctuating emotions than adolescent males. Therefore, in light of the fact that adolescent female high group’s mean score for emotional recognition and expression was higher than the other three IQ and gender combination groups—the current research results for the female high group led to the following question. Are the emotional recognition and expression skills in the female high group too sensitive?

Further, other plausible reasons for the pattern of results in the female high group’s VCE academic achievement are considered with reference to adolescent development and previous research findings (Ciarrochi et al., 2002; Craig et al., 2009; Luthar & Ripple, 1994; Ramos, 2007). Ciarrochi et al. (2002) examined the relationship between AEI, stress and mental health in university students (N = 302). The findings indicated that stress was associated with higher rates of reported depression, hopelessness and suicidal ideation in those with higher skills of emotional perception than others.
Therefore, emotional perception moderated the relationship between stress and mental health. Ciarrochi et al. (2002) speculated that those with lower perceptual skills were less aware, insensitive or confused about the realities of the stressful effects on them, while the individuals with higher perceptual skills were more aware and sensitive to stress, which led to higher levels of depression, hopelessness and suicidal ideation. The findings presented by Ciarrochi et al. (2002) are particularly relevant to the female high group as they had higher skills in emotional recognition and expression, which may have also indicated that they were more emotionally self-aware, perceptive and sensitive to stress than the other three groups in the study. That the heightened emotional recognition and expression skills in the female high group were also reflective of the theory of positive disintegration by Dabrowski (1972) that suggested intellectually gifted young people typically had a very advanced development of their internal psychic milieu, including emotional over-excitability. Further, in light of the female high group’s augmented skills in emotional recognition and expression, it is plausible that they were also more reactive to their heightened subjective experiences, which stimulated the negative predictive effect of emotional recognition and expression for VCE academic achievement.

In addition, the negative predictive effect of emotional recognition and expression for VCE academic achievement in the female high group was considered in light of the research investigating intellectually gifted adolescents’ sensitivity to stress (Luthar & Ripple, 1994). Luthar and Ripple (1994) examined the interactions between adolescents with normative intelligence and high intelligence (gf) and emotional distress, with a focus on predicting social competence. Social competence was operationalised by teacher and peer ratings of adolescents’ social skills and academic grades for inner-city adolescents (N = 138). Luthar and Ripple (1994) identified intellectually bright adolescents and divided them into two groups: those with low emotional distress and those with high emotional distress (internalising depression and anxiety). Gifted adolescents with low emotional distress increased their social competence over a six-month period. In contrast, gifted adolescents with high emotional distress decreased their social competence over the same period of time. These findings indicated that intellectually gifted students with high levels of subjective distress gradually decreased in their social competence over time. However, Luthar and Ripple (1994) found no such increase or decrease in the
adolescents with normative intelligence. The research by Luthar and Ripple (1994) is relevant to the female high group who were characterised by both being intellectually gifted ($M_{IQ} 123$), and having higher skills in emotional recognition and expression than the other groups in the study. Therefore, the female high group had higher cognitive skills in the stage of formal operation thinking (Piaget, 1958) that supported thinking more abstractly, hypothetically and meta-cognitively about themselves and others. In addition, the female high group also had heightened emotional recognition and expression skills, which may have been reflective of Dabrowski’s theory of emotional over-excitabilities found in intellectually gifted students (Piechowski, 2002), that arguably led to higher subjective distress stemming from their appraised challenges, threats and fears (Smith, Haynes, Lazarus, & Pope, 1993) in VCE academic achievement. Consequently, this potentially led the female high group to feel more distressed over an extended period of time, which then gradually led them to utilise their skills in emotional recognition and expression maladaptively and negatively impacted on their VCE academic achievement.

In summary, heterogeneous individual differences in the predictive effect of emotional recognition and expression for VCE academic achievement were evident in the IQ and gender combination groups. The positive predictive effect of emotional recognition and expression was dynamically utilised in the male low group, female low group and male high group to formatively effect VCE academic achievement. The male low group’s VCE academic achievement was the most strongly influenced by their skills to recognise and express their emotions in VCE academic achievement. Of the four IQ and gender combination groups, the female high group had the largest mean score for emotional recognition and expression, relative to the remaining three groups. However, the female high group was educationally at risk for academic underachievement in VCE due to the negative predictive effect of emotional recognition and expression in VCE academic achievement. It is plausible that the female high group’s advanced emotional recognition and expression skills were reflective of their emotional over-excitabilities (Piechowski, 2002) that potentially increased their sensitivity to stressors and stimulated the negative predictive effect of emotional recognition and expression for VCE academic achievement identified in the current study. Therefore, these results provide evidence for the heterogeneous developmental, dynamic and adaptive predictive effect of emotional
recognition and expression for VCE academic achievement in the IQ and gender combination groups. The discussion now considers the predictive effect of understanding others emotions, IQ and gender in VCE academic achievement.

6.4 Key Finding 2: Understanding Emotions, IQ and Gender Predicted VCE Academic Achievement

In the current study the AEI trait of understanding emotions refers to the Year 12 adolescents’ self-perception of their skills to identify and understand the emotions of others, or to “read” another person’s emotions and feelings (Luebbers et al., 2007). The importance of understanding emotions is outlined first, from an evolutionary perspective and second, from a neurological perspective.

First, historically homo sapiens have depended on inclusion in small groups for survival, specifically for protection from predators, sharing food, sharing resources and optimising the chances of successful reproduction (Darwin, 1872). From an evolutionary perspective, all of these factors have made humans motivated to be included in a group (Gluckman et al., 2009). Further, gaining the approval of others in the group is essential to successfully being included as a member in the group and consequently, receiving the benefits and the safety of the group (Gluckman et al., 2009). Within this social context the individual’s wellbeing has become strongly associated to their social connectedness, particularly the individual’s attachment to their primary carer (Bowlby, 1968) and adolescents’ attachment to their peer group (Gluckman et al., 2011b). Therefore, the disapproval of others can be a threat to one’s group membership, and therefore survival (Darwin, 1872).

Second, the ability to identify, understand and predict the thoughts, emotions and consequently the behaviours of others is referred to as the Theory of Mind (Baron-Cohen, Leslie, & Firth, 1985), is formative to the adaptation of strategic social interactions to optimise the individual’s survival. Individuals with autism have a dysfunction in the mirror neuron system and therefore have significant difficulties in developing and utilising their Theory of Mind in social communication (Dapretto et al., 2006). Individuals with autism have a limited ability to anticipate the intent of others, and typically find it difficult to determine the intentionality of others at the third order of intentionality (i.e. to assess what a second person is thinking about me) and beyond
(Gluckman et al., 2009). In addition, the development of a sense of self that occurs throughout the adolescent stage of development is formatively influenced by the group beliefs and values which the individual adapts into their own concept of self to harmonise with the group (Gemelli, 2013). Consequently, the current study analysed the simultaneous predictive effect of understanding others’ emotions, IQ and gender in VCE academic achievement for students who were in the late stage of adolescent development.

The saturated regression model for understanding emotions in others, IQ and gender predicted 28% ($R^2 = .280$) of the variance in VCE academic achievement scores. An analysis of the main effects in the saturated regression equation found that IQ ($b = 17.32$) accounted for 6.6% of the unique variance in VCE scores. Therefore, IQ provided the strongest predictive effect in the model for VCE academic achievement, which was consistent with previous research (Neisser et al., 1996). The second strongest simultaneous predictive effect in the model was provided by gender ($b = -9.02$), which uniquely accounted for 2.9% of predictive effect of VCE academic achievement. This finding was consistent with previous research on gender and academic achievement that found females outperform males in secondary education (Van de gaer et al., 2009). The third strongest unique predictive effect in the regression model was for the variable understanding emotions ($b = 2.0$), which accounted for 0.7% of the variance in VCE academic achievement; however, this relationship did not reach statistical significance in the final regression model. The statistically insignificant unique predictive effect of understanding emotions found in the current study was in disparity to the previous research by Downey, Mountstephen, et al. (2008) who found understanding emotions was significantly predictive of academic achievement in secondary school students, accounting for 12% of the variance in Art and 8% of the variance in Geography. Finally, the fourth strongest predictive effect was identified in the interactional relationship between gender and understanding emotions that accounted for 0.29% of the unique variance; however, this relationship was not statistically significant in the final regression model. Nonetheless, these statistically insignificant relationships may provide insight into the underlying relationships that influenced the predictive effect of understanding emotions in the final regression equation (Nathans et al., 2012). Therefore, the univariate and bivariate statistical findings are now discussed.
The bivariate analysis conducted in the current study identified a positive correlation between understanding emotions and academic achievement, which accounted for 2.5% \((r = .16, p < .01)\) of the variance in VCE academic achievement. Hence, Year 12 students with higher levels of understanding emotions also had higher levels of VCE academic achievement. However, the correlational relationship between understanding emotions and VCE scores, which explained 2.5% of the variance in VCE scores, was in contrast to the statistically insignificant unique predictive effect of understanding emotions in the regression equation, which explained 1% of the variance in VCE scores. As understanding emotions was not correlated to IQ \((r = .01, \text{ns})\) in the current study, it seemed unlikely that IQ influenced the predictive effect of understanding emotions in the final regression model. However, the relationship between understanding emotions and gender warrants further consideration.

Adolescent females had a statistically significantly higher average mean score \((MUE = 56)\) for understanding emotions in others than adolescent males \((MUE = 48)\) in Year 12 \((r = .12, p < .05)\), although the effect size was small \((d = 0.25)\). This finding was consistent with previous research in the adolescent population (Luebbers et al., 2007; Tapia & Marsh, 2006). In addition, it is possible that this finding may be partially reflective of the gender differences in the neuroanatomical development of the human mirror neuron system (Cheng et al., 2009). Magnetic resonance images have found structural neuroanatomical gender differences in the mirror neuron system, whereby young adult females had larger gray matter volume (specifically in the volume pars opercularis and inferior parietal lobule) and higher self-report scores in emotional empathy than matched males (Cheng et al., 2009). As previously suggested by Stottlemyer (2002), it is plausible that the gender differences in academic achievement, which have traditionally been attributed to differences in males’ and females’ language skills and engagement learning (Van de gaer et al., 2009), may also be partially influenced by gender differences in the AEI trait of understanding emotions in others.

As previously discussed, it is also plausible that the nature of the saturated regression model may have also contributed to the higher degree of shared variance and lower degree of unique variance in the predictive effect of understanding emotions for VCE academic achievement; therefore, accounting for the disparity between the stronger
correlational relationship and the statistically insignificant unique predictive effect of understanding emotions in the final regression model (Nathans et al., 2012). Further, understanding emotions ($r = .16$) was more strongly correlated to VCE academic achievement than gender ($r = -.10$), yet the predictive effect of gender was three times larger than that of understanding emotions in the final regression equation. Therefore, it is possible that gender may have partially influenced or confounded the main positive predictive effect of understanding emotions in the regression equation (Nathans et al., 2012). Nonetheless, the pattern of results found in Hypothesis Two(a) with respect to the predictive effect of emotional recognition and expression for VCE academic achievement were consistent with the pattern of results found in Hypothesis Two(b) with respect to the predictive effect of understanding emotions for VCE academic achievement for the total cohort.

Further, the potential mechanisms that underlie the individual differences in the predictive effect of understanding others’ emotions for VCE academic achievement are considered with reference to the ecology of human development (Bronfenbrenner, 1977). Therefore, the individual differences in the predictive effect of understanding emotions for VCE academic achievement are discussed with reference to the individual Year 12 student as they develop throughout the adolescent period and interact upon, with and in response to their environments. The individual Year 12 students are conceptualised as being embedded in social structures referred to as a microsystem, mesosystem, exosystem and macrosystem (Bronfenbrenner, 1977). Therein, the individual differences in the predictive effect of understanding others’ emotions for VCE is discussed with reference to: relationships developed as the Year 12 student interacted with their family, peer group, and school environment (microsystem); interrelations among family, peer group, and school environment (mesosystem); the neighbourhood, mass media, local, state and national government, employment and informal social networks (exosystem); prototypes or patterns of culture such as one VCE classroom appearing and functioning similar to others in the same culture as it follows the laws and regulations of the education department (macrosystem); and the overarching institutional patterns of the culture such as the economic, social, educational, legal and political systems, which influence the manifestation of the microsystem, mesosystem, and exosystem.
(macrosystem) (Bronfenbrenner, 1977, 1979). Therefore, the individual differences in the predictive effect of understanding emotions for VCE academic achievement are discussed within the social context of the individual growing and learning within a family, their peer group, secondary school classroom and school environment, the wider social and cultural context of the Australian society and the member countries of the OECD (2014) when applicable (Bronfenbrenner, 1977).

### 6.4.1 Heterogeneous Individual Differences in Understanding Emotions

The AEI trait of understanding emotions was positively predictive of VCE academic achievement in the male low group \((b_{1a} = 5.0)\), the male high group \((b_{1a} = 2.2)\) and the female low group \((b_{1a} = 2.0)\), as illustrated in Figure 6.2. In contrast, the AEI trait of understanding emotions was positively predictive of VCE academic achievement in the female high group \((b_{1a} = -0.2)\). A comparison of the individual differences in the predictive effect of understanding emotions in the four IQ and gender groups was made. Understanding others’ emotions had the strongest predictive effect on the VCE academic achievement of the male low group by accounting for increase or decrease of 5 VCE points per standard deviation for an increase or decrease in the ability to understanding emotions in others. Understanding emotions in others provided the second strongest predictive effect for VCE academic achievement in the male high group, accounting for an increase or decrease of 2.2 VCE points per standard deviation relative to an increase or decrease in the Year 12 students’ skills. Commensurately, the third strongest positive predictive effect of understanding others emotions for VCE academic achievement was found in the female low group, accounting for 2 VCE points per standard deviation increase or decrease in their ability to understand others emotions. Dissimilarly, the predictive effect of understanding others’ emotions in the female high group had a small negative relationship with VCE academic achievement. As the female high group’s ability to understand others’ emotions increased, their VCE academic achievement decreased and as their ability to understand emotions in others decreased, their VCE academic achievement increased by 0.2 VCE points per standard deviation. The pattern of individual differences in Year 12 students’ ability to understand the emotions of others is also discussed collectively in the four groups, with a review of the four linear predictive effects of understanding emotions in others.
Figure 6.2 Predictive Effect of Understanding Emotions for VCE in Four IQ and Gender Combination Groups

As presented in the Simple Slopes Data Plot, with the exception of the female high group, the differences in VCE points between the IQ and gender combination groups were lowered from $-2\;SD$ to $2\;SD$ when their self-reporting skills in understanding emotions increased. Therefore, these findings confirm the predictive effect of understanding emotions was heterogeneous for VCE academic achievement. The pattern found in the predictive effect of understanding emotions for VCE academic achievement was very similar to the predictive effect of emotional recognition and expression for VCE academic achievement. It is plausible that the replication of the individual differences in the pattern of results in both the AEI traits of emotional recognition and expression in one’s self and the ability to understanding emotions in others offer preliminary support.
for the contention that both AEI traits are utilised adaptively (Darwin, 1872) in order to optimise the group’s survival when challenged by the demands of VCE academic achievement. This contention will be discussed with reference to the individual differences in the predictive effect of understanding emotions in others for VCE academic achievement; particularly in light of the adolescent developmental differences in the Year 12 students’ resources (AEI, IQ and gender) identified in the four IQ and gender combination groups to meet the academic and psychosocial demands inherent in VCE.

6.4.1.1 Male Low Group
The male low group’s AEI trait mean scores were in the lower range for emotional recognition and expression and understanding emotions, yet the degree to which they were predictive of VCE academic achievement was the highest of the four developmental groups. This pattern may suggest that the mean scores represented the male low group’s total resources and the predictive effect was indicative of the degree to which they were directly utilised in VCE. The male low group’s ability to understand others’ emotions ($M_{EU} = 48$) was not statistically differentiated to the male high group’s ($M_{EU} = 49$); therefore, it is reasonable to suggest that both groups had similar skills or resources to access in understanding others’ emotions and therefore with building positive relationships with both their teachers and classmates. Hence, the male low group and the male high group had comparable skills in their ability to interact with others, which included adolescents’ ability to interpret others’ thoughts, emotions and behaviours (Gluckman et al., 2009). The ability to understand others’ emotions was also required by both the male low and high groups to building positive relationships with others such as: members of their family, members of their school community including teachers and classmates, members of their peer group, and other individuals in their community (Bronfenbrenner, 1979). In addition, the male low group and the male high group had the same gender. Therefore, the individual differences in the predictive effect of understanding emotions for VCE in the male low group and the male high group could not be explained by differences in their gender or differences in their understanding emotions mean scores. However, as previously outlined, the fluid intelligence of the male low group ($M_{IQ} = 98$) was less than that of the male high group ($M_{IQ} = 124$).
Therefore, the male low group was more likely to have found the academic demands of VCE more challenging than the male high group due to their comparatively limited intellectual resources (Petrides et al., 2004). The greater the decline in the male low group’s intellectual capacity below the mean IQ of 100 (Jensen, 1998), the greater the increase in the academic difficulty in the male low group and the more they were anticipated to experience stress as they attempted to utilise their intellectual resources to cope with the academic demands of VCE. Further, a decline in their intellectual capacity was anticipated to be associated to increasing experiences of worry, poor academic performance and/or fear of academic failure in Year 12. Therefore, the male low group was anticipated to be subject to comparatively higher levels of psychosocial strain, stress, worry, threat and fear than the male high group, due to their lower average intellectual capacity to meet the academic demands inherent in VCE when compared to the male high group. Therefore, the male low group’s higher levels of psychosocial strain and stress were speculated to have stimulated a comparative need for the utilisation their skills in understanding the emotions of others in order to cope (Lazarus & Folkman, 1984) with the stress of learning the VCE curriculum within the interactive social context of a VCE classroom in a secondary school environment (Vygotsky, 1978).

6.4.1.2 Male High Group
The male high group’s stronger intellectual capacity was anticipated to serve as a protective factor, which would provide members of the male high group more intellectual acumen or resources to meet the academic demands of VCE. It was anticipated that the degree to which the members of the male high group’s intellectual capacity increased above the mean IQ of 100 would be commensurate with their intellectual capacity to meet the academic demands of VCE. The developmental differences in the intellectual resources of the male low group and the male high group were plausibly a primary stimulus for stress in both groups, arguably stimulating comparatively higher and lower levels of stress in each group, respectively. Therein, the differences in intellectual resources found in the male low and high groups differentiated the respective academic and psychosocial demands inherent in VCE and the subsequent stress placed on each group, which was evident in the individual differences in the predictive effect of understanding others’ emotions in VCE academic achievement.
Further, the positive predictive effect of understanding emotions in others accounting for 5 VCE points in the male low group may also be considered from an adolescent developmental perspective. Adolescents partially define their concept of self through their own direct self-appraisal (what I think of myself) and, to a higher degree than adults, they also incorporate the reflected self-appraisal of others (what I think you think of me) in their concept of self (Pfeifer et al., 2009). Consequently, the adolescent male low group may be developmentally sensitive to their own self-appraisal of their academic abilities. In addition, they may be particularly sensitive to others’ appraisal of their poor academic performance or academic failure in the classroom and wider secondary school environment. Hence, receiving poor grades in front of classmates or to be seen as academically failing by parents, teachers or peers, may have a particularly strong impact on the male low group’s concept of self (Pfeifer et al., 2009), relative to the male high group.

It is plausible that as the male low group’s intellectual capacity fell below IQ 100, they were more likely to experience academic demands beyond their intellectual capacity leading to increased risk of academic underachievement or failure (Jensen, 1998), despite their academic efforts. Students experiencing academic failure or difficulties in learning the VCE curriculum in the male low group were also plausibly at increased social and emotional risk (Lipka & Siegel, 2006), potentially experienced elevated feelings of shame, guilt, remorse, loneliness, anger, anxiety, and in some extreme cases, depression (Kiuru, Leskinen, Nurmi, & Salmela-Aro, 2011). These negative feelings may have also contributed to the increased possibility of some members of the male low group feeling that they didn’t belong or weren’t respected by or connected to teachers or peers at school, and therefore felt socially isolated (McNeely & Falci, 2004). Therein, the male low group’s increased likelihood of poor academic performance or risk of academic failure may have also placed strain on their ability to understand others’ emotions, particularly on their drive to feel in control and develop a sense of autonomy, academic achievement and peer group acceptance (Steinberg, 2011c). Based on the male low group’s comparatively lower intellectual resources relative to the male high group’s, it is plausible that the male low group was more likely to have experienced higher levels of psychosocial stress and potentially higher levels of the social pain of rejection.
(Eisenberger, 2012), relative to the degree to which they appraised themselves and others (teachers, peers) appraised them of successfully or unsuccessfully keeping up with their Year 12 studies. From a neurological perspective, the social pain associated to one’s self-appraisal or reflected self-appraisal as being at risk of academically failing may have also stimulated some of the same neurological pain substrates as physical pain in the brain (Eisenberger, 2012). Arguably, from an evolutionary theoretical perspective, some social pain may have been a motivating factor (Eisenberger, 2012) for the male low group and to a lesser degree for the male high group, which could drive them to seek avoidance of social isolation/rejection and therefore to work harder to keep socially connected (Lieberman, 2013) with their Year 12 group in order to optimise their survival and achieve their goal of completing VCE.

Hence, the study findings confirmed that higher skills in understanding the emotions of others was positively associated with higher academic achievement in VCE in the male low group and the male high group; however, the degree of the predictive effect of understanding emotions for VCE academic achievement varied for each group. This result also reflected previous research that found higher levels of EI were associated with prosocial behaviours in adolescents (Charbonneau & Nicol, 2002b) and happiness (Chamorro-Premuzic et al., 2007). The individual differences in the predictive effect of the male low group and the male high group are theorised to be adaptive, stemming from the intellectual developmental differences in each group, which then manifested in differentiated psychosocial demands associated with completing VCE. The individual differences in the academic and associated psychosocial demands of VCE for the male low group and the male high group were anticipated to have stimulated the individual differences in the predictive effect of understanding the emotions in others for VCE academic achievement. Further, in both the male low group and the male high group, those with lower skills in understanding the emotions of others had lower levels of VCE academic achievement. This finding was consistent with the social constructivist theory by Vygotsky (1978), which suggested that more effective learning takes part within the context of a relationship. Therefore, VCE students who have lower skills in understanding others’ emotions may have more difficulties in developing effective relationships with teachers and peers that could support their learning. Members of the
male low group with lower intellectual resources and lower skills in understanding the emotions of others may be particularly at risk for poor academic achievement in VCE. A similar pattern of results was also identified in the female low group, providing further support for the developmental differences in each group to partially account for the individual differences in the predictive effect of understanding emotions in VCE academic achievement.

6.4.1.3 Female Low Group

The female low group (\(M_{IQ} = 100\)) had comparable intellectual resources to the male low group (\(M_{IQ} = 98\)), hence it was anticipated both groups would have similar intellectual challenges in meeting the demands of the VCE curriculum. However, the female low group (\(M_{UE} = 56\)) had a statistically higher mean score for understanding emotions in others than the male low group (\(M_{UE} = 48\)) with a small effect size (\(d = .28\)), which was consistent with previous research (Downey et al., 2010). Interestingly, the predictive effect of understanding emotions in the female low group accounted for 2 VCE points per standard deviation, which was less than the predictive effect of understanding emotions in the male low group, which accounted for 5 VCE points per standard deviation. While it is beyond the scope of the current study to determine the mechanisms for this finding, a plausible explanation is outlined. The female low group’s higher skills in understanding others’ emotions when compared to the male low group, may have acted as a protective antecedent that reduced the predictive effect of understanding emotions in others for VCE academic achievement, despite both groups facing similar academic challenges due to their comparable intellectual resources. Speculatively, it is possible that the female low group was able to use their understanding of others’ emotions in a range of ways to reduce the potential psychosocial stress associated to attempting to meet the academic demands of VCE. For example, the female low group may have been able to use their understanding of others’ emotions to build more social cohesion and therefore a network of supporting teachers and peers to build up their own self-appraisal and to provide positive reflected self-appraisal of others in their concept of self (Pfeifer et al., 2009). The female low group had also been “flying under the radar” to minimise the possibility of others such as their teachers and peers being aware of their intellectual challenges and subsequently reducing the negative self-appraisal of others, thereby
experiencing less psychosocial stress than the male low group and leading to a lower predictive effect of understanding emotions in others for VCE academic achievement.

A review of the intellectual capacity of the female low group ($M_{IQ} = 100$) and the female high group ($M_{IQ} = 124$), found the female low group had less intellectual resources to meet the demands of VCE than the female high group. Further, a comparison of the understanding emotions mean score in the female low group ($M_{UE} = 56$) and the female high group ($M_{UE} = 56$) found they had identical skills in the ability to understand emotions in others. Both the female low group and the female high group had higher skills than the male low group and the male high group in attributing and understanding the mental cognitive and emotional states of others, which was consistent with previous research findings (Barlow, Qualter, & Stylianou, 2010; Chong Abdullah et al., 2004; Luebbers et al., 2007; Petrides & Furnham, 2000a; Salguero et al., 2012; Sánchez-Núñez et al., 2008; Tapia & Marsh, 2006). Consistent with the pattern of results identified in the male low group and the male high group, the positive predictive effect of understanding emotions in others in the female low group accounted for 2 VCE points per standard deviation. Hence, the positive heterogeneous predictive effect of understanding others’ emotions in VCE academic achievement in the female low group, male low group and male high group indicated that adolescents with higher skills in understanding others’ emotions were more likely to attain a higher level of academic achievement in VCE. This finding was consistent with research by Downey, Mountstephen, et al. (2008) that found the AEI trait understanding emotions was predictive of academic achievement in Art and Geography. In addition, the current findings were consistent with previous research that found understanding emotions was negatively associated with adolescent bullying behaviours (Lomas et al., 2011). Further, this finding was also reflected in previous research by Mavroveli et al. (2007) that found the trait EI understanding emotions in others was positively associated with adaptive coping styles and peer-rated pro-social competence in adolescents, while being negatively associated with depression, somatic complaints and male adolescent maladaptive coping strategies.

### 6.4.1.4 Female High Group

In contrast, the ability to understand emotions in others in the female high group was negatively predictive of VCE academic achievement, accounting for a small
reduction in academic achievement of 0.2 VCE points per standard deviation. The developmental characteristics of the female high group are compared to the female low group in order to seek to understand potential mechanisms that may have contributed to this finding. Importantly, both the female high group and the female low group had two developmental variables in common, their gender and their skills in understanding emotions in others, but differed in their intellectual capacity. Therefore, despite the female high and low group having the same gender traits and skills in understanding others’ emotions, the predictive effect of understanding emotions in others positively accounted for 2 VCE points per standard deviation in the female low group and negatively accounted for -0.2 VCE points per standard deviation in the female high group.

One plausible explanation for the small negative predictive effect of understanding emotions for VCE academic achievement in the female high group may be that their higher intellectual capacity was combined with their higher sensitivity. It is plausible that the female high group may have utilised their heightened intellectual capacity and higher sensitivity to be overtly critical in the process of the cognitive appraisal of their social interactions with their peers. Based on the female high group’s perceived disapproval from others in the classroom/school setting, their appraisal may have evaluated the social situation as threatening which potentially stimulated the physiological experiences of fight, flight or freeze (Beck, Emery, & Greenberg, 2005), leading to the negative predictive effect of understanding others’ emotions in VCE academic achievement. Alternatively, the negative predictive effect of understanding emotions for VCE academic achievement may have been an accurate reflection of the gifted females’ appraised lack of social cohesion due to the disparity in the intellectual capacity of the female high group with their chronologically aged peers in Year 12 (Hoekman, McCormick, & Gross, 1999). Therefore, the female high group may have experienced the “forced choice” of reducing their academic achievement in order to gain social acceptance from their peers (Gross, 1989), which would suggest the negative predictive effect of understanding emotions in others for VCE academic achievement was an adaptive response.
In summary, the results of the current study found individual differences in the predictive effect of the AEI trait understanding emotions for VCE academic achievement in the four IQ and gender combination groups. In light of the developmental differences in the IQ and gender combination groups, the heterogeneous predictive effects of understanding emotions were considered to be adaptive responses (Darwin, 1872) to the individuals’ appraisal of their ability to successfully or unsuccessfully utilise their resources to meet the demands of VCE.

In the female low group, male low group and male high group the positive predictive effects of understanding others’ emotions for VCE academic achievement was heterogeneous. Therefore, students from these three groups with higher skills in understanding others’ emotions were more likely to attain a higher level of academic achievement in VCE. This finding may also be considered to be theoretically supportive of the social constructivist theory by Vygotsky (1978), which suggested effective learning takes place within a social context that includes a relationship with a “more knowledgeable other”, relative to one’s ZPD. Further, consistent with the social evolutionary theory the positive predictive effect of understanding emotions for VCE academic achievement may be framed with reference to the social adaptations outlined by Lieberman (2013), whereby understanding the emotions of others may be inclusive of a set of skills that encompasses: a) developing pro-social connections with others to increase communication and the chances of learning with and from others in a classroom environment; b) utilising one’s Theory of Mind to empathise with others and anticipate the most adaptive way to interact with others and minimise conflict; and c) developing positive harmonious relationships with teachers and peers to optimise the social nature of the learning processes in VCE academic achievement. The predictive effect of emotions direct cognition is now discussed with reference to previous research findings.

6.5 Key Finding 3: Emotions Direct Cognition, IQ and Gender Predicted VCE Academic Achievement

The results from the present study found emotions direct cognition, IQ and gender predicted 26% ($R^2 = .263$) of the variance in VCE academic achievement. The strongest predictor in the model was IQ, which positively predicted VCE academic achievement, uniquely accounting for 6.2% of the variance in the regression model. The second
strongest predictor in the model was gender, which provided a negative main effect that uniquely accounted for 3.2% of the model variance in VCE academic achievement. The third strongest predictor in the model was an interaction effect between emotions direct cognition and gender, which uniquely accounted for 1% of the variance in VCE academic achievement. The negative predictive interactional effect of emotions direct cognition by gender accounted for -5.7 VCE points per standard deviation. This finding was inconsistent with previous research by Downey, Mountstephen, et al. (2008), who analysed the relationship between emotions direct cognition and academic achievement in secondary school students, but did not find a gender difference in the AEI trait emotions direct cognition or a significant association with academic achievement. Nonetheless, Luebbers et al. (2007) found emotions direct cognition was strongly correlated with age in the adolescent population, hence as adolescent age increased, so too did adolescents’ skills in emotions direct cognition. Consequently, it is possible that the variance in the research findings between the current study and the research findings presented by Downey, Mountstephen, et al. (2008) may have been influenced by the differences in the cohort’s age and associated stage of adolescent development.

The current study only included Year 12 students in the late stage of adolescent development (15–19 years) (Sawyer et al., 2012) and the research findings by Downey, Mountstephen, et al. (2008) included a wider age range of adolescents from Year 7 to Year 11 who were in the early to late stage of adolescent development (10–19 years) (Sawyer et al., 2012). It may also be possible that the skills encompassed in the construct of emotions direct cognition, which integrate emotion to facilitate thought, do not fully develop until the individual is in their mid-twenties or young adulthood (Cauffman & Steinberg, 2000; Steinberg, 2011b).

An outline of some potential reasons for the negative predictive effect of emotions direct cognition in VCE academic achievement are discussed in light of the gender differentiation found in adolescent males and females. In the AEI trait emotions direct cognition, adolescent females had a higher average mean score ($M_{EDC} = 56$) than adolescent males ($M_{EDC} = 44$) and the difference between the females’ and males’ skills accounted for a medium effect size ($d = .43$). Additionally, the range of scores for emotions direct cognition in the male group ranged from the 21st percentile to the 67th
percentile, whereas the females’ ranges of scores commenced at the 41st percentile and reached the 80th percentile. A review of the lowest score range for emotions direct cognition in the male group indicated that the male group included students with lower skills (at the 21st percentile) than the female group (at the 41st percentile). In addition, a review of the highest score range for emotions direct cognition in the female group (80th percentile) indicated the female group included students with higher skills in emotions direct cognition than the male group (67th percentile). It is possible that this pattern of results may be reflective of the individual differences in adolescent gender developmental patterns, wherein females typically commenced puberty one to two years earlier than adolescent males (Gluckman et al., 2009). The gender differences in the developmental trajectories of emotional and cognitive maturation in male and female adolescences (Giedd et al., 1999; Giedd et al., 2012; Paus et al., 2010; Shaw et al., 2006) may have contributed to the gender differences found in the current study for the AEI trait emotions direct cognition. This possibility is further supported by previous research that found adolescent psychosocial skills increased with age throughout the adolescent period, while adolescent females displayed a higher average level of psychosocial maturity in comparison to their adolescent male peers (Cauffman & Steinberg, 2000).

Hence, it is possible that the gender differentiation in emotions direct cognition found in the current study was reflective of the asynchronous neurological structural and functional maturation of the adolescent male and female emotional system and the cognitive system, which is formative to individual differences in the integration of emotion and cognition in adolescent decision making and behaviour (Spear, 2013; Steinberg, 2004, 2011b). First, the adolescent emotional system, which is stimulated by gender-specific biological (hormonal, chemical, neurological) and psychosocial changes associated with the onset of puberty, contributes to heightened emotional sensitivity, attraction to novelty stimuli, heightened focus on rewards and increased sensation-seeking behaviours in secondary school students (Steinberg, 2011b). Second, the more gradual and protracted maturation of the cognitive system, which includes the prefrontal cortex, reaches full maturation when an individual is in their mid-twenties (Steinberg, 2011b). Consequently the prefrontal cortex of adolescents attending secondary school is still in an immature stage of development when compared to the adult phenotype, which
is subsequently reflected in their immature ability to utilise self-regulation and impulse control in problem solving and decision making (Steinberg, 2011b). Third, the slowly maturing adolescent cognitive system facilitating the development and utilisation of adolescent impulse control and self-regulation, is in maturational disparity with the earlier maturing adolescent emotional system that is hormonally stimulated and increasingly sensitive to emotional stimulation in adolescent males and females when making decisions or solving problems. Fourth, the adolescent emotional system is increasingly likely to override the adolescent cognitive system when the individual adolescent encounters a situation or problem that encompass an emotional element or when they are in the presence of adolescent peers, which may further increase adolescent at-risk behaviours (Steinberg, 2011b). The secondary school students in the current study typically learn in a classroom environment with their peers and are potentially under heightened emotional pressure to successfully complete their Year 12 VCE studies as a prerequisite to tertiary education or employment, and therefore may be increasingly challenged to cope with their heightened emotional sensitivity and to utilise their self-regulation in a classroom and secondary school environment. In light of the asynchronous maturation and interaction of the adolescent emotional system and cognitive system in making decisions and solving problems (Steinberg, 2005), the individual differences in the predictive effect of emotions direct cognition for VCE academic achievement in the IQ and gender combination groups are now discussed in more detail.

### 6.5.1 Heterogeneous Individual Differences in Emotions Direct Cognition

As presented in the Simple Slopes Data Plot, the predictive effects of emotions direct cognition for VCE academic achievement in the four IQ and gender combination groups were heterogeneous.
As illustrated in Figure 6.3, there were individual differences in the predictive effect of emotions direct cognition in VCE academic achievement in each of the four IQ and gender combination groups. First, the negative predictive effect of emotions direct cognition for VCE academic achievement in the male low group ($b_{1a} = -3.17$) accounted for a decrease of 3 VCE points per standard deviation. Similarly, there was a small negative predictive effect for emotions direct cognition in VCE academic achievement for the male high group ($b_{1a} = -0.24$), which accounted for a decrease of approximately 0.2 VCE points per standard deviation. Second, the female low group ($b_{1a} = 2.58$) had a positive increase of approximately 2 VCE points per standard deviation. The female high group ($b_{1a} = 0.59$) had a positive relationship and increased by approximately 0.5 VCE points per standard deviation. Therein, emotions direct cognition had a negative predictive effect on VCE academic achievement in the male low group and the male high group. This finding was in contrast with the negative predictive of effect emotion direct
cognition on VCE academic achievement in the female low group and the female high group. It is possible that this pattern of results is reflective of the gender differences in emotions direct cognition for adolescent males and females.

**Figure 6.4 Mean Score and Predictive Effect of Emotions Direct Cognition for VCE in Four IQ and Gender Combination Groups**

As illustrated in Figure 6.4, a comparison of the emotions direct cognition mean score in the male low group ($M_{EDC} = 44$) and the male high group ($M_{EDC} = 43$) found they had similar skills in the ability to integrate emotion and cognitive information when making decisions. The female low group ($M_{EDC} = 55$) and the female high group ($M_{EDC} = 58$) had similar skills in the ability to integrate emotion and cognitive information when
making decisions; however, the mean skills of the female groups was significantly higher than those of their male peers. These findings are discussed in regard to three patterns in the datum: 1) the mean scores of emotions direct cognition in the male and female groups; 2) the degree of predictive variance explained by emotions direct cognition in low and high groups; and 3) the positive predictive effects of emotions direct cognition in the female high and low groups and a negative predictive effects in the male high and low groups.

First, the four IQ and gender combination groups’ mean scores for emotions direct cognition were potentially representative of each group’s total resources as their capacity to utilise their emotions to facilitate thinking based on their gender and current maturational level within the late stage of adolescent development (Bronfenbrenner, 1977). The higher mean scores for emotions direct cognition identified in the adolescent females in the low and high groups, were consistent with the previous research by Cauffman and Steinberg (2000) that found adolescent females were more psychosocially mature than their comparatively aged adolescent male peers. The individual differences in the mean scores for emotions direct cognition are considered in light of previous research by Blakemore and Robbins (2012) that found that the decision making process in the adolescent brain was subject to the asynchronous neurological development in the earlier maturation of the emotional system, which was associated to the onset of puberty and the later and slower maturation of the cognitive system, which was associated to chronological age. In particular, adolescent decision making was subject to the disparity between the earlier maturation of the emotional system that included a hyper-responsiveness to rewards that could lead to risky decisions in adolescence, and the comparatively slower maturation of the cognitive system that included impulse control and response inhibition systems (Blakemore & Robbins, 2012). The increased response to novelty and rewards in adolescents was particularly marked in adolescent males and risk-taking was further heightened when adolescent males were in the company of their peers (Steinberg, 2011b).

Second, the degree of predictive variance explained by emotions direct cognition in the low and high IQ groups was consistent with the individual differences in their cognitive ability to cope with the demands of VCE, as seminally theorised by Petrides et
A review of the intellectual capacity of the female low group ($M_{IQ} = 100$) and the male low group ($M_{IQ} = 98$) confirmed they had less intellectual resources to meet the academic demands of VCE than the female high group ($M_{IQ} = 124$) and the male high group ($M_{IQ} = 124$). The predictive effect of emotions direct cognition accounted for -3 VCE points in the male low group and 2.5 VCE points in the female low group. In contrast, the predictive effect of emotions direct cognition accounted for 0.59 VCE points in the female high group and -0.24 VCE points in the male high group. These findings were consistent with an adolescent cognitive developmental perspective whereby the members of the male low group and female low group were theorised to be subject to incrementally increasing distress (Lazarus, 1993b) in utilising their resources to adaptively meet the academic demands of VCE, relative to the degree that their IQ fell below 100 (Jensen, 1998). In contrast, the members of the male high group ($M_{IQ} = 124$) were theorised to experience less distress (Lazarus, 1993b) in adaptively meeting the academic demands of VCE relative to the degree that their IQ rose above 100 (Jensen, 1998). The larger predictive effect of emotions direct cognition in the male and female low groups, when compared to the smaller predictive effect of emotions direct cognition in the male and female high groups, was supportive of the contention that the degree of the predictive effect of emotions direct cognition for VCE academic achievement was stimulated by the individual differences in the students’ cognitive ability to successfully cope with the academic demands inherent in VCE.

Third, the positive predictive effects of emotions direct cognition in the female low and high groups, were in contrast to the negative predictive effects of emotions direct cognition found in the male low and high groups. It is possible that the positive and negative predictive effects of emotions direct cognition in VCE academic achievement found in the female and male groups respectively, were partially reflective of the differentiated gender development found in Year 12 students who were in the late stage of adolescent development. The female low group ($b_{1a} = 2.58$) had a positive increase of approximately 2.5 VCE points per standard deviation. The female high group ($b_{1a} = 0.59$) had a positive relationship and increased by approximately 0.5 VCE points per standard deviation. The differences in VCE scores between the female high group and the female low group decreased from -2 $SD$ to 2 $SD$ with the increase in emotions direct cognition.
The increase in VCE scores for the female low group made the strongest impact on the decreasing difference between the female groups’ VCE scores. The negative predictive effect of emotions direct cognition for VCE academic achievement in the male low group ($b_{1a} = -3.17$) accounted for a decrease of 3.1 VCE points per standard deviation. Similarly, there was a small negative predictive effect for emotions direct cognition in VCE academic achievement for the male high group ($b_{1a} = -0.24$), which accounted for a decrease of approximately 0.2 VCE points per standard deviation. Further, differences in VCE scores between the male high group and the male low group became greater from -2 $SD$ to 2 $SD$ with the increase in emotions direct cognition. The increase in emotions direct cognition in the male low group made the strongest impact on the increasing difference between the male groups’ VCE academic achievement scores. These results confirmed that the predictive effects of emotions direct cognition in the IQ and gender combination groups were heterogeneous.

Interestingly, Luebbers et al. (2007) found a negative correlation between emotions direct cognition and emotional management and control in an adolescent population. The negative correlation in emotions direct cognition and emotional management and control was speculated to reflect the developmental nature of both traits in the adolescent population. In the current study the positive effect of emotions direct cognition for the female groups and the negative predictive effect for the male groups were consistent with the finding in the emotions direct cognition regression model, which identified a significant interaction effect between emotions direct cognition and gender for VCE academic achievement. The interaction effect between emotions direct cognition and gender indicated that the gender development in adolescent males and females differentiated their ability to utilise their emotions to facilitate decision making and problem solving in VCE academic achievement.

The gender differences in the positive and negative predictive effect of emotions direct cognition found in the female and male IQ and gender combination groups respectively, may have been partially influenced by sexual dimorphism found in adolescent neurological development (Giedd et al., 2012). In the childhood and adolescent period, the male’s cortical gray matter was approximately 10% bigger than the female’s, while females attained a peak volume in gray matter in the frontal lobe.
approximately one to three years before males (Giedd et al., 1999; Giedd et al., 2012). In research presented by Giedd et al. (2012) the developmental trajectory of regional cortical gray matter (cell bodies, dendrites and terminal branches of axons) volumes followed an inverted U-shaped development, with peak size evident earlier in females at approximately 10.5 years, in comparison to males who attained peak size at approximately 14.5 years. Subsequently, the gray matter in adolescent females and males began to decline in volume and increase neural efficiency. The frontal lobes include the prefrontal cortex, which is formative to adolescents’ ability to make decisions, plan ahead, inhibit impulsive behaviour, understand others and develop self-awareness (Blakemore, 2010; Blakemore & Robbins, 2012). In association with puberty, the prefrontal cortex matures earlier in adolescent females than in males, which increases the likelihood of females being able to make more mature decisions at an earlier age than males (Blakemore, 2010; Blakemore & Robbins, 2012). In addition, Giedd et al. (2012) found some gender specific differences were also associated to sex steroid receptors and hormonal levels; for example, the testosterone levels in males and females predicted the volume of gray matter in the amygdala.

Giedd et al. (1999) also found that the white matter (myelin) volumes increased linearly with age, with males having larger increases in white matter volume than females throughout childhood and adolescents. The development of white matter potentially influenced the connections between neurological systems influencing emotion processing and regulation in male and female adolescents (Ladouceur et al., 2012). Ensuing research by Wang et al. (2012), found males (13 to 18 years of age) continued to show white matter maturation, whereas girls reached mature levels earlier. Therefore, male and female adolescents’ developmental trajectories in white matter microstructure were differentiated (Wang et al., 2012). Further, Silveri et al. (2006) examined the association between adolescent white matter microstructure, impulsive behaviour and response inhibition in males and females. The Bar-On Emotional Quotient Inventory, Youth Version was used to assess impulse control. The results confirmed gender differences in the association with white matter in the anterior corpus callosum for males and in the splenium for females for impulsivity in adolescents (Silveri et al., 2006). Hence, the gender differences found in the positive and negative predictive effects of emotions direct
cognition may have been partially influenced by neurological structural, functional and hormonal/chemical changes in males and females as they progressively mature throughout the adolescent period (Blakemore & Robbins, 2012; Giedd et al., 1999; Giedd et al., 2012; Spear, 2013; Wang et al., 2012). The developmental maturation of adolescents has also been associated with the asynchronous development of adolescent cognitive development that reaches maturity at 16 years of age, and adolescent psychosocial development which does not reach maturity until much later at 26 to 30 years of age (Steinberg, Cauffman, Woolard, Graham, & Banich, 2009). Therefore, the predictive effect of emotions direct cognition for VCE academic achievement in the current study is discussed with reference to the asynchronous development cognition and psychosocial development in adolescent males’ and females’ decision making.

Hence, it is also plausible that the positive and negative predictive effect identified for emotions direct cognition in VCE academic achievement in the adolescent female groups and male groups respectively, were partially influenced by gender differences in adolescent biopsychosocial development (Gemelli, 2013). Adolescent psychosocial development and maturation occurs earlier in females than adolescent males (Cauffman & Steinberg, 2000), potentially differentiating how males and females utilised emotions to facilitate their thinking, decision making and behaviours in VCE. Further, the innate adolescent psychosocial developmental needs for self-identity, autonomy, intimacy, sexuality and achievement are differentiated in adolescent males and females (Steinberg, 2011a). Therefore, gender differences in the rate of psychosocial maturation (Cauffman & Steinberg, 2000) and the gender differences in the qualitative nature of male and female drives for developing their self-identity, autonomy, intimacy, sexuality and sense of achievement (Steinberg, 2011a) in the late adolescent stage of development, may partially have contributed to the positive and negative predictive effects of emotions direct cognition in VCE academic achievement found in the current study. Consequently, it is possible that the differences in the positive and negative predictive effect of emotions direct cognition for VCE academic achievement in the high and low adolescent female and male groups, may have been partially been stimulated by gender differences in the degree and the type of psychosocial maturation in adolescent males and females. In comparison to the adolescent females, the relative immaturity in the psychosocial
development of adolescent males and the strong male psychosocial drives may account for the negative predictive effect of emotions direct cognition in both the high IQ group and the low IQ group found in this study.

Further, a review of risk-taking behaviour in 18,911 youth (13 to 31 years of age) in the National Longitudinal Study of Adolescent Health found adolescent and young adult males engaged in more risk-taking behaviours than females, and were increasingly more likely to engage in risk-taking until their early twenties (Mahalik et al., 2013). The tendency for adolescent males to make decisions that led to behaviours that were more at risk than female adolescents’, may partially reflect a range of adolescent developmental differences. Adolescent males’ have displayed a tendency to: seek immediate gratification rather than delaying gratification in order to persist in goal-directed behaviour (Mischel, Shoda, & Rodriguez, 1989); focus on the immediate consequences rather than focus on the future consequences of their decisions (Steinberg, Graham, et al., 2009); be particularly impulsive and driven by novelty stimuli or sensation seeking (Steinberg et al., 2008); and to be strongly influenced by adolescent peers to take more risks when make decisions that may lead to increased risk-taking behaviours (Chein, Albert, O’Brien, Uckert, & Steinberg, 2011). Therefore, it is possible that a range of factors dynamically influenced the negative predictive effect of emotions direct cognition in VCE academic achievement, identified in the male high IQ and low IQ groups.

Albert and Steinberg (2011) suggest there are a range of dynamic structural and functional maturational changes that may contribute to judgement and decision making in the adolescent period. For example, an adolescent male faced with a pending assignment in his VCE class may choose to go out with his peers rather than stay at home and study. The male student has used his emotions to direct his thinking, which has arguably met his psychosocial need for intimacy with his peers (Albert & Steinberg, 2011). In this instance, the adolescent male’s emotions have directed his cognition to focus on the immediate reward of spending time with his peers, rather than delaying his immediate gratification and focusing on his long-term goal of optimising his VCE academic achievement (Albert & Steinberg, 2011). Consequently, in this example the adolescent male’s emotions have directed his cognition to adopt behaviour that does not require the delay of immediate gratification and negatively impacts on his long-term goal of
directing his behaviour to optimise his level of academic achievement in VCE (Mischel, Shoda, & Rodriguez, 1989).

In summary, the positive predictive effect of emotions direct cognition for the female groups and the negative predictive effect for male groups identified for VCE academic achievement, may have been partially reflective of the differentiated male and female developmental patterns found in how emotions are utilised to facilitate cognition in decision making in adolescents in the late stage of adolescent development. This finding confirmed that Year 12 adolescent females’ and males’ emotions could direct their cognition in VCE academic achievement. Adolescent females’ utilisation of emotions in directing their thinking was positively predictive of VCE academic achievement. While emotions direct cognition in the males was negatively predictive of VCE academic achievement. It is possible that the positive and negative predictive effect of emotions direct cognition found in the female groups and male groups, respectively, for VCE academic achievement may have been influenced by gender differences. Gender differentiation has been identified in the maturation of adolescent neurological and psychosocial systems influencing the development and processing functions of emotion and cognition, (Blakemore, 2010; Blakemore & Robbins, 2012; Steinberg, 2011b), which was theorised to have influenced individual differences in the predictive effects of emotions direct cognition in VCE academic achievement. The discussion will now consider the predictive effect of emotional management and control, IQ and gender for VCE academic achievement.

6.6 Key Finding 4: Emotional Management and Control, IQ and Gender Predicted VCE Academic Achievement

Emotional management and control encompasses the ability to manage both positive and negative emotions within oneself and others, and further to effectively control strong emotional states, for instance anger, frustration, anxiety, and stress (Downey, Mountstephen, et al., 2008; Luebbers et al., 2007). In the current study, a GLM saturated regression model found the variables emotional management and control, IQ and gender simultaneously predicted 28% ($R^2 = .283$) of the variance in VCE academic achievement. An examination of the regression model indicated IQ ($gf$) had the strongest main positive predictive effect in the model and uniquely accounted for 5.7% of the
variance in VCE academic achievement. The positive predictive effect of IQ for VCE academic achievement was consistent with previous research (Deary et al., 2007; Jensen, 1998; Nisbett et al., 2012). Gender also had a main effect in the model, accounting for 4.1% of the variance in VCE academic achievement. In the current study, Year 12 adolescent females attained a higher level of VCE academic achievement than males, which was consistent with gender trends in VCE academic achievement (ABS, 2014) and academic achievement in secondary school students (Van de gaer et al., 2009). Emotional management and control also provided a positive main effect in the regression model that accounted for .4% of the variance in VCE academic achievement; however, this unique contribution was not statistically significant in the final model. This finding was in contrast to previous research that found emotional management and control was positively associated with academic achievement in secondary school (Downey, Mountstephen, et al., 2008).

Plausible reasons for the statistically insignificant small positive predictive effect of emotional management and control for VCE academic achievement found in the GLM saturated regression model for the total cohort are explored with reference to the relevant univariate and bivariate statistics. A positive correlational relationship was identified between emotional management and control and VCE academic achievement, which accounted for 4% \((r = .19, p < .05)\) of the shared variance. Therefore, higher levels of emotional management and control were associated to higher levels of VCE academic achievement, which was consistent with previous research (Downey, Mountstephen, et al., 2008; Parker, Creque, et al., 2004; Tapia & Marsh, 2006). In the current study, a correlational relationship was also identified between gender and VCE academic achievement, which accounted for 2% \((r = -.14, p < .05)\) of the shared variance. An analysis of these correlational relationships confirmed that emotional management and control was more strongly correlated with VCE academic achievement which accounted for 4% of the shared variance, than gender which accounted for 2% of the shared variance in VCE academic achievement. However, in the final regression model the predictive variance of gender accounted for 4.1% of the variance in VCE academic achievement, and therefore was more strongly predictive of VCE academic achievement.
than emotional management and control, which only accounted for .4% of the variance in VCE academic achievement. Potential mechanisms underlying this finding are outlined.

First, it is possible that the predictive effect of gender was confounded or suppressed with the predictive effect of emotional management and control (Nathans et al., 2012). Second, it is possible that a correlational relationship between emotional management and control and gender for VCE academic achievement 3% ($r = .17, p < .05$), even though this relationship was not significant in the final model. In either instance, the correlation was considered to provide evidence of an underlying relationship between gender and emotional management and control, which may have manifested in a larger unique predictive effect for gender and larger shared variance in the predictive effect of emotional management and control for VCE academic achievement found in the final simultaneous saturated regression model. Third, it is possible that the statistical methodology in the simultaneous saturated regression analysis of second and third order variables increased the shared variance and therefore reduced the unique variance in the predictive effect of emotional management and control for VCE academic achievement (Nathans et al., 2012). The results of the GLM simultaneous saturated regression model for emotional management and control, IQ and gender for VCE academic achievement are now contextualised with reference to the relevant univariate and bivariate statistics and previous research findings.

In the current study, the positive correlational relationship confirmed that higher skills in emotional management and control were associated to higher levels of VCE academic achievement. In contrast, the correlational relationship indicated that lower skills in emotional management and control were associated to lower levels of VCE academic achievement. The positive correlational relationship between emotional management and control and academic achievement found in the current study was consistent with previous research in the adolescent population. This correlational finding was consistent with the research findings by Downey, Mountstephen, et al. (2008), whereby emotional management and control was positively associated with academic achievement for secondary school students in: Mathematics accounting for 6% ($r = .24, p < .01$) of the shared variance, Science accounting for 4% ($r = .19, p < .05$) of the shared variance, and the GPA accounting for 2% ($r = .15, p < .05$) of the shared variance. This
finding was also consistent with research by Tapia and Marsh (2006) who investigated the relationship between EI and GPA in high-ability students ($N = 318$) attending a selective secondary school, whereby: self-control was positively associated with GPA, and GPA was related to handling relationships for adolescent males but not adolescent females. In addition, this finding was consistent with previous research by Parker, Creque, et al. (2004), who found stress management to be correlated with secondary school students’ GPA.

In the current study, the variable emotional management and control was indicative of the adolescents’ ability to manage positive and negative emotions within themselves and others, and to effectively control emotional states such as anger, stress, anxiety and frustration. Therefore, the variable emotional management and control was discussed with reference to comparable to constructs in the literature referred to as self-regulation, self-control, delayed gratification and intentional self-regulation. In the current study, adolescent males were found to have stronger skills in emotional management and control than adolescent females; however, the effect size of the gender difference was small (Cohen’s $d = 0.25$). This finding was in contrast to the previous research results that found adolescent females had a higher average self-management scores than adolescent males (Siu, 2009). However, it is also possible that the gender differences in findings may have been influenced by the differences in the developmental stages of the adolescent cohorts or their cultural differences, the current study focused on older students in late adolescence completing Year 12 in Australia, whereas the study by Siu (2009) focused on younger students in early adolescence completing Form One, Two and Three in the Hong-Kong.

Nevertheless, the current research finding was consistent with previous research that has found stressors were appraised differently in adolescent males and females, as was the emotional response, management and control of their stressors (Zimmer-Gembeck & Skinner, 2008). Differences in adolescent male and female emotional management and control may reflect differences in their experienced or subjectively appraised stressors, based on what they consider to be harmful, threatening challenging or beneficial to their wellbeing and goals (Lazarus, 1993b). Major depressive disorder on a global scale increased from the 15th ranked disorder in 1990 to the 11th ranked disorder
in 2010 (Murray et al., 2012). The assessment of the global burden of disease (GBD) in young people found the incidence of cause-specific disability-adjusted life years (DALYs) for young people in the 15 to 19 year old age range was higher for adolescent females than adolescent males (Gore et al., 2011). Depression has also been found to increase significantly after the onset of puberty, particularly for adolescent females (Thapar et al., 2012). In addition, psychosocial stress is one of the major risk factors for adolescent depression (Thapar et al., 2012); therefore, when compared to adolescent males it is possible that adolescent females may be marginally more susceptible to stress. This developmental pattern is reflective of the pattern of results in the current study, which found adolescent females had marginally lower skills in emotional management and control than their adolescent male peers.

It may also be possible that the adolescent gender differences in emotional management and control found in the current study may have been partially influenced by differences in the strategies that adolescent males and females deployed to control or cope with their strong emotional states. For example, adolescent females have been found to have a tendency to use strategies such as rumination, social support, problem solving and distraction to cope with stress (Zimmer-Gembeck & Skinner, 2008). While adolescent males tend to deploy strategies such as direct problem solving, distraction, avoidance and disengaging rather than social support strategies, to cope with stress (Zimmer-Gembeck & Skinner, 2008). Therein, the gender differences in adolescent male and female perceptions of threat, challenge and benefit that stimulate stress (distress–eustress), and their gender-specific coping strategies to manage and control stress, potentially made incremental contributions to the gender differences in emotional management and control identified in the findings for the Year 12 students in this study.

The relationship between emotional management and control, IQ (gf) and VCE academic achievement in the current study is now discussed. First, a correlational relationship identified between VCE academic achievement and IQ accounted for 35% ($r = .59, p < .05$) of the shared variance. Second, the bivariate correlational analysis identified a positive correlation between IQ and emotional management and control accounting for 4.8% ($r = .22$) of the shared variance. This correlation was consistent with a correlational relationship found in the simultaneous saturated regression model between
emotional management and control and IQ accounting for 2.8% \((r = .17)\) of the shared variance. While the correlation between emotional management and control and IQ was not significant in the final regression model, it did identify an underlying relationship between IQ (gf) and emotional management and control. Third, this finding was theoretically significant, as the positive correlational association between IQ and emotional management and control indicated that as Year 12 students’ IQ increased, so too did their ability to manage and control their emotions. It is plausible that the underlying positive relationship between emotional management and control and IQ in the model is reflective of the increasingly important role of cognition in the appraisal of processing more complex emotional and social information in order to predict potentially effective or in effect strategies to manage and control one’s own and others’ positive and negative emotions or strong emotional states (stress, anger, anxiety, frustration) (Downey, Mountstephen, et al., 2008; Luebbers et al., 2007), typically found when encountering a problem or conflict that stimulates strong emotions that necessitate emotional management and control to optimise the individual’s survival (Darwin, 1872).

Smith et al. (1993) hypothesised that the appraisal was a proximal cognitive antecedent of emotion. Stressful experiences in adolescence may be associated with a major traumatic event or with common stressors, which have been typically related to problems in school (peers, teachers and academic achievement) and interpersonal relationships (parents, siblings, romantic relationships and peers) (Zimmer-Gembeck & Skinner, 2008). The management and control of the stressor can be influenced by the nature of the stressor and the similarity or difference in the adolescent’s appraisal of the stressor to be a loss, threat or challenge to their wellbeing (Lazarus & Folkman, 1984). It is possible that the adolescent cognitive skills inherent in the process of appraisal could become increasingly taxed as the structural complexity of social/emotional relationships within a social group increases. In order to manage and control one’s own and others’ strong emotions the adolescent needs to understand the relationship between two or more people and predict future potential relationships within the group. The ability to interpret the mental states and intentional states of others is encompassed in the Theory of Mind (Gluckman et al., 2009). Orders of intentionality become increasingly complex and are understood in a hierarchy: (1) I am conscious or aware of my own thoughts; (2) I can
gauge or evaluate what a second person is thinking; (3) I can evaluate what the second person is thinking about me; (4) I can evaluate what the second person is thinking about what I think about, what he is thinking (Gluckman et al., 2009). Therein, there is a possibility that the positive correlational relationship between emotional management and control and IQ may be reflective of the increasingly important role of cognition in the appraisal process when analysing complex emotional and social information, which may include four to six levels of intentionality (Gluckman et al., 2009); which is required in Year 12 students who are in the late stage adolescence in order to predict management strategies to adaptively cope and effectively control strong emotional states within the increasingly complex social relationships of Year 12 peers (Downey, Mountstephen, et al., 2008; Luebbers et al., 2007).

The mechanism that underlie the individual differences in the association between emotional management and control, IQ and gender for VCE academic achievement identified in the current study are understood with reference to the developmental changes inherent in adolescent biopsychosocial maturation. Adolescence is a time of significant neurological growth, development and change, which influence the functions of cognitive development and social/emotional development (Giedd et al., 1999; Spear, 2013; Weinberger et al., 2005). Anderson, Anderson, Northam, Jacobs, and Catroppa (2001) noted that: (a) attentional control (allocating selective and sustained attention); (b) cognitive flexibility (working memory, impulse control); and (c) goal setting (planning, decision making), are skills associated with the frontal cortex, specifically with regard to the executive functions. The prefrontal cortex does not reach maturation until the individual is in their mid-twenties (Spear, 2013). Therefore, the Year 12 cohort of adolescents (16–19 years of age) who took part in the current study are subject to the maturational and developmental changes in basic neural structures such as the prefrontal cortex, that are formative to the skills encompassed in the AEI trait emotional management and control. Further, research in adolescent brain development confirmed that the reward-seeking neurological emotional systems develop before the regions that influence planning and emotional control are also subject to formative changes; which may influence the experimentation, exploration and risk-taking behaviours (Steinberg, 2011b) that are typically found in adolescents such as those participating in the current
study. The Year 12 students who participated in the current study were in the late stage of adolescent development. Therefore, the adolescents who participated in this study were subject to regional specific neurological structural and functional changes in areas such as the prefrontal cortex and limbic system, which may be differentiated by gender (Spear, 2013) and were plausibly formative to the individual differences in development of emotional management and control. Hence, the individual differences in the predictive variance of emotional management and control for VCE academic achievement are now discussed in the IQ and gender combination groups.

6.6.1 Heterogeneous Individual Differences in Emotional Management and Control

An examination of the four IQ and gender combination groups found individual differences in the predictive variance of emotional management and control for VCE academic achievement. The male low group ($b_{1a} = 5.50$) had a positive increase of approximately 5.5 VCE points per standard deviation. Similarly, an increase in emotional management and control for the female low group ($b_{1a} = 2.38$) had a positive increase of approximately 2.3 VCE points per standard deviation. An increase in emotional management and control for the male high group ($b_{1a} = 1.60$) also resulted in a positive increase of approximately 1.6 VCE points per standard deviation. Therefore, the predictive effect of emotional management and control for VCE academic achievement was positive in the male low group, female low group and the male high group. As presented in the Simple Slopes Data Plot, the differences in VCE academic achievement scores between the male low group, female low group, and the male high group became less from -2 $SD$ to 2 $SD$ with an increase in emotional management and control. These findings were supportive of previous research by Shoda, Mischel, and Peake (1990) whereby preschool children’s ability to delay their immediate gratification by not eating one marshmallow in the first instance, and instead, waiting for a longer period in order to eat two marshmallows, was predictive of adolescent cognitive ability, academic achievement and the capacity to cope with frustration and stress. The findings were also consistent with research in the adolescent population that found higher skills in self-management was negatively related to problem behaviour and positively related to less anxiety (Siu, 2009). In contrast, an increase in emotional management and control for the
female high group ($b_{1a} = -0.70$) had a negative predictive effect on their VCE academic achievement, leading to a decrease of approximately -0.7 VCE points per standard deviation. It is possible that the female high group were overly sensitive to their internal self-criticism regarding their performance in VCE academic achievement. As previous research has found gifted students to have less skills in stress management compared to a normative sample (Lee & Olszewski-Kubilius, 2006).

![Graph showing Emotional Management and Control: Predictive Effect for VCE per SD](image)

**Figure 6.5** Predictive Effect of Emotional Management and Control for VCE in Four IQ and Gender Combination Groups

The individual differences illustrated in Figure 6.5, in the predictive effect of emotional management and control for VCE academic achievement in the four IQ and gender combination groups and the potential mechanisms that underlie those differences are discussed. These findings are discussed in the four IQ and gender combination groups with regard to the following patterns in the datum: (1) the mean scores of emotional
management and control as an antecedent to the predictive effect of emotional management and control in VCE academic achievement; (2) the individual differences in the adaptive/maladaptive and dynamic degree of predictive variance explained by emotional management and control in VCE academic achievement; (3) the relationship between emotional management and control and gender; (4) the relationship between emotional management and control and IQ (gf); and (5) the positive and negative predictive effects of emotional management and control on VCE academic achievement.

6.6.1.1 Male Low Group

Emotional management and control had the strongest positive predictive effect on VCE academic achievement in the male low group, when compared to the other groups. The positive predictive effect of emotional management and control accounted for 5.5 VCE points per SD in the male low group. This finding provided evidence of the unique and significant predictive effect of emotional management and control in positively contributing to VCE academic achievement, beyond the simultaneous predictive effect of IQ and gender. The predictive effect of emotional management and control in the male low group was consistent with previous research by Gumora and Arsenio (2002) who found students’ emotional regulation made a significant and unique contribution to middle school students’ GPA, which was beyond the influence of cognition. This finding was also consistent with research by Duckworth and Seligman (2005) who found self-discipline predicted final grades, school attendance, standardised achievement test scores and selection into a competitive high school program in Year Eight students. This finding also affirmed the significant role of the regulation of emotions, as outlined in the fourth branch of the EI model developed by Mayer and Salovey (1997), which is now discussed in comparison to the predictive effect of emotional management and control in the female low group, male high group and female high group.

The predictive effect of emotional management and control accounting for 5.5 VCE points per SD in the male low group was higher than the other groups as the predictive effect in the female low group accounted for 2.3 VCE points per SD, the male high group accounted for 1.6 VCE points per SD, and the female high group accounted for -0.7 VCE points per SD. Therefore, the actual degree to which the male low group and the other groups deployed or utilised their emotional management and control skills
in VCE academic achievement differed. This finding provides evidence of the context-specific, dynamic and developmentally adaptive nature of how Year 12 students in the male low group directly utilised the predictive effect of emotional management and control to improve their VCE academic achievement when compared to the other three groups in this study. In addition, this finding was consistent with the broader research results presented by Petrides et al. (2004) finding that the predictive effect of EI for academic achievement was stronger in students with lower intellectual resources. Hence, the results for the male low group are now discussed in light of their developmental traits (emotional management and control mean score, IQ and gender), which are argued to underlie the individual differences in the predictive effect of emotional management and control for VCE academic achievement.

The male low group’s developmental capacity for emotional management and control ($M_{EMC} = 52$) was moderately higher than the capacity of the female low group ($M_{EMC} = 43$). Therefore, the male low group had moderately higher skills than the female low group in managing their positive and negative emotions, and were moderately more capable of adaptively controlling strong emotions in themselves and others. These findings were consistent with research findings in the current study for total cohort that found Year 12 adolescent males had stronger skills in emotional management and control than their female peers. These findings were also considered in light of previous research by Gestsdottir, Bowers, von Eye, Napolitano, and Lerner (2010) which found that intentional self-regulation in adolescent students who were in Years Eight, Nine and Ten was positively predictive of Positive Youth Development (PYD) and negatively predictive of substance abuse, delinquency and depressive symptoms. Therein, the emotional management and control mean score in the male low group was also understood with reference to the formative role of self-regulation in making decisions about how to act adaptively in ways that optimise adolescent health and meet the adolescent’s personal needs and their environmental demands (Lerner et al., 2011). Further, trait EI has been positively associated to adolescent mental health (S. K. Davis & Humphrey, 2012). Consequently, the male low group’s emotional management and control mean score was theorised to have been a potential antecedent that indirectly impacted on their subsequent direct deployment of emotional management, and control as
measured in the predictive effect of emotional management and control for VCE academic achievement.

Furthermore, it is plausible that the emotional management and control mean score for the male low group was a self-regulatory antecedent that contributed to adolescent psychosocial wellbeing in the presence or absence of a stressor (Rutter, 1987). Therefore, the male low group’s emotional management and control mean score was indicative of the male low group’s normative capacity to manage their positive and negative emotions and control their own and others’ strong emotional states (Luebbers et al., 2007). The positive predictive effect found in the male low group is considered in light of previous research by Chan (2005b) which found that high competence in managing emotions in oneself and others was associated to positive adaptive coping strategies and promoted psychological wellbeing. Consequently, it is plausible that the male low group’s normative capacity to manage their positive and negative emotions and control their own and others’ strong emotional states may have also been indicative of their capacity to cope with stress and promoted their psychosocial wellbeing, which subsequently influenced their state of readiness to utilise their cognitive capacity and engage in the learning opportunities (Zins & Elias, 2001) inherent in the VCE curriculum. Accordingly, the emotional management and control mean score in the male low group may have provided an indication of their available resources or capacity available for deployment in response to the appraised demands of VCE.

The predictive effect of emotional management and control for VCE academic achievement in the male low group (5.5 VCE points) is discussed with reference to the female low group (2.3 VCE points). The individual differences in the predictive effect of emotional management and control for VCE academic achievement in the male low group and the female low group were anticipated to be subject to their appraisal of the chances that their personal resources (emotional management and control mean score, IQ, and gender) could be utilised to successfully adapt to and cope with the internal or external demands of VCE academic achievement. First, both the male low group and the female low group had similar intellectual skills to meet the academic demands inherent in VCE. In light of their intellectual capacities, the male low group and female low group were anticipated to be under more stress than the male high group and female high group
when faced with the academic demands in VCE (Jensen, 1998). Second, the male low group and the female low group varied in their gender. The female low group had gender attributes that were positively predictive of VCE academic achievement, whereas the male low group had gender attributes that were negatively predictive of VCE achievement (Buchmann et al., 2008; Commonwealth of Australia, 2002). Therefore, the male low group was anticipated to experience a higher level of academic challenge associated to their gender than the female low group.

Third, a review of the emotional management and control mean scores revealed that the male low group had a moderately higher capacity for emotional management and control than the female low group. Therefore, the male low group was anticipated to have benefited from the higher protective mechanisms (such as ameliorating negative functioning or promoting adaptive functioning) (Holmbeck et al., 2006) associated to their emotional management and control mean score, when compared to the female low group. Fourth, the degree of stress (distress–eustress) (Lazarus, 1993b) experienced by the male low group and the female low group was anticipated to be relative to their ability to meet their personal goals in VCE academic achievement. Given that academic achievement in the final year of secondary school is key a predictor of entry into tertiary study, adult employment and an adult income (OECD, 2014), it is plausible that the Year 12 students’ perceived their VCE academic achievement score as being formative to their successful transition from secondary school into adult society (Zarrett & Eccles, 2006). It is anticipated that the male low group’s appraisal of their ability to meet their personal goals, based on their resources and the demands of VCE, was lower than that of the female low group’s, which led to a comparatively higher level of stress in the male low group (Lazarus, 1993b). This subsequently led the male low group to directly utilise a higher degree of their emotional management and control skills to cope with the stressful demands of VCE academic achievement, as evidenced in the higher degree that the predictive effect of emotional management and control accounted for the variance in VCE academic achievement in the male low group when compared to the female low group. The individual differences in the predictive effect of emotional management and control for VCE academic achievement are now discussed in the male high group.
6.6.1.2 Male High Group

In the male high group, the positive predictive effect of emotional management and control for VCE academic achievement accounted for 1.6 VCE points per standard deviation. The individual differences in the predictive effect of emotional management and control for VCE academic achievement in the male high group (1.6 VCE points) are discussed with reference to the findings in the male low group (5.5 VCE points). As previously outlined, the individual differences in the predictive effect of emotional management and control for VCE academic achievement in the male high group and the male low group were anticipated to be subject to their appraisal of the chances that their personal resources (emotional management and control mean score, IQ, and gender) could be utilised to successfully adapt to and cope with the internal or external demands of VCE academic achievement.

First, the emotional management and control mean score in the male high group ($M_{EMC} = 57$) was not statistically different to the male low group ($M_{EMC} = 52$), indicating both male groups had comparable skills in the ability to regulate or manage positive and negative emotions and control strong emotions. Second, both the male high group and the male low group had the same gender and therefore experienced comparable challenges in VCE academic achievement associated with their gender. Therefore, the individual differences in the predictive effect of emotional management and control found in the male high group and male low group could not be directly attributed to developmental differences in their emotional management and control mean score or gender. Third, the intellectual capacity of the male high group was higher than the intellectual capacity of the male low group. Therefore, the male high group was estimated to have more intellectual resources to address the academic demands encompassed in the VCE curriculum than the male low group. With reference to the intellectual compensation theory outlined by Petrides et al. (2004), it was anticipated the male high group would experience less stress than the male low group in utilising their intellectual resources to meet the academic demands of VCE. Consequently, the individual differences in the predictive effect of emotional management and control in VCE academic achievement identified in the male high group and the male low group were estimated to be primarily stimulated by developmental differences in intellectual acumen.
Fourth, the male high group’s appraisal of their chances of utilising their resources (emotional management and control mean score, IQ and gender) to successfully achieve their personal goals in VCE academic achievement was anticipated to stimulate the degree of stress (distress–eustress) (Lazarus, 1993b) that they experienced. The degree of stress experienced by the male high group was anticipated to be reflective of the degree to which their emotional management and control was directly stimulated and utilised to cope with the appraised demands in VCE academic achievement. Therefore, the male high group was anticipated to have experienced the comparatively lower levels of stress than the male high group, which stimulated the smaller predictive effect of emotional management and control in VCE academic achievement. Consistent with this possibility, the predictive effect of emotional management and control accounted for 1.6 VCE points per standard deviation, which was notably lower than the 5.5 VCE points in the male low group. Coherent with the findings in the male low group, the positive predictive effect of emotional management and control in the male high group accounted for variance in VCE academic achievement, which was beyond the predictive effect of both IQ and gender.

These findings illustrated that even though the male high group had similar skills in emotional management and control to the male low group, they utilised less of these skills directly in VCE academic achievement. This finding was consistent with the possibility that the individual differences in the predictive effect of emotional management and control in VCE academic achievement were due to developmental similarities and differences in the male high group and the male low group. This finding affirmed that the individual differences in the predictive effect of emotional management and control in VCE academic achievement in both the male high group and the male low group were best understood by investigating the relationships between the individual and their resources as they relate to their contextual demands, as asserted by Lerner et al. (2011). Further, the predictive effect of emotional management and control in the male high group and the male low group illustrated the significant role of self-regulation in responding adaptively to the potentially negative emotions associated with distress in order to improve VCE academic achievement. This finding is also developmentally contextualised in the research by Eisenberg et al. (1995), who found a significant
relationship between children’s emotional intensity and emotional regulation and their social functioning which was context-specific to home and school. The results indicated that children with low negative emotionality and high levels of regulation had more prosocial and socially appropriate behaviour as rated by their teachers. Further, the current findings were also supportive of the previous research by Eigsti et al. (2006) that found cognitive control in preschool students, which was measured with a delay-of-gratification task, remained predictive of individual differences in adolescent cognitive control ten years later. The findings for the predictive effect of emotional management and control for VCE academic achievement in the female low group and the female high group are now discussed.

6.6.1.3 Female Low Group

The predictive effect of emotional management and control for VCE academic achievement accounted for 2.38 VCE points per SD in the female low group. The possible mechanisms that contributed to this finding in the female low group are now outlined. First, the female low group had an emotional management and control mean score of 43. The emotional management and control mean scores in the female low group ($M_{EMC} = 43$) and the female high group ($M_{EMC} = 56$) were statistically different. Further, the emotional management and control mean scores in the female low group ($M_{EMC} = 43$) and the male low group ($M_{EMC} = 52$) were also statistically different. The male high group’s emotional management and control mean score ($M_{EMC} = 57$) was not significantly different to that of the male low group’s ($M_{EMC} = 52$) and therefore, both the male low group and the male high group had higher emotional management and control mean scores than the female low group. These individual differences indicated that the female low group had a lower capacity than the female high group, male low group, and the male high group to regulate their emotions as outlined in their skills of emotional management and control. Consequently, the female low group had fewer skills in emotional management and control than the other groups, which could have potentially act as a protective factor in VCE academic achievement.

Second, the female low group’s gender was positively associated to academic achievement and therefore may have been a protective factor. Both the female low group and the female high group had the same gender and therefore experienced comparable
challenges in VCE academic achievement associated with their gender. Third, the female low group’s intellectual capacity was significantly lower than the female high group’s. Therefore, the female low group was anticipated to have experienced a higher degree of stress than the female high group in relation to utilising their intellectual acumen to address the demands of VCE academic achievement. As previously outlined, the female low group was anticipated to have experienced a higher degree of intellectual demand than the female high group when challenged by the academic demands inherent in VCE academic achievement, which in turn was estimated to create a higher level of stress in the female low group. Fourth, the predictive effect of emotional management and control was anticipated to be subject to the female low group’s appraisal of their ability to utilise their resources (emotional management and control mean score, gender and IQ) to successfully address the demands of VCE academic achievement as they relate to their personal goals.

Therein, the positive predictive effect of emotional management and control accounted for 2.3 VCE points, which was lower than the male low group and higher than the male high group and the female high group. The predictive effect of 2.3 VCE points was consistent with the individual developmental differences in the female and male low group’s resources (emotional management and control mean score, gender and IQ) as outlined. This finding is consistent with previous research that suggests intentional self-regulation is a formative part of adolescent development, which is subject to differences in the individual and the context; however, it is a significant factor in healthy adolescent development (Bowers et al., 2011). Further, the positive predictive effect of emotional management and control in the female low group was also coherent with previous research that acknowledged academic achievement in Mathematics and Reading was associated with the students’ ability to adaptively manage or regulate a range of their emotional states (enjoyment, anger, anxiety and boredom), which occur in the process of learning, and need to be regulated in order to optimise their persistent engagement in learning and consequently their academic achievement (Tulis & Fulmer, 2013).

The findings in the male low group, male high group, and female low group suggest that adolescents who have higher skills in emotional management and control are able to manage their own and others’ positive and negative emotions and effectively
control strong emotional states, which potentially acts as a protective factor for VCE academic achievement. Further, the positive predictive effect of emotional management and control in the male low group, male high group, and female low group was associated with higher VCE academic achievement. However, in contrast, emotional management and control was negatively predictive of VCE academic achievement in the female high group, and possible reasons for this finding are now discussed.

6.6.1.4 Female High Group

In the female high group, the predictive effect of emotional management and control accounted for -0.7 VCE points per SD. This finding was in contrast to the positive predictive effect of emotional management and control for VCE academic achievement found in the male high group (1.6 VCE points per SD), female low group (2.3 VCE points per SD) and the male low group (5.5 VCE points per SD). The individual differences in the female high group’s predictive effect of emotional management and control for VCE academic achievement are discussed in light of the decomposition of the regression model and the predictor variables (emotional management and control mean score, gender and IQ), which were also subject to the female high group’s appraisal of their probability of successfully meeting their internalised goals in relation to VCE. The female high group’s unique cognitive and affective developmental traits are discussed, particularly in reference to their potentially high personal goals, emotional sensitivity and intensity of their threshold for positive or negative affective reactivity. The female high group’s negative predictive effect of emotional management and control for VCE academic achievement is also discussed with reference to the withdrawal behaviours associated to negative emotions and approach behaviours associated to positive emotions.

First, a comparison of the emotional management and control mean score in the female high group ($M_{EMC} = 56$) and the male high group ($M_{EMC} = 57$) found they had similar skills in the ability to manage and control strong emotions. In contrast, the female high group’s emotional management and control mean score ($M_{EMC} = 56$) was significantly higher than the female low group ($M_{EMC} = 43$). Therefore, the female high group’s ability to manage both positive and negative emotions within oneself and others, and further to effectively control strong emotional states, for instance, anger, frustration, anxiety, and stress (Luebbers et al., 2007) was a protective factor for VCE academic
achievement, which was comparable with that of the male high group and higher than that of the female low group. Downey, Johnston, et al. (2008) found a significant negative association between the dimension of emotional management \( r = -0.56 \) and emotional control \( r = -0.62 \) and the severity of depression in adults. Therefore, it is also possible that the higher skills in emotional management and control mean scores in the current study were associated with higher levels of adolescent psychological well-being and lower scores in emotional management and control mean scores were associated with poorer adolescent psychosocial well-being in the Year 12 VC students. Second, the female high group’s gender was positively associated to VCE academic achievement. Both the female high group and the male high group had different genders, with the female high group’s gender being a protective factor. Third, the female high group’s intellectual capacity was comparative to the male high groups; therefore, both the female and male high groups’ had higher intellectual skills than the female and male low groups, and which could be utilised to address the academic demands inherent in the Year 12 VCE curriculum.

Fourth, the female high group’s predictive effect of emotional management and control for VCE academic achievement was subject to their appraisal of the likelihood that their resources (emotional management and control mean score, gender and IQ) would be able to be successfully utilised to reach their personal goals for VCE academic achievement. From a developmental perspective the female high group’s emotional management and control mean score was high and was positively associated to VCE academic achievement; their female gender was positively associated to VCE academic achievement; and their high intellectual acumen was also positively associated to VCE academic achievement. Therefore, of the four IQ and gender combination groups the female high group had the highest level of protective resources. Therefore, based on the fact that the female high group had more protective resources than the other IQ and gender combination groups, it would have been reasonable to expect that the female high group’s appraisal of their chances of success would have been positive and they would have experienced less stress than any other group, resulting in a small positive predictive effect for emotional management and control, which was slightly smaller than the male high group for VCE academic achievement. However, this was not the case, and it is
therefore possible that the female high group’s appraisal of their chances of successfully attaining their personal goals in VCE academic achievement was slightly negative, which resulted in the small negative predictive effect of emotional management and control accounting for -0.7 VCE points per SD. While it is not possible to definitively conclude what the mechanisms were that led the female high group to have a negative predictive effect for emotional management and control in VCE academic achievement, several plausible possibilities are now outlined.

It is also possible that the predictive effect of emotional management and control acted as a vulnerability or risk factor (Rutter, 1987) for the female high group, which negatively influenced their VCE academic achievement. It may have been the case that high scores in emotional recognition and expression, understanding emotions and emotions direct cognition in the female high group acted as a risk factor that increased the chances of maladaptive outcomes in emotional management and control in the presence of a stressor (Rutter, 1987) such as VCE academic achievement.

The negative predictive effect of emotional management and control found in VCE academic achievement for the female high group may be understood with reference to the impact of individual differences in emotions on individuals’ thinking processes and behavioural outcomes. The female high group’s emotional management and control mean score was indicative of their strong competency in managing positive and negative emotions. Fredrickson (2005) found that positive emotions broaden the scope of attention and extended the thought-action repertoires utilised. In contrast, negative emotions narrowed the thought-action repertoires utilised. Therefore, the type of emotion utilised, being positive and/or negative, may also have partially influenced the role of how emotions subsequently impacted on the attention time given to the problem-solving process and the broad or relatively narrow scope of information utilised by the female high group’s in their emotional management and control that negatively affected their VCE academic achievement. In light of the very small negative predictive effect of emotional management and control in the female high group, it may be reasonable to anticipate that negative emotions narrowed the thought-action repertoires utilised (Fredrickson, 2005) in their emotional management and control strategies that were predictive of VCE academic achievement.
The female high group’s negative predictive effect of emotional management and control for VCE academic achievement is also considered with reference to research by Silk et al. (2003). Silk and colleagues investigated the relationship between adolescents’ emotional regulation and adjustment and links to depressive symptoms and problem behaviour. The results indicated that adolescents who reported more intense emotions and labile emotions (higher mood fluctuations) had less effective emotional regulation and also reported more depressive symptoms and behavioural problems (Silk et al., 2003). Further, disengagement strategies such as avoidance, denial or escape and involuntary strategies (or unconscious strategies) such as rumination were found to be less effective in regulating negative emotions (Zimmer-Gembeck & Skinner, 2008), which were also associated to higher levels of depressive symptomatology and problem behaviour (Silk et al., 2003). Coherent with the research findings presented by Silk et al. (2003), the negative predictive effect of emotional management and control for VCE academic achievement may have been reflective of higher emotional intensity experienced by the female high group and the utilisation of less effective emotional regulation strategies for emotions, such as sadness or anxiety, in the female high group.

In addition, the female high group’s negative predictive effect of emotional management and control may also have been a response to working below their ZPD (Vygotsky, 1978) and experiencing sustained periods of boredom and therefore experienced emotions such as sadness, anxiety and frustration. Tulis and Fulmer (2013) found negative-activating emotion slightly increased anxiety, but was nonetheless beneficial for persistence in the face of academic challenge. In contrast, boredom was a deactivating negative emotion that was unfavorable for persistence in academic challenges (Tulis & Fulmer, 2013). Consequently, if the female high group was not intellectually challenged and was working below their ZPD (Vygotsky, 1978) they were anticipated to be unmotivated, less attentive, have a reduction in their engagement in the processes of actively learning and less persistence in building new knowledge, while experiencing elevated levels of frustration and boredom (Tulis & Fulmer, 2013), which may have negatively impacted on their emotional management and control in VCE academic achievement. Based on this potential explanation and the evolutionary theory of emotion by Darwin (1872), the negative predictive effect of emotional management and
control in the female high group for VCE academic achievement, may be considered to be adaptive, by signaling a lack of congruence in the individual and environmental fit (Lazarus, 1993).

In summary, the data suggests academic achievers were more skilled at being able to manage and control their strong emotions in VCE academic achievement. Therefore, Year 12 students with more skills to manage positive and negative emotions and control strong emotional states were more likely to increase their VCE academic achievement, whereas those with lower skills in managing and controlling their emotions were more likely to decrease their VCE academic achievement. The completion of the final year in secondary school can be challenging and potentially stressful, with students concerned or worried about their VCE academic achievement score and some students possibly anxious about their academic achievement or fearful of academic failure or poor academic achievement. An analysis of the individual differences in the predictive effect of emotional management and control in VCE academic achievement in the IQ and gender combination groups found emotional management and control was positively predictive of VCE academic achievement in the male low group, the female low group and the male high group. This finding suggested that knowing how to manage one’s own and others’ positive and negative emotions and control strong emotional states, were more likely to increase VCE academic achievement. However, in the female high group, the predictive effect of emotional management and control was negatively predictive of VCE academic achievement. There could be a range of possible mechanisms that influenced the negative predictive effect of emotional management and control in VCE academic achievement found in the female high group. For instance, it is plausible that despite having higher skills in emotional management and control than the female low group, the female high group may have been more emotionally sensitive and utilised less effective strategies in managing positive and negative emotions (Fredrickson, 2005) than the female low group. Alternatively, the female high group may have had more difficulty in controlling their strong emotional states and therefore utilised less effective strategies, such as rumination (Zimmer-Gembeck & Skinner, 2008) in attempting to control their strong emotions in relation to VCE academic achievement. Hence, further research is required to determine the mechanisms underlying the negative predictive effect of
emotional management and control for VCE academic achievement identified in the female high group.

6.7 Major Finding Two: Heterogeneous Predictive Effect of AEI Traits in the IQ and Gender Combination Groups

A review of the intercept and slope coefficients for each simultaneous saturated regression equation found the predictive variance of the AEI traits were heterogeneous. The male low group, female low group and male high group had a positive predictive effect for emotional recognition and expression, understanding emotions, and emotional management and control in VCE academic achievement. However, the inverse pattern was found for the female high group, with a negative predictive effect for emotional recognition and expression, understanding emotions, and emotional management and control for VCE academic achievement. Further, the female high group and the female low group had a positive predictive effect for emotions direct cognition in VCE academic achievement, which was in contrast to the negative predictive effect for emotions direct cognition identified in the male high group and the male low group for VCE academic achievement. As biological maturation precedes psychosocial maturation (Gluckman et al., 2009), the importance of the heterogeneous predictive effect of AEI traits in VCE academic achievement in the four IQ and gender combination groups will be discussed in light of the primary adolescent biological developmental changes associated to the late stage of adolescent development, which encompasses individuals 15–19 years of age and are differentiated in adolescent males and females (Sawyer et al., 2012).

The pattern of the AEI traits that were heterogeneously predictive of VCE academic achievement will be discussed collectively in each of the four groups in the following sequence: (1) the male low group, (2) the female low group, (3) the male high group, and (4) the female high group. When appropriate, the pattern of AEI trait predictive effects in each subgroup will also be considered with reference to the individual differences in: (a) adolescent biopsychosocial development (Gemelli, 2013), (b) psychosocial drives to develop their self-identity, achievement, autonomy, intimacy, sexuality, and achievement (Steinberg, 2011a), and (c) the ecological human developmental theory (Bronfenbrenner, 1977). Based on the ecological human developmentally theory by Bronfenbrenner (1977) the individual differences in the
predictive effect of the AEI traits maybe considered to be reflective of the dynamic accommodation or adaptation of growing adolescent’s changing relationship between their ability to utilise their resources to meet and the demands of their VCE environment.

6.7.1 Key Finding 5: AEI Traits Male Low Group
Of the four IQ and gender combination groups in the study, the predictive effect of the AEI traits was strongest in the male low group’s VCE academic achievement. As outlined in Figure 6.6, in the male low group the AEI trait emotional recognition and expression was positively predictive of 5.3 VCE points per $SD$, understanding emotions was predictive of 5 VCE points per $SD$, and emotional management and control was predictive of 5.5 VCE points per $SD$. These findings were consistent with and extended the seminal research presented by Petrides et al. (2004), who also found the predictive effect of EI had the strongest effect in vulnerable or disadvantaged adolescents. However, in contrast to the research finding by Petrides et al. (2004) the AEI trait emotions direct cognition was negatively predictive of -3.1 VCE points per $SD$ in the VCE academic achievement of the male low group. The potential mechanisms underlying these results and the practical importance of the heterogeneous predictive effects of the AEI traits for VCE academic achievement in the male low group are now outlined from an adolescent developmental perspective.
As illustrated in Figure 6.6, in the male low group the predictive effect of the AEI traits emotional recognition and expression; understanding emotions; emotions direct cognition; and emotional management and control for VCE academic achievement; was the highest of the four IQ and gender combination groups. The predictive effect of the AEI traits for VCE academic achievement in the female low group was the second highest of the four IQ and gender combination groups in the current study. Collectively, these findings support the theoretical contention that the AEI traits are particularly important to the VCE academic achievement of students who are educationally at risk based on their intellectual capacity and gender. The male and female low groups had comparable intellectual resources and differed in their gender. The finding that the predictive effect of the AEI traits had a stronger predictive effect in the male low group.
than the female low group, was consistent with previous suggesting adolescent males have more learning challenges than adolescent females (Jensen, 1998). Thereby, the findings in the current study supported and extended Petrides’ et al.’s (2004) seminal research by identifying that AEI traits are particularly important to the VCE academic achievement of students who are educationally at risk based on their intellectual capacity and on their gender, with adolescent males in the low group being the group at the highest educational risk in the current study. While it is plausible that a range of mechanisms underlie the individual differences in the predictive effect of AEI traits for VCE academic achievement identified in the male low group, one possible explanation is outlined and which is framed on the ecological human developmental model by Bronfenbrenner (1977).

From an ecological developmental perspective (Bronfenbrenner, 1977) it is possible that the male low group’s comparatively high predictive effects of the AEI traits for VCE academic achievement may have been reflective of the degree of strain and stress (Lazarus, 1993b) experienced by the male low group who were in the late stage of adolescent development (Sawyer et al., 2012), as they sought to make progressive accommodations to adapt to both their own changing adolescent developmental needs (Steinberg, 2011a) and the changing environmental demands of VCE academic achievement. For example, from an ecological perspective (Bronfenbrenner, 1977), the individual differences in the predictive effect of their AEI traits on VCE academic achievement in the male low group may have been influenced by the disparity between the environmental demands associated to the: (a) high academic demands of the VCE curriculum (VCAA, 2003a); and (b) the increasing importance of VCE academic achievement as a perquisite to future study and employment (OECD, 2014) versus the male low group’s (a) comparatively limited developmental resources (AEI trait mean scores, IQ and the male gender) to cope with the academic demands of VCE, and (b) the male low group’s psychosocial increasing need for autonomy and achievement (Steinberg, 2011a). Therefore, subject to the male low group’s goal for VCE academic achievement and their appraised chances of successfully making progressive accommodations to meet their own adolescent developmental drives and to utilise their resources (AEI mean scores, IQ and gender) to address the high environmental demands
of VCE academic achievement, it was anticipated that the male low group would be feeling strain (Lazarus, 1993b). Hence, it was plausible that the high academic demands of VCE and comparatively lower level of developmental resources (AEI trait mean scores, IQ and the male gender) in the male low group contributed to their psychosocial load, which potentially led the male low group to experience heightened stress, and therefore stimulated the need to utilise higher levels of the predictive effects of the AEI traits in VCE academic achievement.

The results of the present study imply that the incremental predictive effects of the AEI traits for VCE academic achievement, beyond the variance accounted for by IQ and gender, most strongly impacted on the adolescent males in the low group when compared to the other three groups. Of the four IQ and gender combination groups, the male low group was considered to be the group most educationally at risk based on their developmental resources (AEI trait mean scores, IQ and gender) to meet the academic demands inherent in VCE. Therefore, the male low group was considered to have fewer resources (AEI trait mean scores, IQ and gender) to draw upon when meeting the academic and psychosocial demands of VCE, and consequently, the male low group was anticipated to have experienced more stressors stemming from the VCE environment than the female low group, male high group or the female high group. Therefore, in order to optimise the academic achievement of the male low group, it was particularly important that the predictive effect of each AEI trait was understood.

Year 12 adolescent males in the low group with higher skills in the AEI traits of emotional recognition and expression were predicted to attain 5.3 VCE points per SD. While adolescent males in the low group those with higher skills in understanding others’ emotions were predicted to attain 5 VCE points per SD. Further, adolescent males in the low group with higher skills in emotional management and control were predicted to attain 5.5 VCE points per SD in their VCE academic achievement. Conversely, the VCE academic achievement of adolescents in the male low group with lower skills in the AEI traits of emotional recognition and expression was predicted to be reduced by 5.3 VCE points per SD, while those with lower skills in understanding others’ emotions was reduced by 5 VCE points per SD, and those with lower skills in emotional management and control was reduced by 5.5 VCE points per SD.
Further, in the male low group emotions direct cognition was negatively predictive effects of VCE academic achievement, hence reduced VCE academic achievement by -3.1 VCE points per $SD$. The negative predictive effect of emotions direct cognition for VCE academic achievement identified in the male low group was also found in the male high group. In contrast, the predictive effect of emotions direct cognition was positively predictive of VCE academic achievement in the female low group and the female high group. Therefore, it was theorised that the gender differences underlined the negative and positive predictive effect in the male adolescents and the female adolescents, respectively. It was speculated that the positive and negative predictive effect of emotions direct cognition were reflective of the adolescent biopsychosocial developmental differences (Gemelli, 2013; Gluckman et al., 2009). It was possible that the positive predictive effect of emotions direct cognition was reflective of the neurological research that found adolescent females reaching biopsychosocial maturity approximately two years before adolescent males (Spear, 2013). In particular, the disparity between the comparatively earlier maturation of the socio-emotional system to impact on cognition (reflected in the AEI trait EDC) and the protracted maturation of the cognitive-control system to impact on emotion (reflected in the AEI trait EMC), which both impact on adolescent decision making and their subsequent behaviours (Steinberg et al., 2008).

Hence, the current findings refined the research presented by Petrides’ et al. (2004) by examining the AEI traits and by finding that the predictive effect of the AEI traits were differentiated by gender. The predictive effect of the AEI traits for VCE academic achievement was higher in the male low group, who were considered to have fewer resources (AEI trait mean scores, IQ and gender) to draw upon when meeting the academic and psychosocial demands of VCE, and who were anticipated to have experienced more stressors, both internally and in the environment than the female low group, male high group or the female high group.

In summary, in the male low group’s individual differences in the predictive effect of the AEI traits emotional recognition and expression; understanding emotions; emotions direct cognition; and emotional management and control for VCE academic achievement; were confirmed. The results indicated that emotional recognition and
expression, understanding emotions and emotional management and control were positively predictive of VCE academic achievement in the male low group and therefore were protective factors for the male low group’s VCE academic achievement. However, in the male low group, the AEI trait emotions direct cognition was negatively predictive of VCE academic achievement. Consequently, it appears that for adolescent males in the low group the impact of their emotions on their decision making processes significantly and negatively affected their academic achievement in VCE. Therefore, the impact of emotions direct cognition was a risk factor for VCE academic achievement in the male low group.

6.7.2 Key Finding 6: AEI Traits Female Low Group

Based on the female low group’s developmental resources (AEI trait mean scores, IQ and the female gender) to meet the environmental demands of VCE academic achievement, they were considered to be the second most educationally vulnerable group for VCE academic achievement. In the female low group, the AEI traits that most strongly predicted VCE academic achievement were emotions direct cognition, which accounted for 2.5 VCE points per SD; followed by emotional management and control, which accounted for 2.3 VCE points per SD; and understanding emotions, which accounted for 2.0 VCE points per SD; while emotional recognition and expression accounted for 0.9 VCE points per SD in VCE academic achievement. The positive predictive effect of the four AEI traits utilised by the female low group suggested that each trait was adaptively utilised to optimise their academic achievement in VCE. These findings were consistent with the possibility that, collectively, the female low group had slightly more resources (AEI trait mean scores, IQ and female gender) than the male low group to draw upon when meeting their internal psychosocial developmental demands in addition to meeting the environmental demands of VCE academic achievement.
As illustrated in Figure 6.7, a comparison of the female low group’s developmental resources with that of the male low group confirmed they had similar intellectual or cognitive resources. However, with respect to the AEI traits emotional recognition and expression, understanding emotions and emotions direct cognition, the female low group had higher mean scores than the male low group, and therefore had more AEI trait resources to potentially act as an antecedent to the predictive effect of the AEI traits in VCE academic achievement. Further, the positive predictive effect of emotions direct cognition in VCE academic achievement in the female low group was consistent with the positive predictive effect of the female high group and suggested that the relationship of emotions on cognition facilitated VCE academic achievement. However, the positive predictive effect of emotions direct cognition in the female low group was in contrast to the negative predictive effect of emotions direct cognition for
VCE academic achievement in the male low group and the male high group. As previously outlined, these findings were reflective of a gender difference in adolescent males and females, which was potentially reflective of the developmental and maturational differences in adolescent females and males (Cauffman et al., 2010; Steinberg et al., 2008). Furthermore, a review of the AEI trait emotional management and control confirmed that the male low group had a higher mean score than the female low group; therein the male low group had more skills in controlling and managing their strong positive and negative emotions. Hence, the individual differences in the predictive effect of the AEI traits for VCE academic achievement in the female low group were consistent with the degree to which their developmental resources were appraised to meet their personal goals for VCE academic achievement.

### 6.7.3 Key Finding 7: AEI Traits Male High Group

Based on the male high group’s developmental resources (AEI trait mean scores, high IQ and the male gender) to meet the environmental demands of VCE academic achievement, they were considered to be the third most educationally vulnerable group for VCE academic achievement. The positive predictive effect of the male high group’s AEI traits: emotional recognition and expression accounted for 1.1 VCE points per $SD$; understanding emotions accounted for 2.2 VCE points per $SD$; emotions direct cognition negatively accounted for -0.2 VCE points per $SD$; and emotional management and control accounted for 1.6 VCE points per $SD$ in VCE academic achievement.
Figure 6.8 Male High Group: Predictive Effect of AEI Traits for VCE Academic Achievement Points Per SD

As illustrated in Figure 6.8, the pattern of results in the predictive effect of the AEI traits for VCE academic achievement in the male high group was consistent with that of the male low group and, with the exception of emotions direct cognition, the female high group. Collectively, the pattern of results for the male high group, female low group and the male low group was reflective of the person-environment congruence model (Greenberger, Steinberg, & Vaux, 1982), whereby the stressor is stimulated by a lack of congruence or “fit” between the individual’s resources (AEI trait mean scores, IQ and the male gender), adolescent developmental needs/drives and individual goals, and the demands and opportunities in the VCE environment. The individual differences in the degree and the positive or negative predictive effect of the AEI traits for VCE in each of
the three IQ and gender combination groups can be understood as dynamically reflecting the strain or stress that was appraised by each group in VCE academic achievement. The individual differences in the male high group’s, the female low group’s and the male low group’s predictive effect of AEI traits for VCE academic achievement were consistent with the balance between the facilitation and frustration of their needs; the male low group having the least resources and thereby utilising a greater degree of their AEI traits to address the demands of VCE, followed by the female low group and the male low group. The individual differences in the predictive effect of the AEI traits for VCE academic achievement are now discussed in the female high group.

**6.7.4 Key Finding 8: AEI Traits Female High Group**

Based on the female high group’s developmental resources (AEI trait mean scores, high IQ and the female gender) to meet the environmental demands of VCE academic achievement, they were considered to be the fourth most educationally vulnerable group for VCE academic achievement and to have the highest protective factors (Rutter, 1987) of the four groups. The predictive effect of the female high group’s AEI traits: emotional recognition and expression accounted for -1.3 VCE points per SD; understanding emotions accounted for -0.2 VCE points per SD; emotions direct cognition negatively accounted for 0.5 VCE points per SD; and emotional management and control accounted for -0.7 VCE points per SD in VCE academic achievement. The female high group’s negative predictive effect for emotional recognition and expression, understanding emotions, and emotional management and control were in contrast to the positive predictive effect for each of these variables in the male high group, female low group and the male low group. While the female high group’s positive predictive effect for emotions direct cognition was consistent with that of the female low group and in contrast to the male high group and the male low group. It is beyond the scope of this study to determine the mechanisms underlying the results in the female high group; however, potential explanations are outlined. The individual differences in the female high group’s predictive effect of their AEI traits in VCE academic achievement are understood within the context of the person-environment congruence as an adolescent stressor (Greenberger et al., 1982) and the emotional sensitivity found in intellectually gifted individuals (Dabrowski, Kawczak, & Piechowski, 1970).
Figure 6.9 Female High Group: Predictive Effect of AEI Traits for VCE Academic Achievement Points Per SD

As illustrated in Figure 6.9, the female high group’s negative predictive effect of emotional recognition and expression, understanding emotions, and emotional management and control for VCE academic achievement was also considered in light of the theory of positive disintegration by Dabrowski (1972), which is particularly relevant to intellectually gifted females. The female high group may have had very high personal academic goals for their VCE academic achievement, placing a tremendous burden on their adolescent concept of self (Silverman, 1998). Consequently, it is possible the female high group may have been particularly critical of themselves, negatively impacting on
their self-concept of their academic ability and therefore their engagement in VCE academic achievement. Alternatively, the female high group may have chosen to “dumb-down” in order to fit in with their peers and meet their psychosocial needs for social acceptance within the group (Gross, 1989), rather than continuing to focus on optimising their academic scores for VCE and increasing their risk of social isolation (Silverman, 1993).

It is also possible that the female high group’s advanced skills in the AEI traits, as demonstrated by their comparatively high AEI trait means scores, was reflective of their heightened emotional sensitivity and intensity (Dabrowski et al., 1970; Piechowski, 2002). For instance, in the current study, the female high group’s advanced skills in emotional recognition and expression, understanding emotions, emotions direct cognition, and emotional management and control may have heightened their awareness, sensitivity and intensity of emotions (Dabrowski et al., 1970; Piechowski, 1991) when compared to the other IQ and gender groups. Further, the female high group’s advanced intellectual acumen and female gender may have enabled them to focus more intensely on themselves, and consequently, to develop heightened self-awareness and to be more aware of their own needs and self-appraised limitations (Silverman, 1993) relative to their peers in the male high group, the female low group and the male low group. Consequently, the female high group may have had more insight into their needs, had higher expectations of themselves and may have been more critical of their own performance in VCE academic achievement (Silverman, 1998).

Hence, it is plausible that the female high group’s self-appraisal of their potential to effectively utilise their resources (AEI trait emotional recognition and expression, understanding emotions, and emotional management and control mean scores, high IQ and the female gender) to meet their internal needs/drives or goals within the context of the academic and psychosocial demands and opportunities in the VCE school environment, was negative. The female high group’s emotional sensitivity, female gender and high intellectual acumen may have led them to feel more internal emotional conflict, as their emotional intensity or tension was heightened (Silverman, 1998), to the point that it led to negative affect (emotion) that impacted on their thinking (Fredrickson, 2005) and subsequently negatively affected their VCE academic achievement. Consequently, it is
possible that the high AEI trait mean scores for emotional recognition and expression, understanding emotions, and emotional management and control acted as a vulnerability or risk factor (Rutter, 1987) for the female high group, which negatively influenced their VCE academic achievement.

In summary, the results of the male low group, female low group, male high group and the female high group collectively provided evidence of the heterogeneous individual differences in the predictive of the AEI traits for VCE academic achievement. Further, the current research findings also extended Petrides’ et al.’ (2004) research with the measurement of IQ based on gf and the inclusion of gender in the examination of the individual differences in the predictive effect of the AEI traits for VCE academic achievement. The findings for the AEI traits emotional recognition and expression, understanding emotions, and emotional management and control offered further support to the seminal research by Petrides et al. (2004) whereby the predictive effect of the AEI traits were stronger in students who were educationally vulnerable based on their intellectual capacity and became weaker for students with higher intellectual capacity. Consequently, the predictive effect of emotions direct cognition in VCE academic achievement in the IQ and gender groups was differentiated by gender.

Therefore, the analysis of the predictive effects of the AEI traits in the IQ and gender groups was noteworthy, in its ability to identify individual differences in the predictive effect of the AEI traits that acted as potential risk and protective factors for VCE academic achievement in the IQ and gender combination groups. The identification of the individual differences in the predictive effect of the AEI traits for VCE academic achievement was particularly important as each IQ and gender combination group had a unique AEI trait learning profile that was predictive of their VCE academic achievement. Therefore, rather than considering adolescents as having low or high AEI, these findings suggest it may be more effective to consider learners at different points on a continuum and tailor their educational supports accordingly. From a practical perspective, the overview of the four IQ and gender combination group’s AEI trait learning profiles identified in the current study may provide educators with a developmentally differentiated understanding of how AEI traits are utilised by each adolescent group in their learning and consequently, may support the provision of targeted AEI trait
interventions that are developmentally differentiated for each IQ and gender combination group.

Hence, these findings provided evidence of the qualitative individual differences in the predictive effect of the AEI traits for VCE academic achievement in the IQ and gender combination groups. The individual differences in the predictive effects of the AEI traits were understood within the framework of an ecological adolescent developmental model (Bronfenbrenner, 1977). The AEI traits (Luebbers et al., 2007) were conceptualised with reference to changes in adolescent biopsychosocial development (Gemelli, 2013) and primary adolescent psychosocial drives relevant to the Year 12 VCE students in the study cohort, who were in the late adolescent stage of development (Sawyer et al., 2012). Therein, the results of the study provided evidence of individual differences in the predictive effects of the AEI traits for VCE academic achievement in the IQ and gender combination groups. These findings provided further support for the seminal research of EI and IQ (gc) in academic achievement by Petrides et al. (2004) and extended Petrides et al.’s research with the inclusion of AEI traits (emotional recognition and expression, understanding emotions, emotions direct cognition and emotional management), IQ (gf) and gender in academic achievement. The individual differences in the predictive effect of AEI traits for VCE academic achievement were theorised to be dynamic, developmental adaptations based on what the IQ and gender combination groups appraised as harmful, threatening, challenging or beneficial (Lazarus, 1993b) to their survival (Darwin, 1872). The heterogeneous predictive effect of the AEI traits for VCE academic achievement may be indicative of the dynamic accommodations and adaptations (Bronfenbrenner, 1977) adolescents made to both the changes inherent in their biopsychosocial developmental in the late stage of adolescence and the changes inherent in the academic demands of VCE in Year 12 as their final year of secondary school, which was predictive of their transitional options for tertiary education and employment (OECD, 2014).

6.8 Conclusion: Chapter Six

Chapter Six finalises the discussion and interpretation of the research findings stemming from Hypothesis Two \((a,b,c,d)\). The simultaneous predictive effect of IQ, gender and each one of the four AEI trait scores: emotional recognition and expression,
understanding emotions, emotions direct cognition and emotional management and control for VCE academic achievement in Year 12 students, were discussed from a holistic learning perspective. Each AEI trait was significantly correlated to VCE academic achievement and the strongest relationship was identified with emotional management and control ($r = .19$), followed by understanding emotions ($r = .16$), emotional recognition and expression ($r = .12$), and emotions direct cognition ($r = -.007$).

The first major finding was that the four regression models including IQ, gender and one of the AEI traits entitled emotional management and control ($R = 28$), understanding emotions ($R = 28$), emotional recognition and expression ($R = 27$), and emotions direct cognition ($R = 26$) were predictive of VCE academic achievement for the total cohort. To date, previous research studies had not used the saturated regression model methodology of analysis to examine the complexities in the relationships between AEI trait scores, cognition and gender in VCE academic achievement. The disadvantage of the saturated regression model was the increased likelihood of multicollinearity and comparatively small unique main effect sizes (Nathans et al., 2012). However, the advantage of the saturated regression model was the detailed analysis of each variable in relation to all other variables from multiple perspectives (Nathans et al., 2012; Tabachnick & Fidell, 2007). In the four regression models, the predictive variables of IQ and gender each accounted for a main effect. In addition, an interactional effect was identified for emotions direct cognition by gender in predicting VCE academic achievement. However, in the final regression models: emotional recognition and expression, understanding emotions, and emotional management and control did not provide a statistically significant main effect.

The regression model results were considered in relation to the univariate and bivariate analysis, in order to investigate the relationships between the variables and their indirect effects on VCE academic achievement. The correlation between VCE academic achievement and emotional management and control ($r = .19$) was the strongest correlation, followed by understanding emotions ($r = .16$), emotional recognition and expression ($r = .12$), and emotions direct cognition ($r = -.007$, ns). Further, an analysis of the gender differences in the AEI traits found there was not a significant difference in the male and female adolescents’ skills for emotional recognition and expression.
Nonetheless, adolescent females had higher skills for understanding emotions and emotions direct cognition than adolescent males. Further, skills in emotional management and control were higher in adolescent males than in adolescent females.

In the current study, gender differences in AEI for males and females accounted for 12.9% of the variance. Adolescent females had a higher level of understanding emotions (12.8%) and emotions direct cognition (21.8%) than adolescent males. Therefore, adolescent females in the cohort had stronger skills than adolescent males in recognising and understanding their own emotions, understanding emotions in others, and incorporating this information in their decision making and problem solving. However, adolescent males had a higher level of emotional management and control (12.6%) than adolescent females. Therefore, adolescent males were more apt at using cognitive strategies such as self-regulation to manage positive and negative emotions in themselves and others, in addition to controlling strong emotions, such as anger, frustration and anxiety.

The second major finding in the study was that the predictive effects of the AEI traits were heterogeneous, based on the decomposition of the regression equations presented in the four IQ and gender combination groups. The predictive variance accounted for by the AEI traits were strongest in the male low group, followed by the female low group for VCE academic achievement. The positive predictive variance of AEI traits: emotional management and control, understanding emotions, and emotional recognition and expression indicated that as adolescents’ competencies increased or decreased, so too did VCE academic achievement. These findings were consistent with the assertion made by Petrides et al. (2004) that lower intellectual acumen would create higher levels of strain for the student and therefore, based on the compensation theory, would stimulate higher levels of AEI in addressing the challenges of VCE academic achievement. Further, the current study confirmed that the individual differences in the predictive effect of the three AEI traits were differentiated by gender and by each AEI trait for emotional management and control, understanding emotions, and emotional recognition and expression.

Unexpectedly, emotions direct cognition was negatively predictive of VCE academic achievement in the male low group and positively predictive of VCE academic
achievement in the female low group. This gender differentiation in emotions direct
cognition was also found in the male high group and the female high group. The positive
predictive effect of emotions direct cognition was strongest in the female low group and
weaker in the female high group. Similarly, the negative predicted effect of emotions
direct cognition was strongest in the male low group and weaker in the male high group.
These findings suggested that both gender and IQ differentiated the predictive effect of
emotions direct cognition for VCE academic achievement.

The predictive variance accounted for by the AEI traits was strongest in the male
high group, followed by the female low group for VCE academic achievement. In the
male high group, the results confirmed that the AEI traits, understanding emotions,
emotional management and control, and emotional recognition and expression were
positively predictive of VCE academic achievement. Although, as previously outlined,
emotions direct cognition was negatively predictive of VCE academic achievement, and
therefore as scores for emotions direct cognition increased there was a small decrease in
VCE academic achievement. In contrast, the predictive effect of emotions direct
cognition was positively predictive of VCE academic achievement in the female high
group. Further, in the female high group, the results confirmed that the AEI traits,
understanding emotions, emotional management and control and emotional recognition
and expression were negatively predictive of VCE academic achievement. Consequently,
the findings for the male high group were more consistent with the pattern of results
found in the male low group and the female low group. However, the findings for the
female high group were inverse to that of the male high group. Nonetheless, the results
for the female high group were consistent with the assertion made by Petrides et al.
(2004) that AEI was not significant for students with an intellectual capacity over
approximately IQ128 to IQ130. Naturally, further research is needed to confirm the
results of the study, particularly for the female high group, which included females with
high intellectual development.

Therefore, the findings for the AEI trait scores presented in Chapter Six extended
the seminal research by Petrides et al. (2004), who identified a bilinear interaction
between IQ and trait EI, which indicated the effects of EI varied as a linear function of
IQ. In the current study, the predictive variance accounted for by the AEI traits emotional
recognition and expression, understanding emotions, emotions direct cognition, and emotional management and control were all significant, however, they were heterogeneously predictive of VCE academic achievement in the four IQ and gender combination groups. In conclusion, the investigation of Hypothesis Two \(a, b, c, d\) led to three key findings that have been presented in Chapter Six. The three key findings outlined informed the study conclusions, which are now presented in Chapter Seven.
CHAPTER SEVEN

Conclusion

Chapter Seven presents the study conclusions, which are drawn from the results reported in Chapter Four and subsequently discussed for Hypothesis One in Chapter Five and for Hypothesis Two\(_{(a, b, c, d)}\) in Chapter Six. The discussion of the results in Chapters Five and Six led to five major findings and 13 key findings. An analysis of both the major and key findings in the study led to eight conclusions, which are outlined in this chapter. The conclusions that make a theoretical or methodological contribution to the literature investigating the relationship between AEI and academic achievement are outlined. Further, the conclusions that have practical implications for the development of psychoeducational pedagogy are also presented. Finally, the study limitations are also delineated along with suggestions for areas in which further research should be considered.

Therein, Chapter Seven sets forth the:

7.1 Study Aim

7.2 Conclusion One: AEI was Positively Predictive of VCE Academic Achievement, Beyond the Simultaneous Effect of IQ and Gender

7.3 Conclusion Two: Psychometric Validity is Increased by Including Both IQ and AEI to Predictive VCE Academic Achievement

7.4 Conclusion Three: AEI was Heterogeneously Predictive of VCE Academic Achievement, Subject to Developmental Differences in AEI, IQ and Gender

7.5 Conclusion Four: Emotional Recognition and Expression was Heterogeneously Predictive of VCE Academic Achievement

7.6 Conclusion Five: Understanding Emotions was Heterogeneously Predictive of VCE Academic Achievement

7.7 Conclusion Six: Emotions Direct Cognition was Heterogeneously Predictive of VCE Academic Achievement

7.8 Conclusion Seven: Emotional Management and Control was Heterogeneously Predictive of VCE Academic Achievement
7.9 Conclusion Eight: AEI Traits Were Heterogeneously Predictive of VCE Academic Achievement in the Four IQ and Gender Combination Groups

7.10 Theoretical, Methodological and Practical Implications and Contributions to the Literature

7.11 Study Limitations

7.12 Recommendations for Future Research

7.13 Conclusion: Chapter Seven

7.1 Study Aim

The aim of this research study was to determine the individual differences in the simultaneous predictive effect of AEI, IQ and gender for academic achievement. Towards that end, this study has completed an investigation of 369 Year 12 students in order to determine the role of AEI, IQ and gender in VCE academic achievement. Year 12 is a particularly important year in the education of late adolescent students as it is the final year of secondary school in Australia, and therefore is a key predictor to their transition into tertiary study and adult employment (OECD, 2014).

A psychometric assessment of the relationship of one of either AEI or an AEI trait, IQ and gender for VCE academic achievement was investigated with univariate, bivariate and multivariate analysis, resulting in five GLM simultaneous saturated regression models (Tabachnick & Fidell, 2007). The decomposition of each regression model formed the basis of the analyses of the individual differences in the predictive effect of AEI or one of the AEI traits for VCE academic achievement, in four IQ and gender combination groups. Therein, the individual differences of the predictive effect of AEI and the AEI traits for VCE academic achievement were considered in light of the developmental differences in the four groups’ AEI mean score, IQ and gender, to address their adolescent biopsychosocial developmental drives (Gemelli, 2013) and the environmental demands of VCE academic achievement from and ecological developmental perspective (Bronfenbrenner, 1979).

Therein, the purpose of this study was achieved with the completion of the investigation into the simultaneous predictive variance of AEI or one of the AEI traits, IQ and gender for VCE academic achievement, which encompassed an analysis of the study
7.2 Conclusion One: AEI was Positively Predictive of VCE Academic Achievement, Beyond the Simultaneous Effect of IQ and Gender

It can be concluded that AEI was positively predictive of VCE academic achievement, beyond the simultaneous predictive effect of IQ and gender. The incremental positive predictive effect of AEI in VCE academic achievement, accounted for an increase of 4.13 VCE points per SD. The incremental positive predictive effect of AEI for VCE academic achievement in the current study indicated that students who had higher skills in AEI attained higher levels of academic achievement in VCE, while students with lower skills in AEI attained lower levels of academic achievement in VCE. This finding was consistent with previous research that has confirmed the significant association of social and emotional skills with academic achievement (Durlak et al., 2011). The positive incremental predictive effect of AEI with academic achievement was also coherent with previous research in the adolescent population (Di Fabio & Palazzeschi, 2009; Fannin, 2001; Farooq, 2003; Ferrando et al., 2011; Menzie, 2005; Parker, Creque, et al., 2004; Parker, Summerfeldt, et al., 2004; Petrides et al., 2004). However, the current findings for the total cohort were inconsistent with research by Woitaszewski and Aalsma (2004) that did not find a significant relationship between EI and academic achievement in gifted students. Nonetheless, an examination of the individual differences in the predictive effect of AEI for VCE academic achievement in the female high group outlined in Section 7.4 of this chapter, was consistent with the findings presented by Woitaszewski and Aalsma (2004). Further, the findings from the current study were consistent with the seminal EI theoretical assertions made by Payne (1985) and Greenspan (1989), who asserted there was a significant relationship between EI and academic achievement, as evidenced by the incremental predictive effect of AEI in VCE academic achievement, beyond the variance accounted for by IQ(gf) and gender and thereby illustrating the integral role of AEI in VCE learning and academic achievement.

The incremental predictive effect of AEI accounting for 4.13 VCE points per SD in Year 12 VCE academic achievement was developmentally contextualised in relation to
Year 12 students in the late stage of adolescent development, who were subject to formative asynchronous structural and functional neurological maturational changes in their cognitive systems and emotional systems that uniquely influenced their thinking, feeling, decision making skills and behaviours (Spear, 2013; Steinberg, 2011b; Steinberg & Cauffman, 1996). AEI was also differentiated by gender with adolescent females having a higher score than adolescent males in the cohort, which was consistent with previous research findings (Brackett et al., 2004; Jaušovec & Jaušovec, 2005; Salguero et al., 2012; Stottlemyer, 2002). The importance of the incremental positive predictive effect of AEI for VCE academic achievement found in the current study was further understood in light of previous research that has confirmed AEI is a malleable construct, which responds to school based interventions and therefore can be improved (Hagelskamp, Brackett, Rivers, & Salovey, 2013; Reyes et al., 2012). Hence, the positive incremental predictive effect of AEI in VCE academic achievement may be of interest to educators who are aiming to improve the VCE academic achievement level of their Year 12 students. The positive incremental predictive effect of AEI accounting for 4.13 VCE points per $SD$ in VCE academic achievement indicated that adolescents who had the ability to recognise and express their own emotions, to understand the emotions of others, to utilise their emotions to direct and assist their cognition, and to manage and control their own and others strong emotions were more effectively able to learn and optimise their academic achievement in VCE, when compared to those with lower skills in AEI.

Therefore, it is concluded that AEI skills are formative traits in the learning process and consequently should be incorporated in VCE psychoeducational pedagogy and educational reforms to improve the current standard of academic achievement in Year 12. The study findings provided evidence to suggest the inclusion of AEI in psychoeducational pedagogy and educational reforms and innovations have the potential to optimise VCE academic achievement in Year 12 secondary school students and increase the current VCE their retention rates, which may consequently contribute to progress towards reaching the objective outcomes of the Council Of Australian Governments that: (a) all children are engaged in, and benefit from schooling, (b) meet basic literacy and numeracy standards and that levels of achievement are improving, (c) Australian students excel by international standards, (d) schooling promotes the social
inclusion and reduces the educational disadvantage of children, especially indigenous children and (e) young people make a successful transition from to work and further study (COAG, 2011). Specifically, to contribute to progress towards one of the Council of Australian Governments targets—to lift the Year 12 or equivalent attainment rate by 90% by 2020 (COAG, 2011).

7.3 Conclusion Two: Psychometric Validity is Increased by Including Both IQ and AEI to Predictive VCE Academic Achievement

It can be concluded that the differential incremental predictive effects of AEI and IQ ($gf$) for VCE academic achievement provided evidence of the unique and important role of both affective and cognitive factors in adolescent learning. This finding was consistent with previous research by Song et al. (2010), which also found that academic achievement in Chinese college students was more effectively predicted with the inclusion of a test of both general mental ability and EI. Consequently, this finding suggested VCE academic achievement was more effectively conceptualised and psychometrically assessed with the inclusion of both AEI and IQ, rather than focusing on IQ in isolation, which is the current approach utilised the GAT assessment for VCE academic achievement.

From a theoretical perspective the positive predictive effect of both AEI and IQ reflected of the model of intelligent behaviour developed by Wechsler (1943) who asserted the process of intelligent behaviour included both cognitive and non-cognitive capabilities. Hence the findings of this study reflected Wechsler’s theoretical model (Wechsler, 1943) in regard to the significant effects of IQ (cognitive capabilities) and AEI (non-cognitive capabilities) for VCE academic achievement in males and females. This finding was also consistent with the EI model presented by Leuner (1966) who asserted the importance of integrating both EI and abstract intelligence was required in order to reach emancipation or an optimal development. Payne (1985) also affirmed the essential role of both intelligence and EI in attaining self-actualisation. Further, Payne (1985) also asserted that schools placed more emphasis on the intellect, commonly creating an atmosphere of intellectual competition that supported students operating towards the upper limit of their intellectual ability. However, the lack of acknowledgement of EI in schools created an atmosphere of emotional suppression that
detracted from students developing emotional awareness to utilise their emotions intelligently in decision making (Payne, 1985).

The incremental predictive effect of AEI and IQ for VCE academic achievement in the current study was also consistent with the theoretical model of learning presented by Greenspan (1989), who noted intelligent thinking needs to be applied to both emotional and cognitive domains, which are both interrelated and are formative to human intelligence and adaptation. Further, that impersonal or cognitive learning and emotional learning are part of the same process, with the cognitive and emotional learning both potentially developing asynchronously at different rates and to different developmental levels that may partially be influenced by differential epigenetic development (Greenspan, 1979, 1989). Therefore, consistent with previous research models the incremental predictive variance of AEI and IQ in VCE academic achievement offers theoretical support for the inclusion of the both affective or non-cognitive capabilities and cognitive capabilities in intelligent adaptive behaviour (Greenspan, 1979, 1989; Leuner, 1966; Payne, 1985; Wechsler, 1943, 1950a).

Finally, from a practical perspective, the current study found Year 12 VCE students with a low IQ and low AEI were incrementally challenged by two developmental risk factors to their VCE academic achievement, with a decrease of one standard deviation in both IQ and AEI accounting for a decline of 21.5 VCE points. Therefore, it is recommended that VCE students learning profile would be more comprehensively determined and understood by educators with the inclusion of measures of both AEI and IQ. Hence, while IQ and AEI were independent unique constructs in positively predicting the variance in VCE academic, as both IQ and AEI scores increased so to do the students’ VCE academic achievement scores. Consequently, it is recommended that the analysis of the assessment of both AEI and IQ be utilised to identify students who are at educational risk due to low AEI, low IQ or both low AEI and low IQ and appropriate educational interventions provided to meet their individual educational needs. Therein, the inclusion of both IQ and AEI in educational psychoeducational pedagogy and assessment may further support educators to identify and provide targeted interventions based on adolescents developmental needs that would both optimise VCE academic achievement and also potentially contribute to the Council
of Australian Governments objective that “all Australian school students acquire the knowledge and skills to participate effectively in society and employment in a globalised society” (COAG, 2011). The individual differences in the predictive effect of AEI for VCE academic achievement in the four IQ and gender combination groups are now outlined in more detail.

7.4 Conclusion Three: AEI was Heterogeneously Predictive of VCE Academic Achievement, Subject to Developmental Differences in AEI, IQ and Gender

It was concluded that the incremental predictive effect of AEI in VCE academic achievement was heterogeneous in the IQ and gender combination groups. The heterogeneous predictive effect of AEI in VCE academic achievement in the four IQ and gender combination groups indicated an increase of one standard deviation in AEI equated to 5.5 VCE points for the male low group; 4.1 VCE points for the female low group; 2.1 VCE points for the male high group and -0.7 VCE points for the female high group. With the exception of the female high group, the predictive differences in VCE scores between the IQ and gender combination groups became less from -2 SD to 2 SD with an increase in AEI scores. These findings were consistent with the research examining the relationship between EI and academic achievement presented by Peters et al. (2009), whereby it was suggested that EI is more strongly related to academic achievement when there is a need for managing emotions under stressful circumstances. In addition, these findings were also consistent with the previous research findings by Petrides et al. (2004), whereby the predictive effect of AEI for academic achievement was largest in students with lower intellectual skills and was smallest in students with higher intellectual skills. The current study also extended the seminal research findings presented by Petrides et al. (2004) by providing evidence that the larger and smaller predictive effect of AEI in students with lower and higher intellectual acumen, respectively, was further differentiated by gender. It was concluded that AEI had the strongest predictive effect on VCE academic achievement in the male low group and the second strongest predictive effect on VCE academic achievement in the female low group. Further, it was concluded that AEI had the smallest negative predictive effect on VCE academic achievement in the female high group and AEI had a small positive predictive effect in the male group. The meaning and importance of the individual
differences in the predictive effect of AEI for VCE academic achievement are illustrated with a comparison to the predictive effect of AEI, IQ and gender in VCE academic achievement for the total cohort.

The individual differences in the predictive effect of AEI for VCE academic achievement in the IQ and gender groups were both consistent and inconsistent with the predictive effects of AEI, IQ and gender for VCE academic achievement in the total cohort. Based on the predictions stemming from the GLM simultaneous regression analysis for the total cohort, it was determined that Year 12 students with the most risk factors for poor VCE academic achievement were those with a low IQ, who were male and had low AEI scores. While the regression model indicated that Year 12 students with the most protective factors for VCE academic achievement were those with a high IQ, who were female and had high AEI scores. The predictive variance of AEI in the male low group and the female low group were consistent with the predictions of the study model for the total cohort. However, unexpectedly the predictive effect of AEI in the male high group and the female high group were inconsistent with the predictions of the study model for the total cohort, as the predictive effect of AEI was lower than the model predicted in both groups. While the predictive effect of AEI in the male high group was positive, the degree to which AEI was predictive of VCE academic achievement was less pronounced than was anticipated based on the model for the total cohort. Further, the predictive effect of AEI accounting for -0.7 VCE points per SD in the female high group was orthogonal with the predictions of the GLM study model, as AEI was negatively predictive of VCE academic achievement while it was predicted that high levels of AEI were associated to higher levels of VCE academic achievement. These unexpected findings led the researcher to re-examine the data in order to determine why the predictive effect of AEI for VCE academic achievement was smaller in the male high group and negatively predictive of VCE academic achievement in the female high group. An examination of the AEI mean scores in the IQ and gender groups provided further insight into the individual differences in the predictive effect of AEI for VCE academic achievement.

Therein, further insight into one of the mechanisms that may have influenced the individual differences in the predictive effect of AEI in VCE academic achievement was
provided with reference to the adolescents’ AEI mean score. Unexpectedly, the female high group’s AEI mean score was the highest in the four IQ and gender combination groups, yet the degree to which they directly utilised their AEI in academic achievement, as measured in the predictive effect of AEI, was the lowest. This finding stimulated the review of the AEI mean scores in each IQ and gender combination group and raised the possibility that the AEI mean score may have acted as an antecedent to the predictive effect of AEI in VCE academic achievement. This possibility was consistent with the assertion by Parker et al. (2009), who suggested that EI may have both an indirect and a direct effect on academic achievement. Therefore, with reference to the state and trait anxiety model presented by Spielberger (1972), further research is required into the relationship between adolescents’ AEI mean score and the degree to which an adolescent utilises their AEI resources in the predictive effect of AEI for VCE academic achievement.

The importance of the individual differences in the predictive effect of AEI in VCE academic achievement in the male and female low groups and the male and female high groups was understood with reference to the ecological model of human development (Bronfenbrenner, 1977). The male low group and the female low group had comparatively fewer resources (AEI mean score, IQ and gender) than the male high group and the female high group. Therefore, the male low group and the female low group were anticipated to have fewer resources that were available to utilise in making progressive accommodations (Bronfenbrenner, 1977), in meeting their adolescent psychosocial drives (Steinberg, 2011a) and the demands of VCE academic achievement (VCAA, 2010b). Therefore, the male low group was considered to have the highest level of risk for academic underachievement or failure and the female low group were considered to have the second highest level of risk for academic underachievement or failure. Consistent with the theoretical model outlined by Petrides et al. (2004), the lower the students’ intellectual resources the higher strain and stress they were anticipated to experience in attempting to meet the academic demands of VCE. When working above their ZPD it was anticipated that the male low group and the female low group would experience higher levels of anxiety (Vygotsky, 1978). Further, the male low group had lower AEI skills than the female low group that may have further placed the male low
group under pressure when trying to utilise their AEI skills to address the demands of VCE academic achievement. Therein, it is possible that the major stressors for the male low group and the female low group was the challenge of utilising their comparatively limited resources to successfully meet both their own biopsychosocial drives the environmental academic demands of VCE. Consequently, the positive predictive effect of AEI in VCE academic achievement was the strongest in the male low group followed by the female low group. These findings highlight the importance of providing targeted interventions for the male low group and the female low group to optimise their AEI and therein optimise their VCE academic achievement.

In contrast, a review of the resources in the male high group and the female high group suggested they had more developmental resources (AEI mean score, IQ and gender) than the male low group and the female low group. Therefore, the male high group and the female high group had more resources to draw upon in making progressive accommodations, in meeting their adolescent biopsychosocial drives and the demands of VCE academic achievement (VCAA, 2010b). The high intellectual resources of the male high group and the female high group ensured they could more easily manage the academic demands of VCE (Jensen, 1998). In light of their high intellectual potential, it was also possible that the male high group and the female high group may have experienced periods of boredom or frustration if they were working below their ZPD (Vygotsky, 1978). Therein, it is possible that the major stressor for the male high group and the female high group was not the worry of passing VCE but of attaining a high enough score in VCE to enter their preferred area of tertiary study. Therein, it is possible that the major stressor for the male high group and the female high group was the challenge of utilising their comparatively advanced resources to successfully meet their own goals for the environmental academic demands of VCE and their own psychosocial drives.

In addition, the negative predictive effect of AEI on the VCE academic achievement of the female high group highlights the importance of understanding and addressing the unique AEI and academic needs of some of the brightest female students, who were underachieving for their intellectual potential due to the effect of their AEI. This is a critical finding, as the female high group were still attaining extraordinarily high
scores in their VCE academic achievement and therefore it would be more than reasonable for parents, teacher and the students in the female high group to presume that their academic achievement in VCE was more than adequate. However, the findings from this study provide evidence to the contrary, indicating that as the female high group’s IQ and AEI skills increased, their VCE academic achievement declined. Unexpectedly, this finding highlighted the importance of identifying and supporting this educationally underachieving at-risk group of highly intelligent females. Unexpectedly, the negative predictive effect of AEI for VCE academic achievement in the female high group indicates the need for further research into the development and relationship of AEI in VCE academic achievement. Consequently, the predictive effect of AEI in VCE academic achievement was the strongest in the male high group and was negatively predictive of VCE academic achievement in the female low group. These findings highlight the importance of providing targeted interventions for the male high group and the female high group in order to optimise their AEI and therein optimise their VCE academic achievement.

Hence, with reference to the ecological model of human development (Bronfenbrenner, 1977), the individual differences in the predictive effect of AEI for VCE academic achievement in the IQ and gender combination groups provided evidence to suggest that the utilisation of AEI in academic achievement was more effectively conceptualised developmentally, dynamically and adaptively, rather than conceptualising the predictive effect of AEI in academic achievement as a static construct. Therefore, the meaning of the individual differences in the predictive effect of AEI for VCE academic achievement in the IQ and gender combination groups was more effectively understood when identified as a dynamic construct, which was linked to the adolescents’ developmental resources (AEI mean score, IQ and gender) and adaptively or maladaptively utilised to meeting the individual adolescents’ goals and consequently addressing the demands inherent in VCE, based on ecological human developmental model (Bronfenbrenner, 1977). The conclusions drawn from the four GLM saturated regression models for the AEI traits (emotional recognition and expression, understanding emotions, emotions direct cognition, and emotional management and control) IQ and gender in VCE academic achievement are now outlined.
7.5 Conclusion Four: Emotional Recognition and Expression was Heterogeneously Predictive of VCE Academic Achievement

It was concluded that the predictive effect of emotional recognition and expression in VCE academic achievement was heterogeneous in the IQ and gender combination groups. This finding was consistent with previous research by Izard et al. (2001) that found emotional knowledge was a significant predictor of academic achievement and social behaviour in children. In the current study, emotional recognition and expression in adolescents was higher in females than in males, but not significantly so. There was a positive predictive effect for emotional recognition and expression in VCE academic achievement that accounted for 5.3 VCE points per SD in the male low group, 1 VCE point per SD in the female low group and 1.2 VCE points per SD in the male high group. Therefore, VCE students in these groups with higher skills in emotional recognition and expression, which included the ability to identify their own feelings and emotional states, and to express their feelings to others (Luebbers et al., 2007), were able to attain higher scores in VCE, while students with lower skills in emotional recognition and expression were able to attain lower scores in VCE academic achievement. However, in the female high group, emotional recognition and expression accounted for -1.3 VCE points per SD and was therefore was negatively predictive of VCE academic achievement. Consequently, as the female high group’s ability to identify their own emotions and effectively express them to others increased, their VCE academic achievement decreased. As presented in the Simple Slopes Data Plot, when emotional recognition and expression increased from -2 SD to 2 SD the positive predictive effects led to a reduction in the differences in VCE scores between the three IQ and gender combination groups; with the exception of the female high group. In light of these findings, the individual differences in the predictive effects of emotional recognition and expression are considered, with reference to plausible mechanisms underlying these results.

As outlined in Chapter Six, the male low group and male high group had comparatively similar mean scores in emotional recognition and expression and had the same gender, but differed in their intellectual capacity. Therefore, the individual differences in the predictive effect of emotional recognition and expression for VCE
academic achievement in the male low group and the male high group was potentially influenced by the differences in their intellectual capacity to meet the academic demands (Jensen, 1998) in VCE. The predictive effect of emotional recognition and expression was theorised to be highest in the male low group when compared to the male high group, as their intellectual acumen was lower than that of the male high group. Consequently, subject to the male low group’s goals and appraisal, (Arnold, 1960b) they were anticipated to experience higher levels of stress (Lazarus, 1993b) as they were anticipated to be working above their ZPD (Vygotsky, 1978) in VCE academic achievement.

Reflective of the male low and high groups, the emotional recognition and expression mean score in the female low group and the female high group was similar and their gender was the same, therefore, they only differed in intellectual acumen. The predictive effect of emotional recognition and expression for VCE academic achievement accounted for approximately 1 VCE point per SD in the female high group. This finding for the female low group was consistent with the findings for the regression model for the total cohort and with previous research (Petrides et al., 2004). In contrast, the predictive effect of emotional recognition and expression for VCE academic achievement in the female high group accounted for a small negative relationship, reflecting a decrease of approximately -1.3 VCE points per SD. The female high group had a high emotional recognition and expression mean score and the lowest predictive effect for emotional recognition and expression in VCE academic achievement. As previously outlined, the negative predictive effect of emotional recognition and expression may have been attributed to a range of mechanisms associated with: (a) the female high group’s developmental resources (high intellectual potential, female gender and high emotional recognition and expression mean score); (b) the demands of the VCE students’ environment, which included both curriculum content and engagement with other people in the learning process, stimulating both psychosocial and academic demands associated to the VCE score; (c) their personal goals; (d) their appraisal of their chances of utilising their resources to successfully attaining their goals in VCE; and (e) stimulating emotional arousal, such as distress and consequently the negative predictive effect of emotional recognition and expression for VCE academic achievement. With reference to
Dabrowski’s theory of emotional overexcitabilities (Piechowski, 2002), it was possible that the female high group may have been too emotionally sensitive and were subject to heightened emotional experiences that were so intense that they negatively impacted on their academic achievement, for example, experiencing the fear of getting a grade below 90%. While it is beyond the scope of the current study to determine the precise mechanisms that contributed to the negative predictive effect of emotional recognition and expression, the study findings provided evidence that confirmed the female high group was at educational risk as they were academically underachieving for their intellectual potential due to the negative predictive effect of their emotional recognition and expression skills. These findings led the researcher to question: Why are emotional recognition and expression skills important in VCE academic achievement?

The ability to identify and understand one’s own emotions and how those emotional states effect one’s psychological wellbeing is formative to adolescents’ mental health (Payne, 1985), and consequently adolescents’ readiness to engage in academic learning (Elias, 2006, 2009). Emotional self-awareness is also an important factor in the process of developing a coherent self-identity in adolescence (Erikson, 1959). Adolescents with low emotional self-awareness may find it difficult to identify emotions in themselves, process emotional information and then use their emotional information accurately in decision making. Consequently, adolescents with low emotional self-awareness and expression may be more susceptible to being emotionally overwhelmed or emotionally hijacked when confronted with the psychosocial and academic challenges inherent in VCE and may also be more easily led to follow their adolescent peer group, rather than make their own decisions to direct their behaviour. Further, adolescents with lower skills in communicating their emotions to others effectively may be less likely to get the support they need from peers, teachers, parents or specialists to utilise prosocial and adaptive strategies to address their emotional needs and optimise their chances of reaching their academic goals in VCE. The ability to identify one’s own emotional state and use this information to inform mature judgements that effect one’s wellbeing and academic achievement in VCE is particularly challenging, as the asynchronous developmental maturation of both the cognitive system and the emotional system,
Hence, it was concluded that higher skills in emotional recognition and expression were positively and heterogeneously predicative of VCE academic achievement in the male low group, female low group and the male high group. Further, it was concluded that emotional recognition and expression was negatively predictive of VCE academic achievement in the female high group. In addition, there was a consistent pattern of individual differences in the predictive effect of emotional recognition and expression for VCE academic achievement in the four IQ and gender groups; which reflected the pattern previously identified in the decompositions of the GLM simultaneous regression model for AEI, IQ and gender in VCE academic achievement in the IQ and gender group combinations. Consequently, the study findings confirmed the heterogeneous predictive effect of emotional recognition and expression in VCE academic achievement in the IQ and gender combination groups. The plausible mechanisms underlying the individual differences in the degree that emotional recognition and expression was predictive of VCE academic achievement in the IQ and gender combination groups was theoretically considered with reference to the individual developmental differences in the groups’ resources (emotional recognition and expression mean score, IQ and gender), their goals, and hence their appraisal of the likelihood of successfully meeting the demands of VCE academic achievement. Therein, the current study findings led to the conclusion that the heterogeneous predictive effect of emotional recognition and expression in VCE academic achievement was more effectively understood when considered as a developmental, dynamic and adaptive construct, rather than as a static construct.

Emotional recognition and expression had a positive predictive effect in VCE academic achievement in the male low group, the female low group and the male high group. These results provide evidence that affirms the importance of the construct of emotional recognition and expression in Year 12 students’ academic achievement. Consequently, these finds offer support for the inclusion of educational provisions that incorporate the construct of emotional recognition and expression in VCE academic achievement, with the aim of improving academic achievement in VCE. The predictive effect of emotional recognition and expression was the strongest in the male low group,
accounting for 5.3 VCE points per $SD$. Therefore, educational reforms that address the developmental of emotional recognition and expression in the male low group is warranted. In addition, the developmental characteristics of the male low group may represent a critical mass in the VCE cohort of male or mixed gender secondary schools, which requires developmentally targeted interventions to improve their emotional recognition and expression skills in order to optimise this group’s VCE academic achievement. Furthermore, the adolescent female high group’s results suggested that high skills in emotional recognition and expression for females with high intellectual potential were debilitating for their VCE academic achievement. Therefore, female students with high intellectual potential required targeted interventions to address the negative predictive effect of emotional recognition and expression on their VCE academic achievement.

The GLM saturated regression model for understanding emotions, IQ and gender in VCE academic achievement are now considered.

7.6 Conclusion Five: Understanding Emotions was Heterogeneously Predictive of VCE Academic Achievement

It was concluded that the predictive effect of understanding emotion in others in VCE academic achievement was heterogeneous in the IQ and gender combination groups. In this study, the construct understanding emotions referred to the adolescents’ ability to identify and understand the emotions of others (Luebbers et al., 2007). In the male low group, understanding others’ emotions had the strongest positive predictive effect of 5 VCE points per $SD$ in VCE academic achievement. The positive predictive effect of understanding others’ emotions in the male high group accounted for 2.2 VCE points per $SD$ in VCE academic achievement. The positive predictive effect of understanding others’ emotions in the female low group accounted for 2 VCE points per $SD$ in VCE academic achievement. In the female high group, understanding emotions in others had a small negative predictive effect in VCE academic achievement that accounted for -0.2 VCE points per $SD$. As presented in the Simple Slopes Data Plot, with the exception of the female high group, the differences in VCE points between the IQ and gender combination groups were lowered from -2 $SD$ to 2 $SD$ when their ability to understand others emotions increased. The pattern of results identified in the individual
differences of understanding emotions in others for VCE academic achievement was consistent with the previous patterns of individual differences in the predictive effect of AEI total score and the AEI trait understanding emotions for VCE academic achievement in the IQ and gender combination groups.

Hence, it was concluded that higher skills in understanding emotions were positively and heterogeneously predictive of VCE academic achievement in the male low group, female low group and the male high group. In contrast, it was concluded that understanding emotions was negatively predictive of VCE academic achievement in the female high group. These findings further contextualise the seminal research findings by Petrides et al. (2004) that confirmed the importance of Year 12 students’ ability to understand others emotions in their learning and VCE academic achievement, as the individual adolescent develops and matures through interactions with others within their nested environments (Bronfenbrenner, 1977). The individual differences in the predictive effect of understanding emotions also provided evidence that highlighted the distinct developmental differences that partially stimulated the adaptive (Darwin, 1898) utilisation of understanding others’ emotions in VCE academic achievement. The degree to which understanding emotions was utilised in VCE academic achievement was reflective of the changing nature of the relationship between the individual adolescent’s developmental resources (understanding emotion mean score, IQ and gender), their VCE goals, and their appraised ability to successfully utilise their resources to meet their goals with reference to the environmental challenges encompassed in the academic and associated psychosocial demands inherent in VCE academic achievement (Bronfenbrenner, 1977). Thus, from an AEI theoretical perspective the individual differences in the construct of understanding emotions in VCE academic achievement in the IQ and gender combination groups were more effectively comprehended when understanding emotions was conceptualised as a developmental, dynamic and adaptive construct (Zeidner et al., 2003), rather than a static construct without reference to the individuals’ developmental resources and their environmental demands. These findings led the researcher to question: Why is adolescents’ ability to understand others’ emotions so important to VCE academic achievement?
From an evolutionary developmental perspective, the importance of understanding others’ emotions is considered in relation to humans’ motivation to connect to others in order to optimise their chances of survival by sharing resources such as food and shelter, finding a mate, and gaining protection from predators (Darwin, 1898). However, group membership can also be dependent upon an individual’s ability to understand emotions in others due to the competition in establishing the group’s social hierarchy, and the ongoing competition within the group members for resources and social status; which creates the need to form alliances with others and monitor for threats from others within the group, in order to build one’s social capital and reduce the threat of being marginalised or excluded from the group (Gluckman et al., 2009). The experience of breaking a social connection with another person or being excluded from a social group stimulates the same neurological connections as those stimulated by the experience of physical pain (Eisenberger, 2012). Hence, from an evolutionary perspective humans have adaptively developmentally to be able to detect social pain as a threat or a risk factor and social pleasure as a happiness or a protective factor, and are motivated to build social connections and benefit from having the skills to understand other people’s emotions and to utilise this emotional information to effectively interact with others (Lieberman, 2013). Therefore, having the ability to understand others’ emotions through verbal and non-verbal facial and body expressions (Ekman, 2003) and the Theory of Mind (Baron-Cohen et al., 1985) to predict what another person is thinking and feeling, is an adaptive advantage (Darwin, 1898). The ability to “read” another person’s emotions, to understand what drives or motivates them, and then use this information to predict what another person is likely to think and feel in a future situation allows an individual to plan how they should best behave in order to optimise their own survival (Blakemore, 2010), for example, to avoid conflict and ensure harmonious, co-operative and productive behaviour in the group (Lieberman, 2013). However, as biological maturation precedes psychosocial maturation (Gluckman et al., 2009), the ability to understand emotions in others is also subject to epigenetic developmental changes throughout infancy, childhood, adolescence and adulthood.

From an adolescent developmental perspective, the Theory of Mind incorporates the ability to cognitively take another person’s perspective and to understand others’
emotions (Sebastian et al., 2012). The ability to understand emotions in others in adolescence is still developing and is subject to biological changes associated to the onset of puberty and reaches adult maturation in the mid to late twenties (Blakemore, 2010), as adolescents were found to activate the ventromedial prefrontal cortex more than adults did when understanding others’ emotions (Sebastian et al., 2012). Therefore, for the Year 12 students in the current study ($M_{age} = 16$ years old) who are in the late stage of adolescent development (15–19 years old) (Sawyer et al., 2012), the prefrontal cortex is still in the process of maturation and influences a range of functions, including the individual’s ability to understand others’ emotions (Sebastian et al., 2012). As adolescents’ ability to understand others’ emotions is not as mature as adults’, adolescents may be more likely to make errors in understanding others’ emotions than adults (Sebastian et al., 2012), and adolescents may become increasingly concerned with what others, particularly their peers, think and feel about them, which consequently influences their sense of “self” (Sebastian et al., 2008). Therefore, even though adolescents’ ability to understand others’ emotions is still “under construction” and subject to the protracted structural and functional changes that occur during the adolescent period (Blakemore, 2010), the ability for Year 12 students in the late stage of adolescent development (Sawyer et al., 2012) to understand emotions in others is formative to the development of their self-identify (Heaven, 2001). Adolescents’ self-identity is partially influenced by what they understand others think and feel about them, therefore the adolescents’ skills in understanding emotions in others is one of the important factors as adolescents constructs their self-identity and develops within the context of relationships and social interactions with family, peers, teachers, the school community (Heaven, 2001).

For Year 12 secondary school students, the ability to understand emotions in others underpins the social constructivist process of learning, which primarily takes place within the social construct of the classroom that incorporates relationships between the teacher, student, and peers (Vygotsky, 1978). Based on the social constructivist process of learning, few students in VCE will learn new theories by themselves; rather, most students will learn more effectively if working just above their ZPD within a social context (Vygotsky, 1978). Through the relationship and interaction between the more
knowledgeable person, who may be a teacher or another student, and the learner, the individual student will learn and attain new knowledge. Thereby, the student utilises their ability to understand others’ emotions to facilitate the learning process. VCE students are typically grouped together as a total cohort and taught in classes of approximately 20–25 students for the year, which facilitates the social comparison of student’s academic achievement and social status by their academic peer group and the classroom teacher. The students’ ability to learn the extensive VCE curriculum in four to six VCE subjects within the restricted allocated time frame of approximately 35 school weeks in the school year before VCE exams commence in November, was plausibly influenced by their skills to understand others’ emotions. Year 12 students’ ability to understand others’ emotions, was theorised to be required in developing positive working relationships with the VCE teachers and academic peer group in each class. Therefore, the ability to understand emotions in others was considered an important skill for VCE students, which was utilised in developing positive working relationships with the classroom group that included the teacher and the Year 12 students’ academic peers in a secondary school learning environment (Vygotsky, 1978).

Further, the importance of the Year 12 students’ skills in understanding emotion in others for VCE academic achievement is more clearly illustrated when contextualised with the positive and negative emotional and social benefits and costs of academic achievement and academic failure for contemporary adolescents in a technologically advanced globalised society, whereby a student’s VCE score is a prerequisite for entry into tertiary study and is a key predictor for adult employment. For example, it is possible that low skills in understanding others’ emotions may have resulted in limited communication with their teacher, and possibly poor social skills when working in a group, which may have contributed to lower academic achievement. Consequently, poor academic achievement may have led students to feel social embarrassment in front of their peers in the classroom and to feel excluded/rejected from their VCE peer group. The fear of academic failure and the anxiety associated to the anticipated loss of social status in the VCE group may have been experienced as physical pain (Eisenberger, 2012). By activating the same neural circuitry that stimulates physical pain, adolescents’ experience of emotional and social pain, associated to the threat of academic failure and loss of their
connection and social status within their peer group may have caused them to be more motivated to work harder in order to stay connected to their VCE class, or alternatively, have caused them to be more over-whelming and motivated them to deploy defensive behaviours in response to the negative impact of their perceived rejection from their teacher or peers on their self-identity (Heaven, 2001). In addition, the fear of poor academic achievement in VCE may have also been associated to the increasingly real fear of having a limited capacity for a successful transition into tertiary study or employment and subsequently adult employment in a globalised society.

In contrast, students with higher skills in understanding others’ emotions were more likely to utilise their skills to build positive relationships with key stakeholders such as their teachers and peers, which was anticipated to increase the chances of academic success and therefore stimulate eustress that would be associated with increased motivation to work hard and improve their academic achievement in the final year of secondary school. The eustress associated to academic achievement is associated to understanding others’ emotions as welcoming, leading to social inclusion and acceptance in the classroom, excitement and the individual thriving in the VCE cohort with the exhilaration of having an expanded future adult career, and employment and income options in a globalised society. Hence, the individual differences in the predictive effect of understanding emotions in others for VCE academic achievement in the IQ and gender combination groups were understood in light of the students’ late adolescent stage of development, and the adolescents’ resources (understanding emotions mean score, IQ and gender) as risk and/or protective factors that were dynamical and adaptively utilised in VCE academic achievement (Zeidner et al., 2003). The conclusions stemming from the GLM saturated regression model for emotions direct cognition, IQ and gender in VCE academic achievement are now outlined.

7.7 Conclusion Six: (a) Emotions Direct Cognition by Gender was Predictive of VCE Academic Achievement. (b) Emotions Direct Cognition was Heterogeneously Predictive of VCE Academic Achievement in the IQ and Gender Combination Groups

This study investigated the predictive effect of emotions direct cognition, IQ and gender in VCE academic achievement in a saturated regression model. Based on the
analysis of the individual-level data in Year 12 students with a mean age of 17 years and 7 months, evidence has been found that demonstrated the variables IQ and gender had main effects in the model. Further, the model also identified a significant interaction effect between emotions direct cognition and gender for VCE academic achievement. The study findings found that the predictive interaction effect between emotions direct cognition and gender was negatively predictive of -5.76 VCE points per $SD$ in the total cohort. Therefore, it was concluded that the interaction effect between emotions direct cognition and gender was a significant factor in VCE academic achievement, which was positively predictive of VCE academic achievement in females and was negatively predictive of VCE academic achievement in males.

This gender differentiation was also evident in the predictive effect of emotions direct cognition in the IQ and gender combination groups, whereas, emotions direct cognition was negatively predictive of VCE academic achievement in the male low group and the male high group. In contrast, emotions direct cognition was positively predictive of VCE academic achievement in the female low group and the female high group. The degree to which emotions direct cognition was predictive of VCE academic achievement was higher in the male low group and the female low group than the male high group and the female high group. Therefore, the study results also confirmed that individual differences in the predictive effect of emotions direct cognition for VCE academic achievement were subject to adolescent developmental differences in both gender and IQ, which differentiated predictive effect of emotions direct cognition for VCE academic achievement. These findings were consistent with the gender differentiation in the maturation of the adolescent socio-emotional system to direct adolescent cognition in decision making (Steinberg et al., 2008) and the previous research findings by Petrides et al. (2004) that found the degree to which AEI predicted academic achievement was highest for those with fewer intellectual resources. The implications and importance of these conclusions are outlined firstly for the total cohort and secondly for the male low and high group in comparison to the female low and high group.

First, in the regression model the interaction effect between the AEI trait emotions direct cognition and gender for VCE academic achievement was argued to be developmentally consistent with previous research findings by Steinberg et al. (2008) that
found a significant relationship between pubertal status and levels of sensation seeking and risk-taking behaviour, which was differentiated in adolescent males and females, due to the gender differences in the timing of the onset of puberty and the gender-specific hormonal and chemical changes in adolescent females and males (Gluckman et al., 2009; Spear, 2013). The asynchronous maturation of the emotional system and the cognitive system over the period of adolescence has been confirmed, whereby the emotion system that is particularly sensitive to rewards and novelty, has a propensity to overcome the cognitive control system in emotional, exciting and stressful circumstances (Spear, 2013). Therefore, in the current study the adolescent females’ emotional system, and accordingly their skills measured in the AEI trait emotions direct cognition (emotions → cognition), was anticipated to be comparatively more mature and developmentally differentiated from that of their adolescent male peers. It was also plausible that adolescent females were more empathetic than adolescent males, who were more systemising (Baron-Cohen, 2005); these gender differences may have further differentiated the effect of emotions direct cognition positively in the adolescent females’ and negatively in the adolescent males’ VCE academic achievement.

Therein, the “Empathizing-Systemizing (E-S) Theory” presented by Baron-Cohen (2005) was also supportive of the proposition that there were biological differences between brain types typically found in males and females. Wherein, the empathising or type E brain was commonly found in the female brain, which was predominately stronger at empathising with others and the male brain; while the systemising or type S brain pattern typically found in males, was predominately stronger at systemising or finding out how things work. It is plausible that these gender differences might have also partially contributed to the interaction effect found in the current study between emotions direct cognition and gender. It is possible the adolescent females were more empathetic and the adolescent males were more skilled at systemising as asserted by Baron-Cohen (2005). Therefore, the gender differences in brain types partially contributed to the interaction effect between emotions direct cognition and gender found in the current study, contributing to the positive predictive effect of emotions direct cognition in females’ VCE academic achievement, and in contrast, the negative predictive effect of emotions direct cognition in males’ VCE academic achievement.
Hence, it was plausible that the predictive interaction effect between emotions direct cognition and gender for VCE academic achievement was partially influenced by the gender differentiation in adolescent biological, and subsequently adolescent psychosocial, development (Giedd et al., 1999; Giedd et al., 2012; Gluckman et al., 2009; Gluckman et al., 2011b; Steinberg, 2011b; Steinberg et al., 2008). The AEI construct emotions direct cognition was understood with reference to the effect of adolescent emotions on adolescent cognition, and consequently to influence adolescent problem solving, decision making and risk-taking behaviour (Steinberg, 2008). Specifically, focusing on the role of adolescents’ emotions that were potentially subject to their evaluation of salient, remembered or anticipated reward and punishment to arouse adolescents’ positive and negative emotions, respectively, and that were potentially associated with changes in mood (Rolls, 2004), which may have effected adolescent cognition in reasoning, problem solving and subsequently in making decisions that influenced adolescent behaviour (Gardner & Steinberg, 2005; Steinberg, 2004, 2007) associated with VCE academic achievement. It was estimated that adolescent females in the current study had comparatively more mature and empathetic emotions that directed their cognition, when compared to how adolescent males’ emotions directed their cognition; plausibly due to gender differences in adolescent biological and subsequently psychosocial development (Gluckman et al., 2009; Gluckman et al., 2011b; Steinberg et al., 2008). This pattern of findings for the total cohort, whereby the interaction effect between emotions direct cognition and gender was predictive of VCE academic achievement, was also evident in the individual differences in the predictive effect of emotions direct cognition in the IQ and gender combination groups.

Second, the individual differences in the predictive effect of emotions direct cognition for VCE academic achievement in the four IQ and gender combination groups identified in the current study, led to the conclusion that emotions direct cognition was heterogeneously predictive of VCE academic achievement. In the female low group and the female high group there was a positive predictive effect for emotions direct cognition in VCE academic achievement that accounted for 2.5 VCE points per SD and 0.6 VCE points per SD, respectively. Further, an examination of the Simple Slopes Data Plot found the differences in VCE scores between the female high group and the female low group
decreased from -2 $SD$ to 2 $SD$ primarily due to the increase in the female low group’s skills in emotions to direct their cognition in VCE academic achievement. The decrease in the variance between the predictive effects of emotions direct cognition in the female low group and the female high group was largely driven by the comparatively stronger predictive effect of emotions direct cognition in the female low group. In contrast, the negative predictive effect of emotions direct cognition for VCE academic achievement in the male low group and in the male high group indicated that emotions direct cognition accounted for a decrease of -3.1 VCE points per $SD$ and -0.2 VCE points per $SD$, respectively. An examination of the Simple Slopes Data Plot found that the differences in VCE scores between the male high group and the male low group became greater from -2 $SD$ to 2 $SD$; this divergence in scores was primarily attributed to the stronger negative predictive effect of emotions direct cognition for VCE academic achievement in the male low group. As the male low group’s emotions increasingly directed their cognition, their VCE academic achievement decreased by -3.1 VCE points per $SD$. Therein, the individual differences in the predictive effect of emotions direct cognition for VCE academic achievement in the IQ and gender combination groups provided evidence of gender differentiation in the positive and negative predictive effects of emotions direct cognition for VCE academic achievement in the female and male groups, respectively. In addition, the degree to which emotions direct cognition was predictive of VCE academic achievement differed in relation to the individual differences in the intellectual acumen in the female and male high groups and the female and male low groups.

The individual differences in the degree to which emotions direct cognition was predictive of VCE academic achievement in the four IQ and gender combination groups were consistent with the variance in the intellectual capacity of each group. Therefore, this pattern in the results was consistent with the cognitive compensation theory outlined by Petrides et al. (2004), whereby the male high group and the female high group had more intellectual capacity to cope with the academic demands of VCE and consequently, were anticipated to have experienced less stress and distress, which stimulated lower levels of the need for emotions direct cognition in VCE academic achievement. In contrast, the comparatively lower IQ levels found in the male low group and female low group were anticipated to have created more stress and strain when both groups faced the
academic demands of VCE. Therefore, the lower IQ found in the male low group and the female low group were anticipated to have stimulated a higher need for the utilisation of emotions direct cognition, which was subsequently evident in the predictive effect of VCE academic achievement. Hence, these findings suggest that the predictive effect of emotions direct cognition in the female low group and the female high group acted as a protective factor for their VCE academic achievement. In contrast, the predictive effect of emotions direct cognition in the male low group and the male high group acted as a risk factor for their VCE academic achievement. The results indicated that interventions to reduce the negative predictive effect of emotions direct cognition on VCE academic achievement in the male low group and the male high group are warranted.

As academic achievement is an increasingly strong key predictor and prerequisite for employment (OECD, 2014) in a technologically advanced globalised society (Gluckman et al., 2009; Gluckman & Hayne, 2011), educational interventions to optimise the development of emotions direct cognition should be developmentally differentiated for adolescent females and males. Interventions are particularly important for the male low group and the male high group in light of the stronger negative predictive effect of emotions direct cognition on their VCE academic achievement. In the male low group, the strong negative predictive effect of emotions direct cognition for VCE academic achievement was indicative of the large degree to which the male low group’s emotions influenced their cognition and the negative effect of their emotions and on their ability to utilise emotional information in reasoning and decision making, which decreased their VCE academic performance. The study results suggest it is possible the male low group was more likely to be overwhelmed by their emotions, or for their emotions to override or “hijack” their cognition in decision making that was negatively related to their learning in VCE. Further, it is possible that the reward sensitisation effect of peer presence (Chein et al., 2011) both in the VCE classroom and in the wider social context of the secondary school, may have also incrementally stimulated adolescent males in the low group to increase their risky decision making and their subsequent risk-taking behaviours that negatively impacted on their VCE academic achievement. Therefore, environmental interventions should be developed with the aim of reducing the negative predictive effect
of emotions direct cognition on VCE academic achievement in the male low group and
the male high group.

For instance, adolescent males in the low group may benefit from being tutored
away from their peer group to reduce the reward sensitisation effect of their peers on their
ability to make decisions that lead to risky behaviours (Chein et al., 2011). The
opportunity for adolescent males to study in small groups and/or access individual
support may decrease the reward sensitisation effect of peer presence (Chein et al., 2011)
that is more prevalent in a larger classroom of peers. Working in a small group or with
one-on-one support may reduce the male adolescents’ perceived risk of social
embarrassment and therefore their need to “save face” and protect their self-identity and
autonomy, rather than seek the help they may need in front of their peers in the
classroom. For example, in smaller groups with fewer peers, the adolescents in the male
low group may be more willing to admit they are having difficulty learning a concept and
therefore be more willing to accessing extra support to meet their need for academic
achievement in VCE. Further, targeted interventions for the male low group and the male
high group to learn about what the AEI trait emotions direct cognition is, and how it can
positively or negatively impact on learning, would be an important first step in
highlighting the importance of the predictive effect of emotions direct cognition in VCE
academic achievement.

These findings suggest that the male low group and to a lesser degree, the male
high group are more susceptible or vulnerable to having their emotions override their
cognition and effect their decision making processed, which in turn negatively effects
adolescent males’ VCE academic achievement. Therefore, educators should be aware that
due to the predictive effects of emotions direct cognition, the male low group and the
male high group are at increased educational risk in VCE academic achievement.
Therefore, the male low group and the male high group are liable to experience periods
when their emotions are focused on novelty, sensation seeking, rewards, stress and
impulses that direct their cognition and negatively affect their VCE academic
achievement. Consequently, psychoeducational policy, targeted interventions and the
 provision of teaching and learning strategies should be developed that acknowledge and
address the potential for adolescent males’ emotions to “hijack” their cognition, and
negatively impact on their decision making and behaviour for VCE academic achievement.

In addition, it was also concluded that the positive predictive effect of emotions direct cognition for VCE academic achievement in the female low group and the female high group were a protective factor for VCE academic achievement, which may have increased their educational resiliency. These study conclusions suggest that unique interventions are required for the female low group and the female high group that aim to further develop the positive predictive effect of emotions direct cognition in each group. The interventions should be designed to further develop and utilise the female low group’s and the female high group’s ability to identify the metacognitive effects of their emotions or their socio-emotional network (Steinberg, 2007) on their thinking, decision making and risk-taking or resilient behaviours to further optimise the positive predictive effect of utilising their emotions to direct their cognition in VCE academic achievement. Particular attention is warranted for the female high group, as emotions direct cognition was the only AEI trait with a positive predictive effect on their VCE academic achievement. Hence, the findings outlined have identified the heterogeneous individual differences in the predictive effect of emotions direct cognition in VCE academic achievement in the IQ and gender groups.

The importance of the individual differences in the predictive effect of emotions direct cognition for VCE academic achievement in the four IQ and gender groups are further understood with reference to the predictive effect of emotional management and control for VCE academic achievement, while the AEI construct of emotions direct cognition was speculated to be reflective of the socio-emotional network (Steinberg, 2007) that was particularly focused on the effect of emotions on cognition in decision making. The construct of emotional management and control was reflective of the adolescent cognitive control network (Steinberg, 2007) that was particularly focused on the effects of adolescent cognition on emotion in decision making. Hence, the major conclusions stemming from the decomposition of the GLM saturated regression model for emotional management and control, IQ and gender for VCE academic achievement are now outlined.
7.8 Conclusion Seven: (a) Emotional Management and Control was Correlated to IQ. (b) Emotional Management and Control was Heterogeneously Predictive of VCE Academic Achievement

This study has investigated the simultaneous existence of emotional management and control, IQ and gender in VCE academic achievement scores. Based on analysis of individual-level data from 369 VCE students, evidence has been found demonstrating that emotional management and control predicted .4% of the unique variance in the model; however, the effect was not statistically significant in the final GLM saturated regression model. Nonetheless, emotional management and control was correlated to VCE academic achievement, accounting for 3.6% of the variance in VCE academic achievement ($r = .19, p = \leq .01$). Further, emotional management and control accounted for 2.3 VCE points per $SD$ in the regression model for the total cohort. These findings were theoretically consistent with the seminal research of Shoda et al. (1990), whereby preschool children who used cognitive-attentional processes to delay gratification were identified in adolescence as having higher academic competence and a stronger ability to cope with frustration and stress (Shoda et al., 1990). Consistent with the previous research by Shoda et al. (1990), it was found that students who had higher skills in emotional management and control also had higher scores in VCE academic achievement.

Hence, VCE students who had higher skills in managing positive and negative emotions both within themselves and others, and could also control strong emotional states (Luebbers et al., 2007), were more likely to have higher levels of VCE academic achievement. While VCE students with lower skills in handling their own and others’ positive and negative emotions and who had difficulty in controlling their strong emotions, were more likely to have lower skills in VCE academic achievement. The AEI trait of emotional management and control was understood in the current study as being reflective of the structural and functional changes evident in adolescent maturation (Giedd et al., 1999; Shaw et al., 2006). In particular, emotional management and control in Year 12 students was subject to the protracted maturation of the adolescent cognitive control system for students who were in the late stage of adolescent development to manage their heightened social emotional system, in decision making and behavioural
control (Steinberg, 2008, 2010), which was formative to Year 12 adolescents’ ability to utilise their cognitive skills for “self-regulation” to manage or control their strong emotions when problem solving, making decisions and controlling their behaviour in VCE academic achievement. For example, those with higher skills in emotional management and control may have utilised more effective cognitive control strategies, such as focusing on the long-term benefits of higher scores in VCE academic achievement in VCE to more effectively control their strong emotional impulses, i.e. to go out with friends rather than to stay at home and study (Steinberg, 2011b), which positively impacted on VCE academic achievement. Hence, in the current study, the construct of adolescent emotional management and control was understood as being subject to the asynchronous adolescent maturation of the comparatively slower maturation of the cognitive control system and the heightened sensitivity of the social emotional system to uniquely impact on adolescent decision making and risk-taking behaviour (Steinberg, 2010).

In addition, emotional management and control was positively correlated to IQ in the VCE student cohort and the correlation accounted for 4.7% of the variance ($r = .21, p \leq .01$). Therefore, as IQ increased so too did adolescents’ skills in emotional management and control. This relationship between emotional management and control and IQ was unique as no other AEI trait was found to have a statistically significant relationship with IQ in the current study. This finding was consistent with the theoretical conceptualisation of emotional management and control as an AEI trait that primarily utilised adolescents’ cognition or fluid intelligence to manage adolescents’ positive and negative emotions and strong emotional states in VCE academic achievement. The adolescent brain regions involved in the skills attributed to the cognitive management and control of strong emotions, found in the current study of Year 12 students, were thought to be reflective of the adolescent executive functions found in the prefrontal cortex (Coutlee & Huettel, 2012; Steinberg, 2010). The adolescent prefrontal cortex was subject to the maturational changes found in the late stage of adolescent development (Spear, 2013; Steinberg, 2010). The adolescent prefrontal cortex was also thought to support adolescents’ ability to utilise their “top-down” cognitive control system (Spear, 2013) in order to manage their positive and negative emotions and control their strong emotional
states, and therein to support adolescent goal-directed problem solving, decision making and behavioural control (Blakemore & Robbins, 2012) in VCE academic achievement. It is possible that adolescents’ cognitive ability may have managed and controlled their emotions in a number of ways. For example, adolescents’ fluid intelligence may have played a significant role in: (1) determining complex social interactions, analysing the potential risks and benefits, and creating a range of alternative solutions (Rolls, 2004); (2) developing a range of cognitive strategies to manage their emotions, i.e. through impulse control, (Steinberg, 2011b); and (3) delayed gratification whereby the adolescent was prepared to delay the more immediate reward associated to a short-term goal for the larger reward associated to a long-term goal such as optimising their academic achievement (Shoda et al., 1990).

Further, a correlational analysis found Year 12 students’ emotional management and control was significantly higher in the adolescent males ($M = 54.6$) than in the adolescent females ($M = 47.9$) who were in the late adolescent stage of development, however the effect size was small. The gender differences in emotional management and control found in the current study were understood with reference to the developmental differences in adolescent males and females as they matured throughout the adolescent stage of development (Giedd et al., 2012). Further, it is possible that the gender differences in emotional management and control, which were higher in adolescent males than in adolescent females, was partially reflective of the gender differences outlined in the Empathizing–Systemizing Theory of brain and mind development by Baron-Cohen (2005). Where the male’s neurological profile was more commonly found to incorporate systemising skills that allowed them to more readily determine systems of input, processing and output, which subsequently facilitated the management and control of the system (Baron-Cohen, 2005), the females’ neurological profile was more commonly found to incorporate empathising skills that allowed them to more readily focus on the individual, rather than on the system as a whole (Baron-Cohen, 2005). The adolescent females’ tendency to primarily focus on empathising with the individual (Baron-Cohen, 2005) may have reduced their ability to determine system inputs, processes and outputs and therefore reduced the adolescent females’ ability to determine strategies for effectively managing and controlling their own and others’ strong positive and negative
emotional experiences and controlling strong emotional states. Therefore, it was plausible that the gender differences in emotional management and control found in the current study of Year 12 adolescent males and females was partially reflective of the neurological gender differentiation outlined in the empathising–systemising theory of human developed by Baron-Cohen (2005). In the current study, adolescent females were less effective in managing strong positive and negative emotions in themselves and others and they were less skilled in controlling strong emotional states when compared to the adolescent males in Year 12.

An examination of the individual differences in the predictive effect of emotional management and control for VCE academic achievement in the IQ and gender combination groups led to the conclusion that emotional management and control was heterogeneously predictive of academic achievement. The individual differences in the predictive effect of emotional management and control in VCE academic achievement in the four IQ and gender groups were more effectively understood when considered in light of the individual’s resources (emotional management and control mean score, IQ and gender), the individual’s goals, and their appraisal of their resources to successfully meet their goals and hence the potential stress (distress–eustress) (Lazarus, 1993b) associated with coping with the demands of VCE academic achievement. Therefore, the relationship between the emotional management and control and VCE academic achievement was more effectively understood when the AEI trait mean scores were conceptualised as an antecedent, which developmentally contextualised the predictive effect of AEI in VCE academic achievement. Whereby higher skills in emotional management and control acted as a protective factor for the individual’s psychosocial wellbeing, which then optimised their state of readiness to engage in the learning process. Further, those with higher intelligence were more likely to have higher skills in emotional management and control and males were more likely to have higher scores than females in emotional management and control.

Consistent with this trend, the highest emotional management and control mean scores were found in the male high group ($M_{EMC} = 57$) and the female high group ($M_{EMC} = 56$), potentially reflecting their higher fluid intelligence and the stronger skills of emotional management and control in the males when compared to the females. These
higher emotional management and control mean scores were speculated to have acted as protective antecedents for both the male high group and the female high group, which then decreased the need to directly utilise their emotional management and control skills to address the demands of VCE academic achievement. Consistent with this plausible explanation, the male high group had the third strongest positive predictive effect for emotional management and control in VCE academic achievement, which accounted for a positive increase of approximately 1.6 VCE points per SD. In contrast, an increase in emotional management and control for the female high group had a negative predictive effect on VCE academic achievement, leading to a decrease of approximately 0.7 VCE points per SD. The small degree to which emotional management and control was predictive of VCE academic achievement in the female high group was also consistent with this possible explanation. However, the negative predictive effect of emotional management and control for VCE academic achievement in the female high group raised further concerns.

It was plausible that a range of mechanisms may have stimulated the negative predictive effect in the female high group; for instance, it was possible that the females with high intellectual potential were setting personal academic goals that were perfectionistic or unrealistically high and therefore experienced high levels of distress that were difficult to manage and control (Silverman, 1998), manifesting in the negative predictive effect of emotional management and control on VCE academic achievement. Otherwise, when attempting to manage and control their strong emotions, it was possible that the female high group used non-productive coping strategies that focused on negative emotions and avoided the problem, such as rumination (Frydenberg, Eacott, & Clark, 2008), which then stimulated the negative predictive effect of emotional management and control in their VCE academic achievement. Alternatively, the female high group may have been working below their ZPD (Vygotsky, 1978) and therefore experienced more negative emotions such as boredom and frustration associated with the VCE curriculum. Therein, if the female high group were working below their ZPD and experiencing frustration the negative predictive effect of emotional management and control may have been an adaptive response to the lack of congruence between their high intellectual potential and limited academic rigour in the VCE curriculum, which decreased their rate
of learning and stimulated the negative predictive effect of emotional management and control in VCE academic achievement.

Further, the lowest emotional management and control mean scores were found in the male low group ($M_{EMC} = 52$) and the female low group ($M_{EMC} = 43$), potentially reflecting their lower fluid intelligence and the stronger skills of emotional management and control in the males when compared to the females. The male low group had the strongest positive predictive effect for emotional management and control in VCE academic achievement, which accounted for a positive increase of approximately 5.5 VCE points per $SD$. The male low group’s emotional management and control mean scores were lower than the male high group, but not statistically lower. However, the male low group’s emotional management and control mean scores were significantly higher than the female low group’s, which suggested they had more skills to manage and control strong emotions and to speculatively act as an antecedent, which was a protective factor for the male low group. Nonetheless, the male low group was also anticipated to be subject to the highest level of stress associated to the academic demands of VCE academic achievement. Consequently, the predictive effect of emotional management and control accounting for 5.5 VCE points per $SD$ in the male low group indicated the male low group experienced the strongest need to directly utilise their skills in VCE academic achievement. Meanwhile, the female low group had the lowest emotional management and control mean score of the four groups, which indicated they had few resources to manage positive and negative emotions in themselves and others and few resources to control strong emotions. In light of their developmental resources, the female low group was anticipated to experience slightly less stress associated to the academic demands of VCE than the male low group. Consequently, the findings for the female low group that found they had the second strongest positive predictive effect for emotional management and control in VCE academic achievement, which accounted for a positive increase of approximately 2.4 VCE points per $SD$, were consistent with their developmental profile. As presented in the Simple Slopes Data Plot, with the exception of the female high group, the differences in VCE academic achievement scores between the IQ and gender combination groups became less, from -2 $SD$ to 2 $SD$, with an increase in emotional management and control.
Therefore, the individual differences in the predictive effect of emotional management and control for VCE academic achievement in the IQ and gender combination groups were understood within the framework of an ecological model of human development (Bronfenbrenner, 1977). Based on the ecological model of human development, the individual differences in the predictive effect of emotional management and control for VCE academic achievement were understood with reference to each IQ and gender group’s resources (emotional management and control mean score, IQ and gender), goals (internal or external), and appraisal of their chances of successfully utilising their resources to cope with the demands associated to VCE. Further, the individual differences in the predictive effect of the AEI traits for VCE academic achievement were considered with regard to adolescent biopsychosocial developmental differences (Gemelli, 2013). In particular, adolescent developmental differences in intellectual ability and gender were acknowledged to influence individual differences in relation to the development of emotional management and control mean scores and subsequently the individual differences in the predictive effect of emotional management and control in meeting the academic demands of VCE. Individual differences in the adolescent males’ and females’ developmental needs or drives were speculated to lead to individual differences perceived threats, supportive events and challenges that would simulate strong positive and negative emotions in Year 12 adolescents’ emotional management and control in the process of meeting their need or drive to establish their self-identity, and their drive for autonomy, sexuality, intimacy and achievement (Steinberg, 2011a). Consequently, the thesis findings suggest the individual differences in the predictive effect of emotional management and control for VCE academic achievement in the IQ and gender groups were less effectively understood and conceptualised as a unidimensional construct, and more effectively conceptualised as a developmental, dynamic, and adaptive multifaceted construct. Finally, the thesis conclusions for the AEI traits are outlined in the four IQ and gender groups.

7.9 Conclusion Eight: AEI Traits Were Heterogeneously Predictive of VCE Academic Achievement in the Four IQ and Gender Combination Groups

This study led to the conclusion that there were individual differences in the predictive effects of the AEI traits (emotional recognition and expression, understanding
emotions, emotions direct cognition and emotional management and control) in the four IQ and gender combination groups for VCE academic achievement. A review of the predictive effects of three of the AEI traits for VCE academic achievement in the male low group, female low group and male high group confirmed these groups presented with similar patterns in the positive predictive effect of emotional recognition and expression, understanding emotions, and emotional management and control for VCE academic achievement. In contrast, an analysis of the same AEI traits for VCE academic achievement in the female high group found emotional recognition and expression, understanding emotions, and emotional management and control were negatively predictive of VCE academic achievement. Furthermore, a unique pattern of results in the adolescent males versus adolescent females was identified in the predictive effect of emotions direct cognition for VCE academic achievement in the IQ and gender combination groups. Whereby, the predictive effect of emotions direct cognition was positively predictive of VCE academic achievement in the female high group and the female low group; while being negatively predictive of VCE academic achievement in the male high group and the male low group. Therein, the predictive effect of emotions direct cognition illustrated the effect of emotion on cognition was positive for the two female groups and negative for the male groups’ VCE academic achievement. Finally, an examination of the individual differences in the predictive effect of emotional management and control illustrated the effect of cognition on emotion in VCE academic achievement, and was potentially influenced by differences in both the IQ and gender in the four IQ and gender combination groups. Therefore, these findings led to the conclusion that the predictive effect of the four AEI traits were developmentally, dynamically and adaptively utilised in VCE academic achievement by the Year 12 students in the male low group, the female low group, the male high group and the female high groups.

Collectively, the individual differences in the predictive effect of the AEI traits for VCE academic achievement were theoretically consistent with the previous research findings by Petrides et al. (2004), whereby the predictive effect of AEI total score for academic achievement was largest in students with lower intellectual skills and was smallest in students with higher intellectual skills. The current study also extended the
seminal research findings presented by Petrides et al. (2004) by providing evidence that the larger and smaller predictive effect of the AEI traits in students with lower and higher intellectual acumen, respectively, was further differentiated by gender. It was concluded that the AEI traits had the strongest predictive effect on VCE academic achievement in the male low group and the second strongest predictive effect on VCE academic achievement in the female low group. Further, it was concluded that collectively the AEI traits had the smallest negative predictive effect on VCE academic achievement in the female high group and AEI had a small positive predictive effect in the male group.

Consequently, it was concluded that the predictive effects of the AEI traits for VCE academic achievement in the IQ and gender combination groups were heterogeneous. The individual differences in the predictive effect of the AEI traits for VCE academic achievement identified in the IQ and gender combination groups were understood with reference to the ecological model of human development (Bronfenbrenner, 1977). The simultaneous predictive effects of one of the AEI traits (emotional recognition and expression, understanding emotions, emotions direct cognition, and emotional management and control), IQ and gender for VCE academic achievement in the IQ and gender combination groups form a complex pattern of results. Hence, the conclusions for the male low group, female low group, male high group and female high group that are most noteworthy are outlined as follows.

### 7.9.1 The Male Low Group

In the male low group, the AEI trait emotional recognition and expression was positively predictive of 5.3 VCE points per $SD$, understanding emotions was predictive of 5 VCE points per $SD$, and emotional management and control was predictive of 5.5 VCE points per $SD$. While, in the male low group emotions direct cognition was negatively predictive of academic achievement and accounted for -3.1 VCE points per $SD$. Hence, in the male low group the AEI traits emotional recognition and expression, understanding emotions, and emotional management and control acted as protective factors in VCE academic achievement. However, in the male low group the AEI trait emotions direct cognition was negatively predictive of VCE academic achievement and therefore acted as a risk factor for their VCE academic achievement. A review of the four IQ and gender combination groups found that the male low group had the least developmental resources
(AEI trait mean scores, IQ and the male gender) to draw upon in order to cope with the demands of their own internal adolescent psychosocial developmental drives (Steinberg, 2011a) and the environmental demands associated to VCE academic achievement, when compared to the other IQ and gender combination groups. This finding was consistent with research by Nelson (2009) who found EI played a significant role in predicting academic achievement for at-risk students.

Subject to the male low group’s appraisal (Arnold, 1960b) of their chances of successfully utilising their resources to accommodate to both their own adolescent psychosocial developmental drives of identity, autonomy, intimacy, sexuality and achievement (Steinberg, 2011a) and the environmental academic demands of VCE (Bronfenbrenner, 1977), it was anticipated that the male low group experienced a comparatively higher degree of emotional stimulation, strain and stress (Lazarus, 1993b), particularly from the environmental demands of VCE academic achievement when compared to the other three groups. In particular, the male low group was anticipated to experience higher levels of stress as they had: (a) lower intellectual resources with which to address the academic demands of VCE (Jensen, 1998); (b) the male gender was also negatively predictive of VCE academic when compared to the adolescent females in the current study; and (c) the male low group’s AEI trait mean scores were not significantly higher than the other three groups. Therein, the degree of strain and stress on the male low group’s biopsychosocial development from the environmental demands of VCE academic achievement was possibly stimulated by the degree that the male low group experienced or appraised themselves to be provided with opportunities to learn or were at risk of academic underachievement or academic failure in VCE. It was possible that the male low group’s AEI traits may have been stimulated by their feelings of threat/fear by (a) the possibility of academic failure in VCE; and (b) the possibility of the associated damage to their adolescents’ psychosocial developmental drives for self-identity, autonomy, achievement and intimacy with their friends (Steinberg, 2011a); which stimulated an emotional reaction that led to strain and stress that created the need for the male low group to utilise a comparatively higher proportion of their AEI trait resources in the predictive effect of VCE academic achievement.
In the male low group, the negative predictive effect of emotions on cognition for VCE academic achievement is noteworthy and warrants further consideration. Firstly, this finding was consistent with the GLM saturated regression model, which found that a significant interaction between emotions direct cognition and gender, was predictive of VCE academic achievement in the total cohort. The gender effect in emotions direct cognition for VCE academic achievement was also evident in the positive predictive effect for the female high group and the female low group, and the negative effect for the male high group and the male low group. Therefore, the gender differences found in the predictive effects of emotions direct cognition for VCE academic achievement the IQ and gender combination groups were consistent with the adolescent gender differences found in the total cohort. Hence, it was theorised that gender differences in adolescent biopsychosocial developmental (Gemelli, 2013; Gluckman et al., 2009) may have differentiated how emotions directed cognition in adolescent decision making (Steinberg, 2008; Steinberg et al., 2008), which was negatively predictive of VCE academic achievement in the male low group and the male high group, while being positively predictive of VCE academic achievement in the adolescent female high group and female low group.

7.9.2 The Female Low Group
A review of the four IQ and gender combination groups found that the female low group had the second lowest level of developmental resources (AEI trait mean scores, IQ and the female gender) to draw upon in order to cope with the demands of their own internal adolescent psychosocial developmental drives (Steinberg, 2011a) and the environmental demands associated to VCE academic achievement, when compared to the other IQ and gender combination groups. Of the four IQ and gender combination groups, the predictive effect of the AEI traits was the second strongest in the VCE academic achievement of the female low group. In the female low group, the AEI trait emotional recognition and expression was positively predictive of 1 VCE points per $SD$, understanding emotions was predictive of 2 VCE points per $SD$, emotions direct cognition was predictive of 2.5 VCE points per $SD$, and emotional management and control was predictive of 2.3 VCE points per $SD$. Therein, in the female low group the AEI traits emotional recognition and expression, understanding emotions, emotions direct
cognition, and emotional management and control were positively and heterogeneously predictive of VCE academic achievement. The pattern of results in the predictive effect of the AEI traits for VCE academic achievement in the female low group was similar to that of the male low group, with the exception of the positive predictive effect of emotions direct cognition in VCE academic achievement. However, the degree to which the AEI traits were predictive of VCE academic achievement was lower than that of the male low group. This finding was consistent with the general assertion that the female low group had comparative intellectual resources to the male low group, however, their gender was positively predictive of academic achievement and they had higher AEI trait mean scores than the male low group for three of the four AEI traits. It is possible that the differences in the developmental resources of the female low group and the male low group, their goals and their appraisal of their chances of successfully attaining their goals accounted for the differences in the degree to which the AEI traits were predictive of VCE academic achievement.

Furthermore, it was noteworthy that the female low group’s emotional management and control mean score was lower than that of the male low group’s. Therefore, the female low group had fewer skills in emotional management and control than the male low group; however, the predictive effect of emotional management and control was stronger in the male low group than the female low group. Speculatively, it may be possible that the higher stimulation of emotions to direct cognition in the male low group created the increased need for the utilisation of emotional management and control, whereby more cognitive control strategies on emotion, were utilised to optimise VCE academic achievement in the male low group than the female low group. This possibility warrants further research in order to examine the individual differences in the relationship between both (a) emotions ➔ to direct cognition in behaviour, and (b) cognition ➔ to manage and control emotions, which are plausibly differentiated parts of a dual process that both impact on adolescent behaviour (Steinberg, 2010; Steinberg et al., 2008), learning and VCE academic achievement.

Hence, the current study further extended the seminal research findings presented by Petrides et al. (2004) with the inclusion of gender in the analysis of the predictive effect of AEI and IQ (gf) in VCE academic achievement. An examination of the IQ and
gender combination groups found the predictive effect of the AEI traits was strongest in the male low group followed by the female low group, whereas, the predictive effect of the AEI traits was weakest in the female high group followed by the male high group. Therefore, in the current study the predictive effect of the AEI traits for VCE academic achievement were also found to be differentiated by gender, which further extended the seminal research findings presented by Petrides et al. (2004). These results confirmed that the predictive effect of the AEI traits emotional recognition and expression, understanding emotions, emotions direct cognition, and emotional management and control were strongest in the male low group. These results were also consistent with previous research by Reiff et al. (2001) that found EI skills were particularly important in academic achievement for male college students with learning disabilities.

7.9.3 The Male High Group
A review of the four IQ and gender combination groups found that the male high group had the second highest level of developmental resources (AEI trait mean scores, IQ and the male gender) to draw upon in order to cope with the demands of their own internal adolescent psychosocial developmental drives (Steinberg, 2011a) and the environmental demands associated to VCE academic achievement, when compared to the other IQ and gender combination groups. Of the four IQ and gender combination groups the male high group was considered to have the second highest levels of resources (AEI trait mean scores, IQ and gender) to act as protective factors for VCE academic achievement. Therefore, it was anticipated that the male high group would experience less distress than the male low group and the female low group, but slightly more stress than the female high group when faced with the environmental demands of VCE academic achievement. A review of the findings for the male high group found the AEI trait emotional recognition and expression was positively predictive of 1.2 VCE points per $SD$, understanding emotions was predictive of 2.2 VCE points per $SD$, and emotional management and control was predictive of 1.6 VCE points per $SD$. While, the results found emotions direct cognition was negatively predictive academic achievement and accounted for -.2 VCE points per $SD$, which was consistent with the negative predictive effect of emotions direct cognition in the male low group.
Further, the findings in the current study for the male high group were consistent with those of Petrides et al. (2004), whereby the predictive effect of the AEI traits in VCE academic achievement were lower for students as their IQ increased beyond one SD above the mean. Therein, it was possible that these findings were partially reflective of the theoretical contention presented by Petrides et al. (2004) that adolescents in the male high group who had comparatively higher intellectual resources would find it increasingly easier and less stressful to cope with the environmental academic demands of VCE academic achievement; relative to the degree that their intellectual ability was above one SD above the mean IQ of 100 (Jensen, 1998). Therefore, it was plausible that the male high group utilised a smaller degree of their AEI trait skills in response to their lower levels of emotional stress associated to VCE academic achievement. Consequently, the comparatively smaller predictive effect of the AEI traits for VCE academic achievement found in the male high group was consistent with the seminal findings presented by Petrides et al. (2004) that suggested the male high group were anticipated to have experienced incrementally less stress as they attempted to cope with the environmental demands of VCE academic achievement and therefore needed to utilise less of their AEI trait resources to cope with environmental academic demands of VCE.

In addition, as previously outlined, the negative predictive effect of emotions direct cognition for VCE academic achievement in the male high group was consistent with the male low group. Further, emotional management and control was positively correlated to IQ and was higher in adolescent males than in adolescent females. The male high group’s AEI trait mean score for emotional management and control was higher than those of the male low group, female low and the female high group. Therefore, it was speculated that the male high group would have more skills in emotional management and control than the male low group and the female low group, which may have acted as an antecedent to the predictive effect of emotional management and control in VCE academic achievement.

7.9.4 The Female High Group

A review of the four IQ and gender combination groups found that the female high group had the most developmental resources (AEI trait mean scores, IQ and the female gender) to draw upon in order to cope with the demands of their own internal
adolescent psychosocial developmental drives (Steinberg, 2011a) and the environmental demands associated to VCE academic achievement, when compared to the other IQ and gender combination groups and despite having the most resources, which were anticipated to be protective factors in VCE academic achievement. In the female high group, the AEI traits emotional recognition and expression was negatively predictive of -1.3 VCE points per SD, understanding emotions was negatively predictive of -0.2 VCE points per SD, and emotional management and control was negatively predictive of -0.7 VCE points per SD. However, in the female high group emotions direct cognition was positively predictive of .59 VCE points per SD. These findings were partially consistent with the research findings by Woitaszewski (2000), who found there was not a significant relationship between EI and academic achievement in adolescent gifted students and in those presented by Petrides et al. (2004), who found the predictive effect of EI became increasingly negative beyond an intellectual ability of IQ 128 to IQ 130.

The findings in the current study for both the male high group and the female high group were theoretically consistent with those of Petrides et al. (2004), whereby the predictive effect of the AEI traits in VCE academic achievement were lower for students with a higher average IQ. Further, the current finding refined findings presented by Petrides et al. (2004), with identification of the small positive predictive effect in the male high group and the smaller negative predictive effect in the female high group. It was possible that these findings were partially reflective of the cognitive compensation theory presented by Petrides et al. (2004). Whereby, adolescents in the male high group and the female high group, with higher intellectual resources would find it increasingly easier and less stressful to cope with the environmental academic demands of VCE academic achievement, relative to the degree that their IQ rose above an IQ of 100 (Jensen, 1998). Hence, with reference to the cognitive compensation theory outlined by Petrides et al. (2004) it is possible that the male high group and the female high group utilised a smaller degree of their AEI trait skills in response to their emotional experiences associated to VCE academic achievement. However, this explanation does not adequately account for the gender differences found in the male high group and the female high group.
The gender differences found in the predictive effect of emotions direct cognition were consistent across the four IQ and gender groups; therefore, it was plausible that in addition to intellectual developmental differences, gender developmental differences also influenced the individual differences in the male high group and the female high group. For instance, gender differences were primarily influenced by developmental differences in the earlier maturation of adolescent females and comparatively later maturation of adolescent males. In particular, the gender differentiation in the maturational timing of the onset of puberty to stimulate changes in the female socio-emotional system approximately two years before adolescent males. The adolescent developmental differences in female and male Year 12 students plausibly impacted on the variance between the maturation of the social-emotional system and the cognitive control system, which suggested adolescent males’ emotions were more likely to direct their cognition in times of heightened emotions or when in the presence of their peers. However, these gender developmental differences do not adequately explain the negative predictive effect of emotional recognition and expression, understanding emotions, and emotional management and control in the female high group.

It was possible that the female high group were working below their ZPD (Vygotsky, 1978) and therefore were bored (a negative deactivating emotion) and consequently the negative predictive effect of the three AEI traits emotional recognition and expression, understanding emotions and emotional management and control in VCE academic achievement was reflective of their negative deactivating emotional state (Tulis & Fulmer, 2013). However, this may not be the total explanation, especially when analyses of the female high group’s AEI trait mean scores shows that they were typically higher than those of the other three groups. In addition, the negative predictive effect of the three AEI traits may be better understood with reference to the female high group’s internal psychosocial adolescent developmental drives (Steinberg, 2011a) and the literature referring to intellectually gifted females (Gross, 1989). It is plausible that the female high group’s adolescent developmental drives for identity, autonomy, intimacy, sexuality and achievement (Steinberg, 2011a) were not adequately addressed and the negative predictive effect of emotions direct cognition was an adaptive response to this developmental problem. As explained by Gross (1989), intellectually gifted students also
differ from their chronologically aged peers in regard to their social and emotional development, as they also develop as a member of the educational community with the need to belong. Intellectually gifted students drive for intimacy (Steinberg, 2011a), through peer acceptance and social cohesion may have become an increasingly stronger drive than that of their own academic achievement (Gross, 1989). The findings in the female high group indicate that: (a) educators need to be aware of the unique predictive effects of the four AEI traits on their VCE academic achievement; and (b) further research is warranted in order to replicate these findings and explore the possible reasons for these findings.

Consequently, it was concluded that the results from the examination of the individual differences in the predictive effect of the AEI traits in the four IQ and gender groups provided evidence to suggest the need to affirm and extend some of the conclusions outlined by Petrides et al. (2004). In the seminal research by Petrides et al. (2004) the regression results for English and GCSE academic achievement found a significant bilinear interaction between IQ ($g_c$) and EI, wherein below IQ 128 and IQ 130, respectively, the effects of EI increased as IQ decreased. While above IQ 128 and IQ 130, respectively, the bilinear interaction between IQ and EI reversed; therefore, as IQ increased, the predictive effect of EI was increasingly negative on IQ and subsequently, for English and GCSE academic achievement. In this study, the AEI traits (emotional recognition and expression, understanding emotions, emotions direct cognition, and emotional management and control) did not interact with IQ ($g_f$) to predict VCE academic achievement. However, a review of the four IQ and gender combination groups found the predictive effect of the AEI traits for VCE academic achievement was strongest in the male low group and the female low group, who were the two groups with a lower average IQ. While the predictive effect of the AEI traits for VCE academic achievement was weakest in the male high group and in the female high group, who were the two groups with a higher average IQ.

Therefore, it was concluded that the pattern of results in the current study were consistent with the pattern of seminal research findings presented by Petrides et al. (2004), who also found: (a) the predictive effect of AEI had the strongest effect in students with fewer intellectual skills, who were considered to be educationally
vulnerable or disadvantaged adolescents; and (b) the predictive effect of AEI had the weakest effect in students with higher intellectual skills, who were considered to be educationally stronger or to be adolescents with greater intellectual resources available to support their academic achievement. Since Petrides et al. (2004) used a British cohort and the current study used an Australian cohort, the results of the current study provide further evidence for the general trend that the predictive effect of the AEI traits in VCE academic achievement was stronger in adolescents who had fewer intellectual resources and weaker in adolescents who had stronger intellectual resources. Fluid intelligence was the strongest predictor of VCE academic achievement in the AEI trait models, accounting for 17.3 VCE points per $SD$ in emotional recognition and expression; 17.3 VCE points per $SD$ in understanding emotions; 17.4 VCE points per $SD$ in emotions direct cognition; and 16.2 VCE points per $SD$ in emotional management and control.

In sum, these findings provide empirical evidence that there are heterogeneous individual differences in the predictive effect of the AEI traits emotional recognition and expression, understanding emotions, emotions direct cognition, and emotional management and control in VCE academic achievement in the IQ and gender combination groups. Further, the individual differences in the predictive effects of the AEI traits in the IQ and gender combination groups were developmentally, dynamically and adaptively utilised in the VCE academic achievement. The individual differences identified in the predictive effect of the AEI traits for VCE academic achievement in the male low group, female low group, male high group and the female high group indicated that AEI traits effect learning and academic achievement very differently. As a result, the study findings highlight the importance of identifying the individual differences in the predictive effect of AEI traits in VCE academic achievement in the IQ and gender groups in order to provide targeted educational supports to optimise VCE academic achievement. These findings suggested that individual differences in the predictive effect of AEI traits for VCE academic achievement in the IQ and gender combination groups may have been influenced by the Year 12 students’ developmental resources, their goals and adolescent drives, and their personal reality—as appraised by what the adolescents considered to be harmful, threatening, challenging or beneficial to their survival (Lazarus, 1993b) in VCE academic achievement. Further research is also recommended to investigate the potential
importance of understanding the individual differences in the predictive effect of the AEI traits for VCE academic achievement in the IQ and gender combination groups, within the context of the AEI trait mean score as an indicator of the individual’s developmental capacity that acts as an antecedent that is dynamically and adaptively utilised to varying degrees by the adolescent in the predictive effect of VCE academic achievement.

It was concluded that the individual differences in the predictive effects of AEI traits emotional recognition and expression, understanding emotions, emotions direct cognition, and emotional management and control for VCE academic achievement, in the four IQ and gender combination groups were heterogeneous. Based on the analysis of the decomposition of the GLM saturated regression models, the Simple Slope Data Plots illustrated the individual differences in the predictive effects of the AEI traits in the four IQ and gender combination groups. This finding confirmed that the predictive effect of the AEI traits in VCE academic achievement were subject to adolescent developmental differences (AEI trait mean scores, IQ and gender). It was theorised that the Year 12 adolescent students developed and utilised their AEI traits as they sought to accommodate both the demands their own developmental drives (Steinberg, 2011a) and the environmental demands of VCE academic achievement (Bronfenbrenner, 1979). The findings offer support to the seminal research of Petrides et al. (2004) by affirming the stronger predictive effect of AEI traits in students with fewer intellectual resources and the weaker predictive effect of the AEI traits in students with more intellectual resources. Further, the current research differentiated the predictive effect of the AEI traits by gender, finding the predictive effect of the AEI traits was strongest in the male low group and weakest in the female high group. The individual differences in the predictive effect of the AEI traits were also discussed with reference to the individual differences in the IQ and gender combination groups’ AEI trait mean scores, which were theorised to be an antecedent to the predictive effect of the AEI traits in VCE academic achievement. Therefore, educational pedagogy and interventions aimed at acknowledging and incorporating the predictive effect of AEI traits to improve students’ academic achievement in VCE would be more effective if targeted at the individual differences in adolescents’ developmental needs rather than presuming all adolescent students have the same AEI traits and would benefit from the same approach to develop their AEI skills.
Thereby, the current findings affirmed and extended the seminal research presented by Petrides’ et al. (2004) by examining the predictive effects of the AEI traits, IQ and gender for VCE academic achievement in the IQ and gender combination groups. Accordingly, the current study has provided evidence of the individual differences in the predictive effect of the AEI traits in learning for VCE students in the late stage of adolescent development, who were completing Year 12 as their final year of secondary schooling. These study findings affirm the importance of understanding of the individual differences in the AEI traits, IQ and gender for VCE academic achievement and highlight the importance of acknowledging the role of AEI traits in VCE academic achievement and learning. These findings suggest AEI is an important construct for those students who are in their final year of secondary school. The individual differences in the predictive effect of AEI for VCE academic achievement have implications for educational reform and warrant inclusion in the current educational pedagogy for Year 12 VCE. The predictive effect of AEI for VCE academic achievement has been identified as a key factor that is formative to optimising adolescent academic achievement in Year 12; therefore, and AEI is a factor that can inform future psychoeducational pedagogy to improve academic achievement and contribute to the achievement the Council of Australian Governments targets for Year 12 or the equivalent qualification of attainment to reach 90% by 2020 (COAG, 2011). Consequently, the theoretical, methodological and practical contributions of the study’s findings to the literature are now outlined.

7.10 Theoretical, Methodological and Practical Implications and Contributions to the Literature

This thesis made a significant contribution to the literature regarding AEI and academic achievement from a theoretical, methodological and practical perspective, as outlined:

7.10.1 Theoretical Contribution to the Literature

This study provided a theoretical contribution to the EI literature with an acknowledgement of the biopsychosocial maturational changes in adolescence that differentiate the development and subsequent utilisation of AEI and the AEI traits in VCE academic achievement. The predictive effect of AEI and the AEI traits is as an adaptive response to both the internal psychosocial drives in adolescent development and
the environmental demands associated to VCE academic achievement. The construct of EI was developmentally differentiated with the introduction of the terms: adolescent emotional intelligence (AEI), childhood emotional intelligence (CEI), and infant emotional intelligence (IEI). The current study incorporated the term AEI, which acknowledged and delineated the maturational and developmental changes in human biopsychosocial development throughout the adolescent stage of development (Gemelli, 2013), which was argued to have differentiated the development of EI (Mayer & Salovey, 1993; Salovey & Mayer, 1990). The differentiated development of AEI was theorised to have been uniquely influenced by a range of developmental changes associated with the onset of puberty, such as the asynchronous structural and functional maturational changes in the adolescent cognitive-control system and socio-emotional system to influence how adolescents think, feel, make decisions and behave (Steinberg, 2011b), which were argued to be formative developmental factors in the emotional and cognitive constructs encompassed in EI (Mayer & Salovey, 1993; Salovey & Mayer, 1990).

The construct of AEI presented in the current study was particularly understood with reference to the developmental maturation of the prefrontal cortex, which included the maturation of the executive functions that influenced a range of adolescent skills, such as their emotional awareness of themselves, understanding others’ emotions, risk assessment, self-regulation, impulse control, metacognition and decision making (Blakemore, 2010; Blakemore & Robbins, 2012; Burnett et al., 2011; Goddings et al., 2012; Weil et al., 2013). Therefore, the seminal introduction of the term AEI in the current study acknowledged the developmental differentiation of the AEI construct from the onset of puberty as a biological indicator of the commencement of adolescence to the adoption of an adult status in the community marked by the attainment of adult employment as a psychosocial indicator of the completion of the adolescent stage of development (Sawyer et al., 2012).

The findings from the current study also provided speculative and preliminary theoretical evidence to support the contention that individual differences in the predictive effect of AEI for VCE academic achievement were more effectively understood when considered in light of the individual’s AEI mean score. Within this context: (1) the indirect effect of AEI for VCE academic achievement was more effectively and
theoretically understood with reference to the individual’s AEI mean score as their total resources; and (2) the direct predictive effect of AEI for VCE academic achievement was understood as a percentage of the individual’s total resources that were directly utilised to possibly cope (Salovey et al., 1999) in VCE academic achievement. In the current study, it was suggested that the individual’s AEI mean score may have acted as an antecedent, which provided AEI resources that indirectly influenced the subsequent individual differences in the predictive effect of AEI for VCE academic achievement in the four IQ and gender groups. Higher AEI scores were anticipated to be a protective factor and lower AEI scores were anticipated to be a risk factor. Presuming the adolescents’ mean AEI score represented their total resources and acted as an antecedent, the individuals’ AEI mean score provided further insight into understanding the individual differences found in the predictive variance of AEI for VCE academic achievement in the IQ and gender combination groups. Therein, in this study, the mean AEI score was speculated to have been an antecedent to the individual differences in the predictive effect of AEI for VCE academic achievement. This theoretical possibility contributed to the current EI literature and led to a recommendation for future research into the development of an AEI trait and state model and an AEI trait and state psychometric assessment, which could be utilised to further investigate the relationship between AEI and VCE academic achievement.

Based on the ecological human development model (Bronfenbrenner, 1977), the individual differences in the predictive effect of AEI for VCE academic achievement were conceptualised as being developmentally dynamic and adaptive with reference to the IQ and gender groups’ current adolescent stage of development, their personal resources (AEI mean score, IQ and gender) and the environmental demands of VCE academic achievement based on their personal goals. The individual adolescent was understood to mature and develop as they progressively made accommodations and adaptations while interacting as they interacted with the social contexts in which they were embedded or nested (Bronfenbrenner, 1977). Hence, the changing relationship between the adolescent and their appraisal of their ability to successfully or unsuccessfully utilise their resources (AEI mean score, IQ and gender) to meet the demands of VCE academic achievement in relation to their goals, was theorised to
influence the developmental, dynamic and adaptive predictive effect of AEI for VCE academic achievement. The heterogeneous predictive effect of AEI for VCE academic achievement identified in the IQ and gender combination groups was theorised to be a developmental, dynamic and adaptive response to the individuals’ appraisal of their ability to meet their goals in VCE, which was consistent with the ecological model of human development presented by Bronfenbrenner (1977). Hence, the identification of the heterogeneous predictive effect of AEI for VCE academic achievement provided further insight into the developmental, dynamic and adaptive nature of the predictive effect of AEI to VCE academic achievement, which made a contribution to the current literature investigating the relationship between EI and academic achievement.

7.10.2 Methodological Contribution to the Literature
The current study provided empirical research into the predictive variance of AEI, IQ, and gender for VCE academic achievement by using a GLM simultaneous saturated regression analysis. The decomposition of the GLM saturated regression model also facilitated the study of individual differences in the four IQ and gender combination groups. Collectively, the psychometric analysis of the simultaneous saturated regression model made a methodological contribution to the field of research examining the relationship between EI and academic achievement.

The current study’s methodological contribution was also enhanced by the selection of an Australian cohort as an OECD member country (OECD, 2014). The targeted sample in the study was designed to reduce the developmental variance in the maturation of the adolescent cognitive and emotional systems inherent in adolescents ranging from Year 7 to Year 12 (Giedd et al., 1999; Giedd et al., 2012; Shaw et al., 2006; Weinberger et al., 2005). The large range of developmental changes, such as the asynchronous development in the cognitive and affective skills of adolescents from Year 7 to Year 12 (Steinberg, 2011b) had the potential to confound (Tabachnick & Fidell, 2007) the actual predictive variance of AEI in academic achievement. Therefore, the current study contributed to the methodological literature by limiting the study cohort to focus on a single year level, Year 12 VCE. Year 12 was selected for this study as it is the final year of secondary school in Australia and an important transitional year for all Year 12 students into tertiary study or employment in a globalised economy. Year 12 students
were typically in the late stage of adolescent development (Sawyer et al., 2012). Consequently, the current study contributed to the methodological literature by limiting the developmental variance in the adolescent cohort for this study by targeting students in the late stage of adolescent development, who were in secondary school and completing VCE in Year 12.

The decomposition of the GLM simultaneous saturated regression model made a unique contribution to the methodological literature exploring the individual differences in the relationship between EI and academic achievement (Tabachnick & Fidell, 2007). The investigation of the individual differences in the predictive effect of AEI for VCE academic achievement in the current study led to the identification of the heterogeneous predictive effect of AEI in VCE academic achievement, which consequently led to the recommendation for future research to explore the possibility of a trait and state model of AEI and the psychometric assessment of trait and state AEI. In light of the theoretical and methodological contribution the current study has made to the literature, the practical implications of the study findings are now outlined in relation to psychoeducational pedagogy.

7.10.3 Practical Implications for Psychoeducational Pedagogy

The study conclusions have implications about the development of psychoeducational pedagogy and are considered in relation to the individual student, the school pedagogy, the Australian national educational pedagogy and the OECD educational evaluation and assessment framework.

7.10.3.1 Individual Student: VCE Psychoeducational Policy/Practice

Academic achievement in VCE was based on a Victorian State standardised rank score, which means an incremental increase or decrease of four points may make a functional difference to the student’s Victorian State ranking score, which in turn serves as a score to determine eligibility ranking for entry into tertiary education and further for entry into specified university courses (VTAC, 2011) and subsequent entry to adult employment options. Hence, the practical significance of the positive predictive variance of AEI, which accounted for 1% of the variance in VCE academic achievement, resulted in an average increase or decrease of four VCE rank points, making a formative practical impact on the adolescents’ future career options.
Further, the predictive effect of AEI accounting for 4.13 VCE points per SD indicates that AEI is a construct that is of significant importance to identify, as AEI was incrementally predictive of academic achievement when IQ and gender were controlled. In the current study, higher AEI scores were positively predictive of higher VCE academic achievement; conversely, lower AEI skills were predictive of lower VCE academic achievement, which was consistent with previous research (Di Fabio & Palazzeschi, 2009; Hassan et al., 2009; Perera & DiGiacomo, 2013; Preeti, 2013; Rivers et al., 2012; Sanchez-Ruiz et al., 2013; Schutte et al., 1998). The positive predictive effect of AEI for academic achievement in the current study is also considered to reflect previous research that has found higher levels of EI had been positively associated to psychosocial functioning (Rivers et al., 2012). Specifically, higher level of AEI have been associated to mood management (Ciarrochi et al., 2001), pro-social behaviour (Charbonneau & Nicol, 2002b), resiliency (Edward & Warelow, 2005), positive peer relationships (Petrides et al., 2006), happiness (Furnham & Petrides, 2003), wellbeing and health (Austin, Saklofske, et al., 2005) and leadership (Charbonneau & Nicol, 2002a).

Therefore, it is recommended that educators would benefit from developing an understanding of their students’ AEI, and how AEI can be incorporated in the VCE curriculum and their teaching and learning practice. There is a range of approaches to understanding students’ EI, then integrating EI into the curriculum and assessment schedule (Elias, 2006; Greenberg et al., 2003; Hagelskamp et al., 2013; Reyes et al., 2012; Riggs, Greenberg, Kusché, & Pentz, 2006). For the purpose of illustrating the implications of this research for psychoeducational pedagogy, one possible systemic approach was outlined as an example.

Psychoeducational staff may also consider the value of conducting an AEI assessment determine students’ AEI Individual Profile. By identifying an individual student’s AEI developmental needs, the school leadership team, teachers, counsellors and specialist support services could then determine if specific educational provisions should be incorporated in the VCE curriculum, or additional specialist supports be provided to optimise their learning. For example, a VCE student with lower skills in AEI may require specific classroom support or individual counselling to develop their emotional
management and control skills in order to cope with the stress associated to completing their VCE exams, and this intervention could be specifically targeted to address the individual’s needs with a view to improving their potential VCE academic achievement. Hence, based on the students’ VCE AEI Individual Profile, psychoeducational provisions may be developed to address students’ individual needs and incorporate appropriate AEI strategies in the school VCE pedagogy in order to optimise students’ VCE academic achievement.

7.10.3.2 Secondary School: VCE Psychoeducational Policy/Practice

Based on the findings in the current study it is recommended that AEI be incorporated into school policy for VCE students, which is consistent with previous recommendations for educational policy development (Elias, 2009; Kress, Norris, Schoenholz, Elias, & Seigle, 2004; Zins & Elias, 2001). With reference to the findings in the current study, one example of how AEI could be incorporated in a secondary school VCE policy is outlined.

Based on the finding that AEI is a formative factor in VCE academic achievement, it is recommended that VCE students complete an AEI assessment, which may be utilised to develop a VCE AEI School Profile. The VCE AEI School Profile could provide a unique outline of the results of the total VCE cohort for each school. The VCE AEI School Profile may directly inform classroom practices and inform the educational strategies utilised by teachers. The development of AEI skills could be included in the VCE curriculum in a manner that addresses the specific needs of the VCE school population. The VCE AEI School Profile may identify subgroups of adolescents and then address their needs as a subgroup. For example, the identification of a group of students in the male low group may include students who have displayed an increasing disconnection with the school community or a reluctance to engage in the learning process. Hence, schools may be able to extend their current understanding of how VCE students’ AEI impacts on their VCE academic achievement and this information may support teachers in optimising VCE adolescents’ learning opportunities. Based on the VCE AEI School Profile, the school pedagogy could have statistical data to inform them in developing strategies to optimise the VCE academic achievement for individual students, the VCE classes, at-risk groups, and the VCE cohort collectively. Thereby, the
VCE AEI School Profile could directly inform VCE pedagogy, with direct implications for VCE policy, programming, identification of at risk-students, and the incorporation of AEI in VCE teaching and learning practice.

7.10.3.3 Australian National Educational Policy and Practice

Australia is one of the highest performers in the OECD countries with 84% of young people completing their secondary education, which is 2% higher than the OECD average completion rate in secondary school (OECD, 2013b). However, the Australian secondary school completion rate is still below 90% (or a Year 12 equivalent), which COAG (2011) identified as a national target to be attained by 2015. Further, 11.5% of Australian youth (aged 15 to 29 years) were not engaged in education, employment or training in 2013 (OECD, 2013b), highlighting the need for improvements in current secondary school educational provisions, in order to further reduce the number of disengaged youth in Australian secondary education. Hence, achieving a 6% improvement to the current secondary school completion rate remains an Australian national goal, to be achieved by 2015 (COAG, 2011).

With the aim of informing educational policy and educational reforms to support the achievement of the COAG target for a 90% secondary school completion rate (COAG, 2011). The study results indicated that AEI has a statistically significant incremental predictive effect, which was beyond that of IQ and gender in VCE academic achievement. Importantly, the predictive effect of AEI in VCE academic achievement has not previously been psychometrically assessed or identified in VCE. Therefore, this empirical research finding has implications for psychoeducational pedagogy, policy, assessment measures in Australia, specifically for the 224,300 students completing Year 12 in 2013 (ABS, 2014). Further, the findings may be of interest to principals, psychologists, allied specialists and educators planning to support the wider body of 3,645,519 students attending 9393 schools in Australia (ABS, 2014). The findings may also have implications for the 2,706 secondary schools in Australia and efforts to further improve the national retention rate for students in Years 7 to Year 12 which was 81.6% in 2013, with a females retention rate of 85.6%, being higher than that of the males retention rate of 77.8% (ABS, 2014). The inclusion of AEI in future Australian national educational pedagogical reforms is recommended in order to provide appropriate
educational innovations to further improve current teaching and learning practices in
VCE academic achievement and potentially improve the level of VCE academic
achievement and plausibly the Year 12, or equivalent, student retention rates.

Based on the study data and conclusions, AEI should be incorporated in
Australian VCE educational policy. Therein, the following practical recommendations
are made:

- First, the GAT, which serves as a proxy measure of IQ and includes
  measures of gc and gf, should be modified to also include an assessment of
  AEI. The inclusion of both AEI and IQ would increase the statistical
  significance of the predictive variance of the GAT for VCE academic
  achievement.

- Second, the modified GAT including both measures of AEI and IQ would
  generate data that could be analysed at an Australian national level in a
  regression model, with the aim of identifying adolescents’ level of
  academic risk based on the total cohort, socio-economic levels, school’s
  location and on an individual school basis. Further, the decomposition of
  the regression equation in IQ and gender combination groups would
  provide diagnostic analysis of the individual differences and the
  identification of those at academic risk for targeted interventions at an
  Australian national and state level.

- Third, the assessment data provided by the GAT could identify those at
  risk due to low AEI and/ or low IQ, and therefore provide diagnostic
  psychometric data to inform intervention and support programs to those
  adolescent students identified as being academically at risk.

- Fourth, the assessment data provided by the GAT could also identify those
  with the highest AEI skills and/ or high intellectual acumen and therefore
  provide diagnostic psychometric data to inform extension and support
  programs to address the unique needs of the students who are
  intellectually gifted (IQ ≥130) and/or those with high skills in AEI.
Importantly, the identification of these students with high intellectual
potential and/or high potential in AEI may importantly extend the Australian national average VCE academic achievement scores.

7.10.3.4 OECD Educational Policy and Practice

Currently, it is estimated that 82% of young people in the 34 OECD member countries will complete their secondary education (OECD, 2014). The level of an adolescents’ academic achievement in the final year of secondary education is a key predictor for their entry into tertiary study and their future adult employment; therein, is a major predictor of an individual’s successful transition into a knowledge-based globalised economy. Adolescents who subsequently attain a tertiary education are anticipated to earn twice that of a median worker or an adult worker without a tertiary education (OECD, 2014). Hence, education levels are globally used as a measure of human capital, employment, income and health, with high levels of education equating to high human capital for the individual and each OECD country’s Gross Domestic Product (GDP). The findings from this study have provided evidence to illustrate the incremental validity of AEI in VCE academic achievement, which was consistent with a growing body of research (Brackett, Rivers, & Salovey, 2011; Perera & DiGiacomo, 2013). Therefore, optimising AEI in secondary schools through psychoeducational pedagogy to develop the individual’s academic achievement, and hence, the GDP for national economic growth, warrants further consideration. Based on the study data and conclusions drawn from Australia as an OECD member country (OECD, 2013a), the following practical recommendations are made:

- First, individual OECD member countries that have a comparative population profile with the Australian demographic may consider including AEI in their educational policy. The study findings make direct reference to adolescent students in their final year of secondary education; therefore, these findings are relevant to a comparative age range and year level in comparative educational systems.

- Second, the current findings may also inform the OECD evaluation and assessment policy for students in Year 12 or an equivalent level of education. The inclusion of AEI in the current international academic achievement assessment regime would facilitate the collection of
internationally comparable data. The assessment of AEI in the OECD countries and the subsequent analyses of the predictive effect of AEI for academic achievement in the 34 OECD member countries, may provide information that has not been accessed to date. The assessment of AEI and inclusion of AEI in the Year 12 secondary curriculum warrants further consideration, given the predictive effect of AEI in VCE academic achievement, particularly for adolescent males with average to below average intelligence. It is possible the findings from the current study could be utilised to direct educational innovations in the field of AEI to optimise academic achievement in the final year of secondary education. Consequently, the inclusion of AEI in the current OECD evaluation and assessment policy for academic achievement, presents the potential for the development of an educational innovation that is argued to be increasingly important for adolescents living in a technologically advancing globalised economy.

- Third, it is anticipated that the importance of understanding and optimising the AEI development of adolescents, and including AEI as a formative factor in academic achievement, will become increasingly important for adolescents in the globalised economy, particularly in light of the increasing global rates of adolescent neuropsychiatric disorders accounting for 45% of years lost because of disability in adolescents 10 to 24 years of age (Gore et al., 2011), coupled with the fact that emotional problems such as anxiety and depression are predicted to be the leading cause of the global burden of adolescent disease by 2030 (WHO, 2011). Therefore, speculatively, the importance of AEI in academic achievement may also increase for the contemporary adolescent population by 2030.

7.11 Study Limitations

The current study findings were limited by the fact that:

- the participants in the study were a volunteer sample;
- the assessment of AEI was a self-report measure; and
- the study was limited to Year 12 VCE students from Australia.
Due to the limitations outlined, the results of the study are not generalisable to all adolescent populations. While EI self-report measures have been subject to criticism (Mayer, Salovey, & Caruso, 2008), the AEI trait self-report assessment utilised in the current study has been subject to peer review and found to have adequate levels of reliability and validity (Luebbers et al., 2007). Replication of this study in other cultures could provide further evidence supporting generalisation to comparable populations (Tabachnick & Fidell, 2007). Nonetheless, the findings from the current Australian cohort were also coherent with previous research from a range of other countries that also found a significant relationship between AEI and academic achievement (Chong Abdullah et al., 2004; Kashani et al., 2012; Qualter et al., 2012; Rivers et al., 2012; Salguero et al., 2010). Despite these limitations, the significant findings identified in this study illustrated the importance of further research to explore the individual differences in the relationship between AEI and academic achievement, particularly to identify the mechanisms that underlie the development of AEI and how AEI directly or indirectly effects academic achievement.

7.12 Recommendations for Future Research

Based on the current study hypotheses, methodology, findings, limitations and conclusions, future research may more fully illuminate the role of AEI in academic achievement by taking into account the following six potentially important points:

(1) The relationship between AEI and academic achievement may be more effectively understood in light of a more detailed understanding of the developmental changes in AEI from the beginning to the completion of the adolescent period. Within this developmental framework, the dynamic and adaptive relationship between AEI and academic achievement can be more effectively investigated, particularly in light of other recognised predictors of academic achievement, such as the adolescent’s intelligence and gender.

(2) The AEI construct may be more effectively psychometrically modelled as a state (intensity of transitory emotion, i.e. in response to a stimulus) and as a trait (intensity of relatively stable emotional disposition) factors; as assessed for state–trait anxiety model a through P-technique factor
analysis (Barton, Cattell, & Conner, 1972). The development of a state-trait AEI model may subsequently be utilised to assess AEI as an antecedent and as a consequence of academic achievement. Consequently, rather than conceptualising AEI as a unidimensional construct (Lazarus, 1993b), which is currently the case, the development of a state-trait AEI model may provide a more complex model with which to conceptualise AEI as a bi-dimensional construct.

(3) Gender may have a confounding effect on the unique variance of AEI in predicting academic achievement, which would in effect reduce the unique variance attributed to AEI in academic achievement and increase the unique variance attributed to gender in academic achievement. Therefore, future research models should investigate this possibility and incorporate appropriate psychometric analysis, such as a commonality analysis (Capraro & Capraro, 2001) to address this possibility.

(4) The current study found AEI scores positively predicted academic achievement; however, it may also be possible that academic achievement predicts AEI. Chen, Rubin, and Li (1997) found there was a reciprocal effects relationship between academic achievement and social competence in children, whereby academic achievement predicted social functioning and social functioning uniquely predicted academic achievement. In addition, Welsh, Parke, Widaman, and O'Neil (2001) used structural equation modelling to determine the direction and the degree of influence of both social and academic competence in school children. They found academic achievement influenced social competence from Year One to Year Three, while social competence influenced academic achievement from Year Two to Year Three and these findings providing evidence of a reciprocal model. Therefore, future research should investigate the possibility of a bi-directional relationship between AEI and academic achievement. It is possible that this relationship could be identified in a longitudinal child and adolescent (Prep to Year 12) developmental study. It is possible there is a bi-directional effect, i.e. low AEI causing low
The identification of changes in both EI skills and academic performance from Prep to Year 12 would allow the researcher to determine developmental patterns through childhood and adolescence to determine what came first. Based on this information, one could confirm if: (1) an increase or decrease in CEI and AEI skills was followed by a change in academic performance; and/or (2) if a change in academic performance was followed by a change in CEI and AEI skills; and/or (3) if the changes in CEI and AEI skills were associated with developmental maturation throughout childhood and adolescence. This longitudinal study of male and female CEI and AEI with academic achievement may enable causality to be determined, relative to the individual’s stage of development and gender. For instance, to examine the changes in CEI and AEI with the onset of puberty, which typically occurs approximately two years earlier in females than in males.

Further research is warranted into the role of AEI in the academic achievement of intellectually gifted female adolescents. As the current study discovered, AEI was negatively predictive of academic achievement in the female high group, with the exception of emotions direct cognition; this finding was consistent with the findings of two previous research studies (Petrides et al., 2004; Woitaszewski, 2000). First, Woitaszewski (2000) found that EI did not contribute to the social and academic success of gifted students. Second, Petrides et al. (2004) that found that EI was negatively predictive of academic achievement beyond an intellectual level of approximately IQ 128–130 or 2 SD above the mean. Collectively, these findings suggest the relationship between AEI and academic achievement in intellectually gifted students warrants further research. Therefore, future research should be conducted to investigate the relationship between AEI, IQ (both gf and gc), and adolescent psychosocial drives (Steinberg, 2011a) for academic achievement. The study should be based on a larger number of intellectually gifted male and
female adolescents (≥ IQ 130) in the cohort (Field, 2009), in order to replicate the current findings and enable a more detailed psychometric analysis of the plausible mechanism underlying the negative predictive effect of AEI for academic achievement identified to date.

(6) In light of the finding that the psychometric measure of academic achievement was more effectively predicted with the inclusion of both IQ and AEI, further research is required into developing an intelligence test that includes both IQ (gf and gc) and EI.

7.13 Conclusion: Chapter Seven

The term AEI was empirically introduced in order to developmentally differentiate the construct of EI in the adolescent population. The construct of EI was also developmentally differentiated throughout the human lifecycle with reference to EI in: infant development (IEI), childhood development (CEI), adolescent development (AEI), and adult development (EI). The term AEI was introduced in this study in order to developmentally refine the definition of EI and specifically acknowledge the unique adolescent biopsychosocial developmental changes (Gemelli, 2013) that impacted on the development of AEI in the adolescent population. Further, the current study targeted one adolescent developmental stage of development, late adolescence (Sawyer et al., 2012), in order to limit the potential for the developmental differences in the maturation of the cognitive and emotional systems to confound the identification of individual differences in adolescents’ ability and utilisation of AEI in VCE academic achievement. Therefore, acknowledging the unique adolescent biopsychosocial developmental changes in the late adolescent stage of development to impact on the development of AEI in Year 12 students and the incremental predictive effect of AEI in VCE academic achievement, beyond the effect of IQ and gender, further refined the previous research and contributed to the current literature’s investigation of AEI in academic achievement.

Developmentally, AEI was considered in light of the inherent adolescent maturational changes associated to the onset of puberty that uniquely impacted on the asynchronous maturation of adolescent emotion and cognition (Steinberg, 2008, 2011a), which are the two formative elements of EI (Mayer et al., 1990; Salovey & Mayer, 1990). The investigation of the predictive effect of AEI on academic achievement was
particularly complex, due to the asynchronous maturation of the adolescent emotional system and cognitive system (Steinberg, 2008), from the commencement to the completion of the adolescent stage of development from approximately 10 to 25 years of age (Sawyer et al., 2012); which was argued to uniquely impacted on the changing developmental nature of AEI. The adolescent emotional system was subject to formative changes associated to the onset of puberty, which typically led to an increase in emotional sensitivity to stress, novelty and rewards, particularly in the presence of peers (Steinberg, 2008). In contrast, the adolescent cognitive-control system was slower to mature and had a protracted developmental period that was not completed until the mid-twenties (Steinberg, 2008). Hence, adolescents’ executive functions were still immature as so to was their ability for self-regulation, impulse control and goal directed behaviour (Steinberg, 2008). Consequently, the heightened sensitivity of the adolescent emotional system and the immature cognitive-control system interacted to effect adolescent decision making and partially accounted for the increased risk-taking behaviours identified in the adolescent period of development (Steinberg, 2008). Therein, as the developmental nature of AEI changed throughout early adolescence (10-14 years), late adolescence (15-19 years) and young adulthood (20-24 years) (Sawyer et al., 2012), so too did the potential of AEI to be differentially utilised in academic achievement. The investigation led to eight conclusions.

First, this thesis has provided evidence that AEI was incrementally positively predictive of VCE academic achievement and accounted for 4.3 VCE points per SD, beyond the simultaneous predictive effect of IQ and gender. Therefore it was concluded that AEI was a psychometrically significant predictive factor in VCE academic achievement that may be of interest to educators who aim to improve students’ academic achievement, particularly given the meta-analysis of school-based interventions indicating that AEI is a malleable and can be developed at school (Durlak et al., 2011). Second, this thesis found evidence to support the unique incremental predictive variance of both AEI and IQ (gf) for VCE academic achievement accounted for 21 VCE points per SD. Therefore, it was concluded that assessments to determine potential VCE academic achievement would be more psychometrically rigorous (Tabachnick & Fidell, 2007), theoretically robust (Wechsler, 1943) and diagnostically informative to
psychoeducational practitioners with the inclusion of both AEI and IQ measures (Zins, Payton, Weissberg, & O'Brien, 2007). These findings suggested the inclusion of a measure of IQ and AEI in the current VCE GAT and OECD assessment regime warrants further consideration; particularly, to identify students who are at educational risk due to their low intellectual skills, low AEI skills or those at the highest level of risk with both low intellectual and AEI skills.

Third, an examination of the individual differences in the relationship between AEI and VCE academic achievement in the four IQ and gender combination groups found AEI was heterogeneously predictive of VCE academic achievement. In comparison to the four groups in the current study the male low group was considered to have the least developmental resources and their AEI was the most strongly predictive of their VCE academic achievement, while the female high group were considered to have the most developmental resources and their AEI was negatively predictive of their VCE. Hence, it was evident that examining the individual differences in the predictive effect of AEI for VCE academic achievement in isolation from the adolescents’ developmental differences was an inadequate theoretical approach. Whereas, contextualising the individual differences in the predictive effect of AEI for VCE academic achievement in the four IQ and gender combination groups from an ecological human developmental perspective (Bronfenbrenner, 1979) and an adolescent psychosocial perspective (Steinberg, 2011a) provided a sound frame developmental framework with which to consider plausible adolescent developmental drives, for instance the drives for intimacy (social inclusion) versus achievement (academic achievement) in the female high group, to influence the predictive effect of AEI in academic achievement. Therein, this thesis provided evidence of the developmental, dynamic and adaptive role of AEI in VCE academic achievement, as illustrated by the individual differences in the predictive effect of AEI for VCE academic achievement in four IQ and gender combination groups.

This study also found the predictive effect for one of the AEI traits (emotional recognition and expression, understanding emotions, emotions direct cognition and, emotional management and control), IQ, and gender for VCE academic achievement were statically significant. An examination of the simultaneous predictive variance of one of each AEI traits (emotional recognition and expression, understanding emotions,
emotions direct cognition, and emotional management and control), IQ, and gender for VCE academic achievement identified a main predictive effect for the interaction between gender and emotions direct cognition for VCE academic achievement. Further, an examination of the individual differences in the four IQ and gender groups found the predictive effect of the four AEI traits (emotional recognition and expression, understanding emotions, emotions direct cognition, and emotional management and control) was heterogeneously predictive of VCE academic achievement in the IQ and gender combination groups.

Fourth, the individual differences in the predictive effect of emotional recognition and expression was strongest in the male low group and accounted for 5.3 VCE points per SD, followed by the male high group and the female low group. In a similar pattern to the previous findings, the predictive effect of emotional recognition and expression was weakest in the female high group and negatively accounted for -1.3 VCE points per SD.

Fifth, a similar pattern was found in the predictive effect of understanding emotions for VCE academic achievement in the male low group, which accounted for 5 VCE points per SD – again, followed by the male high group and the female low group. While the predictive effect of understanding others’ emotions in the female high group was negative and accounted for -0.2 VCE points per SD.

Sixth, in the regression model a significant interaction effect was identified for emotions direct cognition and gender for VCE academic achievement, negatively accounting for 5.7 VCE points per SD. A gender differentiation was also found in the individual differences in the predictive effect of emotions direct cognition for VCE academic achievement in the IQ and gender groups. Emotions direct cognition was positively predictive of VCE academic achievement in the female low group and the female high group. In contrast, the predictive effect of emotions direct cognition was negative in the male low group accounting for -3.1 VCE points per SD and in the male high group accounting for -0.2 VCE points per SD. It was plausible that the gender differences in the predictive effect of emotions direct cognition were reflective of biopsychosocial developmental differences in adolescent males and females (Gemelli, 2013). Neurologically, the interaction effect between Emotions Direct Cognition x Gender for VCE academic achievement may reflect the biological differences in brain
types of females who have the tendency to be “Empathizing” and males who have the tendency to be “Systemizing” (Baron-Cohen, 2005). Furthermore, adolescent females commence puberty approximately two years before adolescent males (Gluckman et al., 2009); therefore, when comparing an adolescent male and female of the same chronological age in this study, the adolescent female is typically more mature than the adolescent male. Hence, the females’ adolescent emotional system is typically more mature than that of the males’ adolescent emotional system (Steinberg, 2011b). The adolescent emotional system matures in a non-linear trajectory and it can periodically override the cognitive system that matures in a protracted linear trajectory (Steinberg, 2011b); the instances when adolescent emotions override their cognitive-control system have been referred to as being “hijacked” by their emotions (Gluckman et al., 2011b). Therefore, based on the negative predictive effect of emotions direct cognition on academic achievement in the male high group and the male low group, it was concluded that adolescent males were at risk of being periodically “hijacked” by their emotions direct cognition, which negatively impacted on their VCE academic achievement. Therefore, targeted interventions and environmental limitations may need to be incorporated into the VCE curriculum to acknowledge and address the negative impact of adolescent males’ emotions to direct their cognition, thinking, behaviour and academic achievement.

Seventh, the positive predictive effect of emotional management and control accounted for 2.3 VCE points per SD for the total cohort. The construct of emotional management and control focused on the role of cognition on emotion, which was subject to a linear and protracted maturational process (Steinberg, 2011b). Further, the adolescent males in this cohort had higher skills in emotional management and control than the adolescent females. A positive correlational relationship was also identified between IQ (gf) and emotional management and control, therefore as adolescents’ IQ increased so too did their emotional management and control. While this relationship was not evident in the final regression model, it represented an important underlying relationship, as IQ was not related to AEI or the other three AEI traits. This finding may provide further insight into the research findings presented by Petrides et al. (2004) whereby EI moderated the relationship between cognition and academic achievement. The positive predictive effect
of emotional management and control for VCE academic achievement found in the current study was consistent with previous research for self-regulation (Denham et al., 2011) and the delay of gratification (Mischel et al., 1989).

Therein, the decomposition of the five GLM simultaneous regression models provided evidence of individual differences in the predictive effects of the AEI traits for VCE academic achievement in the four IQ and gender combination groups. The study also provided evidence that AEI was homogenously and adaptively utilised by VCE students, subject to adolescent developmental differences in their AEI mean score, IQ and gender. The homogenous predictive effect of the four AEI traits illustrated the dynamic, developmental and adaptive nature of how Year 12 students utilised their AEI traits, adaptively or maladaptively, in their VCE academic achievement.

Eighth, it was concluded the predictive effect of the AEI traits (emotional recognition and expression, understanding emotions and, emotional management and control) was heterogeneous in the four IQ and gender combination groups. The strongest positive predictive effect of the AEI traits collectively was found in the male low group when compared to the three other IQ and gender combination groups. The second strongest predictive effect of the AEI traits for VCE academic achievement was found in the female low group. The third strongest predictive effect was found in the male high group, while the AEI traits in the female high group had the weakest negative predictive for VCE academic achievement for three traits, with the exception of emotions direct cognition. Therein, the individual differences in the predictive effect of the AEI traits for VCE academic achievement in the IQ and gender combination groups were more effectively conceptualised as being developmental, dynamic, and adaptively utilised. Consequently, the AEI traits should be incorporated in psychoeducational paedology, which should include strategies for the total cohort that are developmentally differentiated and based on the individual differences of students’ AEI mean score, IQ, and gender in the adolescent population. In particular, AEI interventions for the most educationally at risk-groups, the male low group and the female high group, need to be specifically differentiated based on their unique developmental needs in order to optimise their academic achievement in VCE.
Hence, this study provided empirical evidence that AEI was incrementally predictive of the variance in VCE academic achievement, beyond that of IQ and gender. An examination of the individual differences in the predictive effect of the AEI traits for VCE academic achievement in the IQ and gender combination groups illustrated the adaptive role of the AEI traits in academic achievement. Hence, this study has provided evidence that has supported and extended the seminal research presented by Petrides et al. (2004) through examining the individual differences in AEI for academic achievement with the investigation of the predictive effect of one of either AEI or the AEI traits (emotional recognition and expression, understanding emotion, emotion direct cognition, and emotional management and control), IQ (gf), and gender in VCE academic achievement. As a result, it was concluded that AEI is a construct that played a significant role in VCE academic achievement, which was beyond that of IQ and gender and therefore warranted inclusion in the Australian national curriculum, evaluation and assessment framework (OECD, 2011). The significant role played by AEI in Australian academic achievement may also inform the development of future educational pedagogy, particularly the inclusion of AEI in the curriculum development, evaluation and assessment framework of comparable OECD member countries (OECD, 2014).

In conclusion, the present findings contribute to our understanding of the significance and individual differences through which adolescents’ VCE academic achievement was influenced by their AEI to enhance or inhibit their academic achievement. Thus the research findings have the potential to inform psychoeducational pedagogy to develop strategies for the incorporation of AEI in the curriculum and assessment policy with a view to addressing the AEI developmental needs of the total cohort and also identify those most at risk of academic underachievement and provide targeted interventions to optimise AEI in adolescent academic achievement. The investigation of the effect of AEI in academic achievement, beyond the simultaneous predictive effect of IQ and gender, may provide a developmental framework required to link the individual differences in the existing AEI and academic achievement research, and to ultimately understand the role of AEI in decision making and learning when faced with the need to accommodate both the inherent biopsychosocial adolescent developmental drives (Steinberg, 2011a) and the increasing demand and importance of
academic achievement as a prerequisite to employment in a globalised economic society (OECD, 2013b, 2014).
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APPENDIX A
Study Terminology and Definitions
The key terms utilised in this study are explained, defined or outlined in order to provide further clarity in the conceptual framework of this research.

A.1 Academic Achievement: Victorian Certificate of Education (VCE)
The students’ level of academic achievement in this study is based on the individual’s Victorian Certificate of Education (VCE) score. The VCE score is also referred to as The Equivalent National Tertiary Entrance Rank (ENTER) or the Australian Tertiary Admission Rank (ATAR) (OECD, 2012). The ENTER or ATAR is calculated by the Victorian Tertiary Admissions Centre (VTAC) according to National Curriculum Standards (VTAC, 2010).

A.2 Equivalent National Tertiary Entrance Rank (ENTER) or Australian Tertiary Admission Rank (ATAR)
The Equivalent National Tertiary Entrance Rank (ENTER), renamed the Australian Tertiary Admission Rank (ATAR) from 2010, is the overall ranking on a scale of zero to 100 that a student received, based on the student’s Victorian Certificate of Education (VCE) study scores in Victoria, Australia. The name change from ENTER to ATAR was made so that a common name was be used by all Australian states and territories, with the exception of Queensland. Only the name was changed, and there was no alteration to the score calculation (VTAC, 2004).

The ENTER/ATAR is calculated by the Victorian Tertiary Admissions Centre (VTAC), and is then used by universities and TAFE institutes to select students for courses. The Victorian Curriculum and Assessment Authority (VCAA) are responsible for the development and maintenance of the Curriculum and Standards Framework (CSF), the delivery of the VCE and its assessments, and the conduct of statewide testing. The VTAC also administers the tertiary application and selection process. The VCE score is developed as a tool for the purpose of tertiary selection, providing a ranking of a student’s overall performance in all studies compared with all other VCE students. The rank order developed by VTAC, using VCE results, was based on an aggregate (total) of
scaled scores referred to as study scores (VTAC, 2010). The aggregate VCE score referred to as an ENTER/ATAR is calculated by combining the following elements:

- the study score in English, ESL, Literature or English Language; plus
- the next three permissible study scores (maximum of one Vocational Education and Training (VET) study score); plus
- increment/s of 10 % for any fifth and/or sixth permissible study score that is available.

VCE Candidates are ranked in order of these aggregates. Ranking is undertaken within the relevant age group, and this ranking is referred to as the ENTER/ATAR. The ENTER/ATAR is the overall percentage ranking (calculated in steps of 0.5) reflecting comparative performance across relevant student groups in a given year. The highest ENTER/ATAR rank was 99.95, with 99.90 being the next highest rank, etc. The lowest automatically reported ENTER/ATAR rank was 30.00, with ranks below 30.00 being reported as “less than 30.00” to the student (VTAC, 2004, 2010). The principal of the school is provided with any actual ENTER/ATAR scores that are below 30.

A.3 VCE Study Score
Study scores ranged from zero to 50 and demonstrated how a student performed in a VCE study or curriculum area relative to all other students doing that same study in Victoria, Australia. It is based on the students’ results in school assessments and examinations. VCE results are scaled because individual study scores were not an absolute measure of overall performance. VTAC combined study scores to form an aggregate (total), which was then converted into a rank called the ENTER/ATAR (VCAA, 2003b; VTAC, 2010).

The “before study scores” were normalised to accommodate the wide range of VCE studies and ensure that the strength of competition in each study was as equitable as possible. Scaling ensured that each study contributes equally to the ENTER/ATAR (e.g. a study score of 25 is equivalent to a Study Score of 25 in Chemistry, Specialist Mathematics, Drama or Visual Arts). The scaling process is standardised each year and results in the adjusted scaled scores (VCAA, 2003a; VTAC, 2010).
A.4 Intelligence
In this study intelligence is composed of a “general mental ability” or “g” with fluid “f” and crystallised “c” components, as hypothesised, developed and researched by Galton (VCAA, 2003b), Spearman (1869), Cattell (1927) and Jensen (1963). For this study “gf’, or fluid intelligence is used as the primary measure of intelligence (1998) is referred to as IQ.

A.5 Adolescent Development
The nature of adolescent development and its definition has changed due to the earlier onset and later completion of adolescence than previous generations (Gluckman, Low, & Franko, 2011a). There is a global trend for adolescence, marked by the onset puberty, to begin at an earlier age than previous generations. The period of adolescence is also reaching completion at a later age than previous generation, which is marked by the transition of the adolescent into adult roles in the society. As outlined by Sawyer et al. (2012), currently the World Health Organization (WHO) defines adolescence as the period between 10 and 19 years of age; however, the United Nations (UN) defines youth as between 15 and 24 years of age. This study references both the WHO and the UN, defining adolescence as ranging from 10 to 24 years of age, classifying early adolescence as 10 to 14 years; late adolescence as 15 to 19 years; and young adulthood as 20 to 24 years (Sawyer et al., 2012).

A.6 Childhood Development
The childhood phase of growth and development commences at 3 years of age and finishes at 9 years of age. The childhood period of development is estimated to have emerged in early homo sapiens species (Sawyer et al., 2012). From an evolutionary perspective, the childhood period provides humans with an adaptive advantage, speculatively, by allowing more time for brain growth and development. The brain growth is formative in enabling the child to learn language and complex social skills, which supports their survival in a group and assists them to avoid predators (Gluckman et al., 2009).
A.7 Emotions

Emotions are universal feelings that have a rapid onset at a biological, physiological, neurological (LeDoux, 2000; Rolls, 1998), unconscious and conscious level (Sartre, 2002); providing information that assists in human survival and adaptation to the environment (Darwin, 1874; Denton, 2005; Izard, 1977). Emotions are invoked whenever thought stimulates a feeling (Averill, 1999), which in turn, may provide insight at an intrapersonal, interpersonal or social group level. In turn, this may lead to specific behaviours or action tendencies. The feeling-based monitoring of the effects of those behaviours, through facial, bodily and vocal tone in the self and others, may then lead to more thinking, feeling and learning (Izard, 1977). There is a developmental spectrum of emotions ranging from basic innate emotions to higher cognitive emotions, which may be displayed in culturally specific ways (Saarni, 2000).

- **Basic emotions:** These include joy, distress, anger, fear, surprise and disgust, which are identified and expressed in both involuntary and voluntary displays. They are influenced by individual, social and cultural norms (Ekman, 1972; Izard, 1977; Oatley & Jenkins, 1996).

- **Higher cognitive or social emotions:** These include love, guilt, shame, embarrassment, pride, envy and jealousy, emotions commonly associated with socialisation with other people (Parkinson, Fischer, & Manstead, 2005).

- **Culturally specific emotional displays:** These emotions are the culturally learned and approved ways of identifying and expressing various emotions. For example, there are noted differences in the culturally accepted displays of anger in Western, non-Western and preliterate individuals (Ekman, Campos, Davidson, & De Waals, 2003).

A.8 Alexithymia

Alexithymia refers to the reduction or absence of the tendency to imagine or fantasise and consciously experience, describe, and identify emotions or feelings, with an increased tendency towards external-oriented thinking. Alexithymia and emotional intelligence are independent constructs that have a strong inverse correlation (Parker, Taylor, & Bagby, 2001).
A.9 Emotional Intelligence Throughout the Human Life Cycle

The term emotional intelligence (EI) is used to refer to emotional intelligence across the human life span and in a general conceptual context. In the current study emotional intelligence is also developmentally defined with approximate age ranges and stage of human development conceptualised throughout the human life span, as outlined in A.9.1, A.9.2, A.9.3, A.9.4, and A.9.5.

A.9.1 Infant Emotional Intelligence (IEI)

Infant emotional intelligence in this study refers to the infant’s (birth to 36 months or end of lactation) capacity to understand one’s own emotions, to recognise and express emotion effectively with others, to utilise emotional information to direct reasoning and decision making, to manage and control one’s own and others’ emotions in order to adapt effectively. Infant emotional intelligence is a period of rapid growth physiological, sensory, behavioural, emotional and cognitive growth.

- Infant emotional intelligence (IEI)
  - birth to 36 months or end of lactation.
- Female infant emotional intelligence (IEIf)
  - birth to 36 months or end of lactation.
- Male infant emotional intelligence (IEIm)
  - birth to 36 months or end of lactation.

A.9.2 Childhood Emotional Intelligence (CEI)

The emotional intelligence construct for the childhood population in this study was entitled childhood emotional intelligence (CEI). The term childhood emotional intelligence is used in order to demarcate the unique and formative biological, cognitive, emotional and psychosocial growth during childhood that impacts on the manifestation of childhood emotional intelligence. Childhood emotional intelligence commences at approximately three years of age, with formative development and maturation in emotional intelligence and cognitive development and maturation occurring throughout this period. The conclusion of childhood emotional intelligence is marked by the onset of puberty, which leads to the commencement of adolescent emotional intelligence.
Childhood emotional intelligence in this study refers to the child’s (male and female aged 3 to 11 years of age; female 3 to 9 years of age; male 3 to 11 years of age) capacity to understand one’s own emotions, to recognise and express emotion effectively in/with others, to utilise emotional information to direct reasoning and decision making, to manage and control one’s own and others’ emotions in order to adapt effectively.

- Childhood emotional intelligence (CEI)
  - CEI 3 to 11 years; early childhood emotional intelligence 3 to 5 years; mid childhood emotional intelligence 6 to 8 years; late childhood emotional intelligence 9 to 11 years of age.

- Female childhood emotional intelligence (CEIf)
  - CEIf 3 to 9 years of age; early childhood emotional intelligence 3 to 5 years of age; mid childhood emotional intelligence 6 to 7 years of age; late childhood emotional intelligence 8 to 9 years of age.

- Male childhood emotional intelligence (CEIm)
  - CEIm 3 to 11 years of age; early childhood emotional intelligence 3 to 5 years of age; mid childhood emotional intelligence 6 to 8 years of age; late childhood emotional intelligence 9 to 11 years of age.

A.9.3 Adolescent Emotional Intelligence (AEI)
Adolescent emotional intelligence in this study refers to the adolescent’s capacity to understand one’s own emotions, to recognise and express emotion effectively with others, to utilise emotional information to direct cognition, thinking, reasoning and decision making, to manage and control one’s own and others’ emotions to adapt effectively. Adolescent emotional intelligence commences with the onset of puberty, marking the end of the childhood emotional intelligence stage of development. Collectively, male and female adolescent emotional intelligence is estimated to commence at approximately 10 years of age and to conclude at approximately 24 years of age. When AEI is considered with specific reference to each gender, female adolescent emotional intelligence is estimated to commence at approximately 10 years of age and conclude at approximately 24 years of age; therein, females are estimated to commence
puberty approximately two years before their chronologically aged males. Male adolescent emotional intelligence is estimated to commence at approximately 12 years of age and to reach completion at approximately 24 years of age.

- **Adolescent emotional intelligence (AEI)**
  - AEI 10 to 24 years of age; early adolescent emotional intelligence 10 to 14 years; late adolescent emotional intelligence 15 to 19 years; young adulthood adolescent emotional intelligence 20 to 24 years.

- **Female adolescent emotional intelligence (AEI_f)**
  - AEI_f 10 to 24 years of age; early adolescent emotional intelligence 10 to 14 years; late adolescent emotional intelligence 15 to 19 years; young adulthood adolescent emotional intelligence 20 to 24 years.

- **Male adolescent emotional intelligence (AEI_m)**
  - AEI_m 12 to 24 years of age; early adolescent emotional intelligence 12 to 14 years; late adolescent emotional intelligence 15 to 19 years; young adulthood adolescent emotional intelligence 20 to 24 years.

**A.9.4 Emotional Intelligence (EI)**

Emotional intelligence in this study refers to the construct of emotional intelligence in a general collective sense. From a developmental perspective the term emotional intelligence also refers to an adult’s emotional intelligence. Specifically, an adult’s (male and female aged 25 years to 64) capacity to perceive and express emotions accurately and adaptively; understand emotion and reason with emotional knowledge; use feelings to facilitate thought; and regulate the emotion in oneself and others (Mayer, 2000; Mayer & Salovey, 1997; Mayer, Salovey, & Caruso, 2000b; Mayer et al., 2004; Salovey & Pizarro, 2003). Emotional intelligence in this study refers to the adult’s capacity to understand possession of knowledge about how emotions work and an ability to use this knowledge adaptively in one’s life.

- **Adult emotional intelligence (EI)**
  - 25 years to 64
Female adult emotional intelligence (EI$_f$)
  - 25 years to 64
Male adult emotional intelligence (EI$_m$)
  - 25 years to 64

A.9.5 Elderly Emotional Intelligence (EEI)
Emotional intelligence in this study refers to the elderly adult’s (male and female aged 65 years to death) capacity to perceive and express emotions accurately and adaptively; understand emotion and reason with emotional knowledge; use feelings to facilitate thought; and regulate the emotion in oneself and others (Mayer, 2000; Mayer & Salovey, 1997; Mayer, Salovey, et al., 2000b; Mayer et al., 2004; Salovey & Pizarro, 2003).

Emotional intelligence in this study refers to the adult’s capacity to understand possession of knowledge about how emotions work and an ability to use this knowledge adaptively in one’s life.

- Elderly emotional intelligence (EI)
  - 65 years to death
- Female elderly emotional intelligence (EI$_f$)
  - 65 years to death
- Male elderly emotional intelligence (EI$_m$)
  - 65 years to death
APPENDIX B
Part One: Aetiology of EI

B. 2.1.1 EI: Models of Emotion
The theory of emotions (Izard, 1977) is formative to the development of the theory, conceptualisation and measurement of EI in the child, adolescent and adult populations (Mayer et al., 1990; Salovey & Mayer, 1990). Further, an understanding of the complex developmental relationship between the cognitive system and the emotional system can be informed with reference to neurological research that has examined the interaction of emotions and cognition (Gray et al., 2002). The theory of emotions will be reviewed from six theoretical perspectives, the: (1) Philosophical; (2) Evolutionary; (3) Feelings; (4) Cognitive; (5) Functional; and (6) Social Constructive and Cultural. The history, theories and definitions of emotions will be critiqued in order to provide an understanding of emotional skills and abilities in emotional identification, processing, regulation, appraisal and metacognitive/emotional processes, which are identified in the EI psychodynamic models (Leuner, 1966), the EI ability models (Mayer, Caruso, et al., 1999) and the EI trait models (Petrides & Furnham, 2003). This review of emotions will also acknowledge of the stages of emotional developmental (Erikson, 1959), which are formative to the developmental changes in feeling and thinking experienced by the individual through the childhood, adolescent and adult stages of human development.

B.2.1.1.1 EI: Philosophical Origin
Early philosophers developed recognisable theories of emotion and intelligence, often in relation to human development (cited in Lewes, 1857); therein, providing insight into the philosophical origins of the contemporary theories of EI (Salovey & Mayer, 1990). Anaxagoras (499 B.C–428 B.C) suggested that all knowledge comes through the senses and reason was used to distinguish the objective elements of things. “Thus the eye discerns a complex mass which we call a flower; but discerns nothing of that of which the flower is composed” (Second Epoch, Lewes, 1857, p. 63). Based on Anaxagoras’ theory, human senses perceive the phenomena (manifestation) but not necessarily the noumena (essence). Therefore, Anaxagoras’ theory included both the senses and reason, but did not explicitly acknowledge the role of emotion in the phenomena or noumena of knowledge.
In comparison, Plato (439 BC–347 BC) in the Republic divided the soul into three distinct parts: the calculative part (reason), the appetitive part (passion), and the spirited part (will). Emotions such as anger, grief, and fear were seated in the will (Nussbaum, 2007). Plato called the perception of existing things “ideas”, which were the only real existences: they were noumena and all living things were their phenomena. Plato and subsequently, Aristotle held that the soul had both rational and irrational parts; hence, there was a mental conflict between the rational (cognition) and irrational (emotions).

Aristotle (384–322 BC) in Rhetoric, defined emotions as, “that which leads one’s condition to become so transformed that his judgement is affected, and which is accompanied by pleasure and pain. Examples of emotions include anger, pity, fear, and the like, as well as opposites of these” (Calhoun & Solomon, 1984, p. 44). In his article, “On the Soul”, Aristotle asserted that cognition and physiology were intertwined elements of emotion:

The act of thinking probably belongs to the soul alone, but if even this thinking happens to be some sort of imagination or connected with imagination then it, too, can belong to the body as well as the soul… Apparently then all the conditions of the soul are connected with the body, including anger, gentleness, fear, pity, courage, not to mention joy, loving, and hating, for the body is affected by each of these. (Calhoun & Solomon, 1984, p 49)

Anger sprang from an interpretation of the situation and personal beliefs shaped by social and moral perspectives. Seen in this way, emotions can become intelligent parts of the personality:

…it is not an easy task to delineate how, at whom, at what, and for how long one should anger, nor at what point justifiable anger turns to unjustifiable… The middle tendency is praiseworthy, that in which one angers with those people and at those matters he should, in the way he should, for as much time as he should, and so on; and the excessive tendency and the tendency to be lacking in anger are blameworthy proportionately to their amount. Surely, we should go in the middle tendency. (Nichomachean Ethics, Calhoun & Solomon, 1984, pp. 51-52)
As described by Aristotle’s philosophy, intelligent behaviours incorporate both emotion and reason, which is consistent with contemporary EI theories (Bar-On, 2005; Ciarrochi et al., 2002; Mayer et al., 1990; Mayer & Geher, 1996; Salovey & Mayer, 1990). Aristotle’s philosophical assertion that cognition, social interactions, and physiology shape emotional responses is also evident in contemporary theories of emotion (Oatley & Jenkins, 1996; Oatley & Johnson-Laird, 1987; Schachter & Singer, 1962). Lazarus (1991) explained that Aristotle’s philosophy implicitly encompassed a stimulus, relationship, appraisal, and action tendency. These emotional components, are evident in the appraisal theory of emotion presented by Arnold (1960b).

Unlike the theories presented by Plato and Aristotle, the Stoicism that was founded by Zeno of Citium (Athens, Greece, 313 BC), disagreed with the idea that the soul had both rational and irrational faculties. The Stoics argued that the mind was *pneuma* (hot fiery breath) that infused the physical body (Rubarth, 2006). The soul was unified and rational, so passions were the result of an error of judgment and therefore interrupted rationality (Baltzly, 2004). Stoic definitions of passions (*pathê*: things which one undergoes) alluded to excessive impulses, based upon false judgements, which caused a fluttering of the soul (physical reaction). The *pathê* ascribed too much importance to external things, rendering people too dependent on the world for their happiness, so they “suffered” their passions. The Stoics claimed irrational impulses resulted in emotional disturbance but measured impulses resulted in emotional peace based on rationality. Stoicism held that intelligence was needed to control the emotions, and that emotions disrupted rationality, thereby affirming the disturbance of emotions to rational processes and emphasising the importance of rational development to control emotions. However, Descartes did not entirely agree with the Stoics about the potential dangers of the passions.

Rene Descartes (1596–1650) developed a theory of emotions that divided the mind into thoughts and passions and consequently acknowledged the role of both cognition and emotion in motivating human behaviour. He defined passions as the “perceptions, feelings, or emotions of the soul which we relate specially to it, and which are caused, maintained, and fortified by some movement of the spirits” (Calhoun & Solomon, 1984). The Six Primary Passions were defined as wonder, love, hatred, desire,
joy and sadness, with all other passions drawn from these. Further, passions were considered motivating to human behaviour:

…the customary action of all the passions is simply this, that they dispose the soul to desire those things which nature tells us are of use, and to persist in this desire, and also bring about that same agitation of spirits which customarily causes them to dispose the body to the movement which serves for the carrying into effect of these things… (The Passions of the Soul, Article LII, Calhoun & Solomon, 1984, p 66)

Hence, Descartes separates the independent thought, emotion and physical substance of a person. The mind is an “unextended” substance, defined by free will and thought; while bodies are “extended” in space and subject to the laws of physics. This dualistic model focused on the cognitive perspective of emotions, while Spinoza (1632–1677), like the Stoics, asserted that emotions were frequently outside human control, and therefore should be controlled with reason:

Emotion, which is called a passivity of the soul, is a confused idea, whereby the mind affirms concerning its body, or any part thereof, a force for existence greater or lesser than before, and the presence of which the mind is determined to think of one thing rather than another. (Ethics, Calhoun & Solomon, 1984, p 85)

Thus, Spinoza recognised three primary emotions, pleasure, pain, and desire; however, he asserted that emotional knowledge should be considered as a remedy against the effect of one’s emotions and therein emotional knowledge was crucial to the attainment of an individual’s virtues.

Hume (1711–1776), founder of subjective idealism, wrote Treatise on Human Nature (1739). Hume followed Descartes’ theory of emotions to a degree by suggesting that perceptions of the mind were divided into impressions and ideas, which were primary or secondary. The impressions were sensation, where sensory impressions led to action, and reflection, consisting of passions and other emotions. Further, Hume divided the reflective impressions into calm (beauty) and violent (love, hate, grief, joy, pride and humility) impressions; these created physical and mental disturbances ranging from
pleasure to pain. Ideas were copies of impressions, revived faintly in memory or imagination. Hume deduced that reason was a faculty for judging the truth and falsity of ideas (beliefs); however, actions and desires were not ideas, so should not be conformable or contrary to reason. “Reason is, and ought only to be the slave of the passions, and can never pretend to any other office than to serve and obey them (Hume, 1739, Treatise III.i. 1/458)“. Therefore, Hume deduced that desires were contrary to reason, as they were dependent upon potentially false beliefs that disrupted reason (Hume, 1739, Treatise II.iii. 3).

Hence, there has been a longstanding philosophical debate regarding the definition and theoretical conceptualisation of knowledge/problem solving/intelligent behaviour that has encompassed emotion and cognition, which are the two formative elements of EI (Mayer et al., 1990). The philosophical position of Aristotle, Plato, and Descartes considered reason to be “rational” and the passions or emotions as “irrational”, therein, both reason and emotions effected the individual’s will. In contrast, Anaxagoras, the Stoics, Spinoza, and Hume considered the passions or emotions as orthogonal to reason, therefore emotions were to be ignored or controlled, to ensure they did not lead to an error of judgement which interfered with pure reason. The early philosophical debates were formative to the evolution and development of the Western thought that considered intelligence to be opposite to emotional experience (Salovey et al., 1995). In addition, the Western school system largely adopted the Stoics’ philosophy that cognition and reason were formative to knowledge and emotions were disruptive to reason and therefore emotions were to be ignored, suppressed or controlled, in order to minimise their negative impact on learning through reason (Payne, 1985). Consequently, Western educational pedagogy has traditionally assumed emotions were irrelevant or disruptive to the cognitive processes of rational thinking, learning and therefore academic achievement. However, what if the traditional Stoic approach of valuing and focusing on cognition has overlooked the potentially significant role of emotions, and hence EI in learning?

As proposed by Plato and Aristotle, the importance of emotions as the appetitive part of the soul, or the “passions” that are associated with the calculative part or the “reason” and drives the spirited part or the “will”, still pervade contemporary theories of
emotion. Theories of emotion are conceptualised from an evolutionary, cognitive, functional and social theoretical perspective. Each of these theories of emotion provides theoretical frameworks to illuminate the complex and multi-faceted role of emotions that are essential to optimising human development, adaptation, survival, and therefore learning. Historically the conceptual and theoretical foundations of EI can be traced to formative theories of emotion (Bar-On, 2000; Leuner, 1966; Mayer & Salovey, 1995). Therefore, the evolutionary, feeling, cognitive, functional and social constructive and cultural theories of emotion are now investigated.

**B.2.1.2 EI: Evolutionary Theory of Emotion**

Darwin’s (1809–1882) thesis, *The Expression of the Emotions in Man and Animals* (1874) argued that emotions were innate and derived from a common evolutionary basis. They were universally expressed forms, often with involuntary body or facial movements resulting from instinct and normative expressions learned through repetition. He compared emotions in animals and humans, noting emotions were universally expressed forms, such as the expression of anger in a dog growling and a human. The six basic facially legible emotions Darwin identified were happiness, sadness, anger, fear, disgust and surprise.

Further, Darwin identified similar facial configurations in comparable species as illustrated in Figure B.2.1, and stressed the importance of emotions to the survival of the species. For example, the emotion of anger, as expressed in the arched back of the cat, was communicating a warning signal of aggression to other species. Lazarus (1991) largely agreed with Darwin’s evolutionary argument, concurring that emotions provided information essential to one’s adaptation and therefore survival.
In Figure B.1 Darwin (1874) captured the universal human expression of sadness in this child, as illustrated in the photograph presented in his publication “L’Expression Des Emotions Chez l’Homme et les Animaux” (p.194 Fold out illustration in French Edition).

Darwin theorised the purpose and manifestation of human emotional expression and behaviour in three Principles:

1. **The Principle of Serviceable Associated Habits:** Some states of mind result in emotional expressions that are unconscious and become habitual because, they are effective for survival. The will could consciously be used to try to repress the muscles showing some expressions.

2. **The Principle of Antithesis:** Other emotions are the opposite of the useful emotional behaviours and are highly expressive.

3. **The Principle of Actions due to the Constitution of the Nervous System, independently from the first of the Will, and independently to a certain extent of Habit:** Other emotional behaviours are the consequence of the “nerve force” or physiological changes that take place in the body when emotions are experienced. For example, reflexes, perspiration, increased action of the heart, and trembling.

These three Principles suggest actions that are initially performed voluntarily and which aided survival, i.e. mating or defence, became habitual and eventually became hereditary. Darwin (1898) noted that these inherited habits evolved and became innate, and were performed unconsciously, “even in opposition to the will”. Notably, following
his analysis of facial expressions, Darwin concluded that the same “state of mind” was expressed globally across races in *The Origin of Species* and *The Descent of Man*. Darwin’s empirical work that defined the musculature used for facial expressions of emotion, while not infallible, provided clear categorical guidelines for the physiological expression and recognition of emotions.

Darwin’s (1898) empirical research, at the time criticised for methodological weakness, formed the basis for the anthropologist Paul Ekman’s extensive work on cross-cultural emotional communication (Ekman, 1972, 1997, 2003). Initially, in the 1960s, Ekman studied non-verbal communication to distinguish universal and cultural expressions. In contrast to Darwin’s evolutionary emotional behaviour theory (1898), Ekman initially contended that emotional expressions and gestures were purely social and culturally variable, as opposed to innate.

In Ekman’s first study (2003), he showed photographs to people from a number of countries, and the majority agreed upon the emotion shown in each facial expression. Contentiously, Ekman’s results did not support the theory that emotions were purely socially constructed. Rather, the results indicated that emotions were universally recognised and expressed, which was consistent with Darwin’s evolutionary theory of emotion (1898). In addition, the study results indicated that there were also commonalities of emotional expression across cultures. Ekman introduced the term “display rules”, to refer to socially learned rules dictating which emotions were uniquely exaggerated, minimised or masked based on social and cultural norms (Ekman, 2003).

Next, Ekman aimed to determine if emotions were primarily innate or socially and culturally determined. Hence, Ekman identified isolated people with no influence from other cultures, to ensure that emotional expression and recognition was not influenced by cross-cultural communication. If emotions were primarily socio-cultural, it was anticipated that they would have unique forms in a socially isolated tribe. In 1967 to 1968, the Fore Tribe who was a socially isolated tribe in a remote region of Papua New Guinea were told stories and asked to select photographs of Americans expressing various emotions apparent in the story. Happiness, anger, disgust and sadness were distinguishable; however, fear and surprise were not.
Returning to San Francisco, Ekman reversed the experiment, with Americans identifying Fore Tribe people’s facial expressions. The American people were able to recognise the Fore Tribe’s facial expressions of happiness, anger, disgust and sadness, but the emotions of fear and surprise were not distinguishable. The American results were exactly the same as the Fore Tribe’s, providing evidence of the universal and innate emotional expressions common to differentiated cultures as previously asserted by Darwin (1898). Figure B.2 illustrates an example of human worry, as indicated by the “horseshoe” mark on the forehead of an adult as photographed by Darwin (1874, p. 194). Later, Ekman also identified the same “horseshoe” mark on the forehead of a child from the New Guinea Highlands Fore Tribe in 1967 to 1968, as published by Ekman (2003); which illustrated the universal, heredity and innate nature of emotional expression.

Figure B.2 Universal Expression of Worry in a “Horseshoe Frown”: Darwin (1874)

Figure B.2 provides a visual representation of worry in a male adult photographed by Darwin (1874, p 194, Fold out illustration in French Edition) and is consistently with an image of a Fore Tribe child photographed by Ekman (2003, p. 99). The innate expression of worry in the facial expression was termed the “horseshoe” by Darwin (1874). The comparison of both visual representations of worry in the “horseshoe” expression illustrated in the photographs of both the male adult and the male child; provide visual evidence of the common and innate nature of the expression of worry identified earlier in 1874 by Darwin and more recently in 2003 by Ekman.

Subsequently, researchers developed systems to classify facial emotional expressions, such as the Facial Action Coding System (FACS) (Ekman & Friesen, 1978;
Gosselin, Kirouac, & Dore, 1995, and the Maximally Discriminative Facial Movement (MAX) system (Izard, 1977). Galati and his colleagues found that congenitally blind and normally sighted people displayed almost no significant differences in respect to the number and type of facial action units produced (Galati, Scherer, & Ricci-Bitti, 1997). This example illustrates the innate evolutionary expression of emotions. Further, based on the FACS Ekman (2003) calls the true smile of enjoyment the “Duchenne Smile” named after the scientist Duchenne. Darwin (1874) noted that Duchenne informed him that few people could voluntarily control the orbicularis oculi muscle which surrounds the eye socket. Therefore, Duchenne asserted that when humans were truly happy and were smiling the orbicularis oculi muscle contracted, giving a “wrinkly appearance” around the eyes. In contrast, when the individual was not truly happy, but still smiled, the orbicularis oculi muscle did not contract, which was evident with no wrinkles around the eyes. Therein, Ekman noted that one could distinguish between a genuine or Duchenne smile expressing true happiness and wrinkles around their eyes, from a polite smile with no wrinkles around the eyes. Consequently, ongoing research continues to affirm and extend the seminal evolutionary theory of emotions presented by Darwin (1874). This research has particular relevance for the EI traits of emotional recognition and expression.

Although researchers offer different identifications of basic emotions, those frequently seen in infants are regarded as primary. Evans suggests a continuum of emotions ranging from basic, to higher cognitive, to culturally specific (Evans, 2001). Each emotion has a unique expression, physiological reaction, and an adaptive function and behavioural expression as outlined by Schaffer (2004) in Table B.1.

Table B.1

<table>
<thead>
<tr>
<th>Emotion</th>
<th>Facial Expression</th>
<th>Physiological Reaction</th>
<th>Adaptive Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Surprise</td>
<td>Eyes wide, eyebrows raised; mouth open; continued orienting</td>
<td>Heart rate slowed; breathing briefly suspended; general loss</td>
<td>Preparing to assimilate to new experience; enlarge visual field.</td>
</tr>
<tr>
<td>Emotion</td>
<td>Description</td>
<td>Physiological Response</td>
<td>Function</td>
</tr>
<tr>
<td>---------</td>
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</tr>
<tr>
<td>Calm</td>
<td>Mouth closed; facial muscles relaxed.</td>
<td>Heart rate normal; relaxed breathing; normal muscle tone.</td>
<td>Observing environment; feeling comfortable in surroundings.</td>
</tr>
<tr>
<td>Joy</td>
<td>Corners of mouth up and back; cheeks raised; eyes narrow.</td>
<td>Increased heart rate; irregular breathing; elevated skin conductance.</td>
<td>Signals readiness for friendly interaction.</td>
</tr>
<tr>
<td>Delight</td>
<td>Mouth corners slightly raised and back; eyes wide and alert; and cheeks raised.</td>
<td>Rapid heart rate; tense muscle tone; regular breathing.</td>
<td>Feeling rewarded and motivated.</td>
</tr>
<tr>
<td>Fear</td>
<td>Brows raised; eyes wide; tense, fixed.</td>
<td>High, stable heart rate; low skin temperature; gasping respiration.</td>
<td>Learn about threatening agent; avoid danger.</td>
</tr>
<tr>
<td>Disgust</td>
<td>Brows lowered; nose wrinkled; raised cheeks and upper lip.</td>
<td>Low heart rate and skin temperature.</td>
<td>Avoid harmful source.</td>
</tr>
<tr>
<td>Anger</td>
<td>Brows lowered, pulled together; mouth open, square; lips pressed together.</td>
<td>Increased heart rate, skin and temperature flushing.</td>
<td>Overcome obstacle; attain goal.</td>
</tr>
<tr>
<td>Sadness</td>
<td>Inner corners of brows up; corners of mouth pulled down and middle of chin pulled up.</td>
<td>Low heart rate; low skin temperature; low skin conductance.</td>
<td>Encourage others to give comfort.</td>
</tr>
</tbody>
</table>

*Note.* Adapted from Schaffer (2004).

Carroll Izard’s (1977) extensive research also supported the evolutionary and innate nature of emotions and premise that the expression of emotions were subject to
cultural differences. Paul Griffiths, a philosopher, suggested a higher, cognitive set of emotions, such as love, shame, guilt, embarrassment, envy, jealousy and pride, which are innate but heavily influenced by cultural variations and cognition (cited in Evans, 2001). These emotions are self-conscious emotions, involving a negative or positive effect on our sense of self (Saarni, 2000), often within a social context (Averill, 1980). Self-conscious emotions appear at the end of the second year of childhood, when the sense of self emerges. They may be influenced by adult intervention or instruction, cultural norms, and specific parenting styles. Intense shame associated with feelings of personal inadequacy is linked to withdrawal and depression, as well as intense anger and aggression towards others (Berk, 2003; Seligman, 1995). Dawkins (1989) and subsequently Denton (2005) have also affirmed the formative influence of evolutionary theory of emotions to influence human development and survival. Dawkins (1989) acknowledged the effect of emotions to stimulate innate pressures or drives in human development and behaviour to adaptively or maladaptively optimise survival of the species from a conscious and unconscious perspective.

**B.2.1.1.3 EI: Feeling Theory of Emotion**

William James (1842-1910) presented “The Emotions” in the journal *Mind* (1884), and collaborated with Carl Lange to develop the James-Lange Theory of Emotion. Perhaps the most practical of the theories, James suggested that emotions are the perception of physiological disturbances related to the autonomic and motor functions.

My thesis on the contrary is that the bodily changes follow directly the perception of the exciting fact, and that our feeling of the same changes as they occur IS the emotion. (James, 1884, pp. 189 - 1990, emphasis in original)

Based on the theory of emotion presented by James (1884), it was deduced that we feel sad because we cry, rather than we cry because we feel sad. James and Lange theorised there were three steps or stages in producing emotional feelings:
Firstly, the emotion provoking stimuli is received by the cortex, of peripheral changes (such as the skeleto-muscular activity to run away and autonomic changes such as increase in heart rate) via pathway. Secondly, the sensing of peripheral responses (e.g. altered heart rate and somatosensory effects produced by running away) via pathway 3 occurs. Finally, the emotional feeling in response to the sensed feedback from the periphery is obtained. (Lang, 1994)

The theory has been criticised, particularly by Walter Cannon’s (1927) research on dogs and cats, which concluded that emotions were not only a result of physiological reactions. James was dismissive of theorists such as Descartes and Spinoza (Tichener, 1914), and his focus on the biological framework minimises the importance of reason (De Sousa, 2003). Finally, the theory has limited ability to differentiate between physiological changes that involve emotions and those that do not. Despite the criticism, the James–Lange Theory connected emotions to physiological and neural systems, and influenced later ideas (Palenick, 2007). For instance, Ekman and Friesen (1978) found that, by making the facial gestures of an emotion, they experienced elements of the emotion.

Damasio, a neuroscientist, presented the Somatic Marker Hypothesis, arguing that after evaluating reinforcers, a bodily response (somatic marker) normally occurs, leading to a feeling that influences decision making (Rolls & Treves, 1998). For example, when a squirrel sees a cat, “He saw the cat, was jolted by the body state, and ran” (Rolls, 1998, p. 73). The somatic marker theory provided a positive contribution to the field of emotion, but has been criticised for oversimplifying the emotional states and the influence of other factors to the production of that state.

In a counterargument, Damasio suggested emotions should be distinguished from feelings, because their subjective personal nature makes them difficult to analyse (Damasio, 2001). He has followed the initial work of Darwin, James, Freud (Damousi, 2005), and Sherrington with a focus on neural circuits and physiology. Damasio defined emotions and feelings as:
An emotion, be it happiness or sadness, embarrassment or pride, is a patterned collection of chemical and neural responses that is produced by the brain when it detects the presence of an emotionally competent stimulus—an object or situation, for example. The processing of the stimulus may be conscious but it need not be, as the responses are engendered automatically. Emotional responses are a mode of reaction of brains that are prepared by evolution to respond to certain classes of objects and events with certain repertoires of action. Eventually, the brain associates other objects and events that occur in individual experience with those that are innately set to cause emotions, so that another set of emotionally competent stimuli arises…. Feelings are the mental representation of the physiological changes that characterize emotions. (Damasio, 2001, p. 781)

Damasio’s studies looked at the effects of the amygdala (Adolphs, Tranel, Damasio, & Damasio, 1994; Hamann et al., 1996), and the ventromedial prefrontal cortices and the hypothalamus in the fore brain and brainstem, which triggered chemical and neural signals to the body and the brain, constituting an emotional state (Damasio, 1997).

**B.2.1.1.4 EI: Cognitive Theory of Emotion**

Cognitive theories focus on the propositional cognitive processes as the fundamental component of emotions, which can be either conscious or unconscious. A cognitive judgment is made about a proposition/concept/situation within the context and influence of one’s personal belief or desire. Hence, De Sousa (1987) suggested emotions are not perceptions but ways of seeing based on one’s cognitive interpretation. Research by Dewey was encompassed in the cognitive theory of emotions. Dewey’s theory of emotion was formative to the theoretical construct of EI. While Dewey did not specifically refer to the term “emotional intelligence” his theory and conceptualisation of emotion was theoretically consistent with the models that was subsequently presented by Leuner (1966).
John Dewey (1859 – 1952) wrote *The Theory of Emotion (I.) Emotional Attitudes* and *The Theory of Emotion (II.) The Significance of Emotions* (Dewey, 1894, 1895). Dewey suggested, as opposed to Darwin, that one’s emotional subjective and objective experiences were not distinguishable, but part of the one emotional experience that necessarily included cognition. Dewey also criticised James (1884) for his focus on physiological disturbances in emotion, which he thought minimised the importance of emotion in human life. Dewey defined emotion as follows:

> Emotion in its entirety is a mode of behaviour which is purposive, or has an intellectual content, and which also reflects itself into feelings or Affects, as the subjective valuation of that which is objectively expressed in the idea or purpose. (Dewey, 1895, p. 15)

Dewey (1895) suggested emotion was referred to as that of “Affect” or “Seizure” (p. 16) evident in a physiological manifestation; however, emotion also had another two important phases. First, emotion was considered to drive one’s behaviour as “…a disposition, a mode of conduct, a way of behaving” (Dewey, 1895, p. 16) Second, emotion and cognition were considered as inherently linked in the emotional experience, the “…the full emotional experience also always has its ‘object’ or intellectual content” (Dewey, 1895, p. 17). Dewey believed that humans experience emotion holistically, not as separate processes with “emotional warmth” and the “cold intellectuality” (Dewey, 1895, p. 21). He suggested the terms “intellectual” and “emotional” were developed and utilised to make a functional distinction in the emotional experience, in order to identify the feeling, or “quale” of emotion. In contrast, Dewey considered emotion as a more complex and a holistic manifestation that incorporated both emotional and intellectual processing, which was also influenced by an individual’s genetic disposition and prior experiences:

> The objection entirely overlooks the fact that we have one organic pulse, the frightful bear, the frightened man, whose reality is the whole concrete coordination of eye–leg–hear, &c., activity, and that the distinction of cold intellectuality and warm emotionality is simply a *functional* distinction within this one whole of action. (Dewey, 1895, p. 21)
By acknowledging that contribution of both emotions and the cognition were reflected in feelings or “quale”, Dewey’s theory of emotion reflects the theoretical model and conceptualisation of emotional intelligence by contemporary EI theorists such as Mayer et al. (1990), Goleman (1995), and Bar-On (1997a).

Sigmund Freud (1856–1939) acknowledged the primal importance of emotion as an unconscious instinct, a conscious drive, and a feeling present during the struggle to understand the concept of self. Freud, controversially, found the James-Lange Theory untenable within the context of his psychoanalytic theories (cited in Calhoun & Solomon, 1984, pp. 196, Sigmund Freud: Anxiety, 1915). Freud (1910, 1923) developed a range of psychological theories and models of the human mind, which reconceptualised emotions and their role in human development. Calhoun and Solomon suggested it was possible to identify three different views of emotion in Freud’s theories:

An emotion is an instinct or innate drive, which is essentially unconscious; a ‘free floating anxiety’ is an affect that is no longer connected to a cause or object; An emotion is an instinct attached to an idea and therefore conscious; An emotion is a feeling or effect as a by-product of the mind. (Calhoun & Solomon, 1984, p. 185)

Freud (1915) in Unconscious Emotions asserted that, as outlined by Kant, senses dictate our view of external reality and human external perceptions are subjectively conditioned. This analogy can be extended to human internal perceptions and what we view as our conscious, preconscious, and unconscious internal reality:
I am in fact of the opinion that the antithesis of conscious and unconscious is not applicable to instincts. An instinct can never become an object of consciousness—only the idea that represents the instinct can. Even in the unconscious, moreover, an instinct cannot be represented otherwise than by an idea. If the instinct did not attach itself to an idea or manifest itself as an affective state, we could know nothing about it. When we nevertheless speak of an unconscious instinctual impulse or of a repressed instinctual impulse, the looseness of phraseology is a harmless one… We should expect the answer to the question about unconscious feelings, emotions and affects to be just as easily given… But in physio-analytic practice we are accustomed to speak of unconscious love, hate, anger, etc., and find it impossible to avoid even the strange conjunction, ‘unconscious consciousness of guilt’, or a paradoxical ‘unconscious anxiety’. (III Unconscious Emotions, Freud cited in Calhoun & Solomon, 1984, pp. 190 - 191)

The Topographical Model, which was subsequently deducted by scholars from Freud’s writings in 1915, illustrated the concept that some emotional experiences were not readily available at a conscious level. Further, Freud (1915) asserted that drives were largely unconscious but influenced conscious personal development. Theoretically, Freud asserted that the preconscious could be accessed through psychoanalysis, but not in an individual’s conscious state. Freud’s (1915) work explored differences in conscious and unconscious thoughts, emotions, and feelings, alongside the individual’s subjective experience. He also developed the method of moving thoughts, emotions, and feelings from the preconscious to the conscious. Therein, Freud suggested that dreams and “Freudian slips” were opportunities to see what was subconsciously important:
…the disruptive ideas can be shown to originate in suppressed emotions in mental life. In normal people selfish, jealous and hostile feelings and impulses, upon which the pressure of moral teaching weighs very heavily, quite often makes use of slips in order to find some way of expressing their forces, forces that are undeniably present but are not recognized by the higher authorities in our minds. Permitting these slips and fortuitous actions to occur reflects, to a considerable extent, a useful toleration of amorality. Sexual currents of many kinds figure prominently among these suppressed emotions. (The Psychopathology of Everyday Life, Freud cited in Phillips, 2006, p. 8)

Hence, Sigmund Freud (1915) emphasised the importance of emotions in the conscious and unconscious state as legitimate sources of information. Subsequently, Anna Freud (1895–1982) utilised and refined Sigmund Freud’s theoretical models and concepts of emotions in her work with children and adolescents. Therein, Anna Freud (1946, 1958) utilised her father’s theoretical psychoanalytical models and investigated the changes in the psychic structure of the child at puberty, which necessarily encompassed analysing emotions in children and adolescents. As noted by Damousi (2005), Sigmund Freud’s (1953) psychodynamic theories provoked a fundamental theoretical shift from the traditional focus on the hereditary effects of emotion to the importance of the individual and environmental influences as determinants of a child’s emotions, which was one of the formative components of their mental state. For instance, based on Freud’s theories a psychiatrist Dr Muhl, encouraged listening to the child and valuing children’s thoughts and emotions, which was previously considered of little value (Shaping the Child, Damousi, 2005). Therein, Sigmund’s and Anna Freud’s controversial theories uniquely conceptualised emotion, and highlighted the potentially dynamic, adaptive and interactive relationship between emotions, reason and behaviour that stimulated heated debate.

Schachter and Singer are psychologists who supported James’ physiological ideas about emotion, but also wanted to research and expand upon the role of cognitive processing in emotion. They developed the Schachter-Singer Theory of Emotion (1962) often referred to as The Two Component Theory of Emotion, with emotion
conceptualised as a combination of arousal and cognition. For example, if a person experiences a state of arousal alongside a euphoric companion, they may use cognition to deduce that they are also feeling euphoric. Therefore, the interpersonal influence of another person may affect an individual’s interpretation of his or her physiological arousal. Schachter and Singer conducted laboratory research and found support for their theory. However, Marshall and Zimbardo (1979) replicated the study, but did not come to the same conclusions as Schachter and Singer; suggesting that the relationship between physiological arousal and cognition might be more refined and complex.

Aaron Beck (1991) is a psychiatrist who developed the theory of Cognitive Therapy, believing that dysfunctional negative views towards the self, the world, and the future, could instigate psychological disorders such as depression. Beck, Rush, Shaw and Emery (1979), unlike Freud, concluded that depression arose from consciously accessible negative thinking and maladaptive information processing rather than the unconscious. How an individual cognitively interprets life events influences their emotional response and behaviour (Beck, 1976); therein Cognitive Therapy was theorised to help individuals identify maladaptive information processing that lead to dysfunctional beliefs. Hence, the theory of Cognitive Therapy by Beck identified the malleable relationship between emotion and cognition to regulate behaviour, which was consistent with the seminal theoretical conceptualisation of EI as “the accurate appraisal and expression of emotions in oneself and others and the regulation of emotion in a way that enhances living” (Mayer et al., 1990).

**B.2.1.5 EI: Functional Theory of Emotion**

Functional theories of emotion focus on the appraisal of events that pre-empt emotions and their function, which is formative to the understanding of EI. Based on the functional theory of emotions, an emotion expresses an individual’s readiness to establish, maintain, or change a relationship to their environment (which includes other people in their environment) on matters that are important to them (Berk, 2003; Frijda, 1986; Oatley, 2004; Oatley & Johnson-Laird, 1987; Strongman, 1996). Oatley and Jenkins (1996) defined an emotion as caused by consciously or unconsciously assessing a goal, with the individual experiencing a positive feeling when their goal is advanced and a negative feeling when it is impeded.
Magda Arnold (1903–2002) researched the nature (process and structural elements) of emotion, its effects, and how self-control can lead to self-actualisation. The Appraisal Theory by Magna Arnold (1960), focused on the appraisal of an event based on its importance to the individual, as illustrated in Figure B.3 (Arnold, 1960, cited in Parkinson et al., 2005, p. 9). Further, a secondary appraisal of the event may occur in response to cognitive information and physiological effects that the individual generates.

![Appraisal Theory Diagram](image)

*Figure B.3 Appraisal Theory: Arnold (1960)*

Underlying Arnold’s phenomenological analysis was the fundamental assumption that common factors affect the emotional experience; consequently, human psychological wellbeing could be improved by understanding how emotions and cognition interact. Arnold (1960a, 1960b) in *Emotion and Personality* presented theories of the connection between cognition, feelings, moods, and emotion, by explaining the complex interaction of conscious and unconscious attention, perception, appraisal, physiological sensations, intrinsic motivation, and emotional regulation in the development of the self-ideal. Current theories of EI incorporate the theoretical appraisal model presented by Arnold (Gasper & Bramesfeld, 2006), for instance emotional appraisal is formative to the EI trait of emotional management and control.
Furthermore, emotional thoughts were often associated with second-order thoughts relevant for perceiving and regulating emotion, referred to as metacognitive thoughts. Briñol, Petty, and Rucker (2006) modelled the metacognitive process of emotion creating the primary and secondary interplay of emotions and cognition. Briñol, Petty and Rucker (2006) classified primary and secondary thoughts into dimensions, as outlined in Figure B.4. They concluded that understanding emotion could be enhanced with the incorporation of “metacognitive process in thoughts that precede, accompany and follow emotions”, thereby supporting Arnold’s research.

Figure B.4 Metacognitive Processes of Emotion by Briñol, Petty and Rucker (2006)

Sartre asserted that the object of our emotions “fascinates us and takes us captive” as a result of our appraisal, arousing attraction or aversion that changes our perception of the world around us. Arnold agreed with Sartre (1957), and also suggested that overly-systemising the study of emotions risked losing the common human experience, reflected in many EI theorists’ attempts to understand how cognition and emotion interact:
It almost seems as if the belated realization that human activity is never purely emotional or purely intellectual had resulted in a refusal, as frantic as it is futile, to admit the existence of qualitatively different aspects in total human activity… We know passion as a persistent and overwhelming urge, and emotion as an experience that not only disturbs but also arouses to action. When a man is profoundly moved, he does not lose control over his actions, but he is completely engrossed, almost lost in the thing he loves or hates; he is shaken to his depths, committed body and soul. (Arnold, 1960b, pp. 10 - 11)

Humans are not aware of the structures of emotion and cognition, but do understand the quality of the experience that is *sui generis*. Arnold’s description that aptly outlines what Mihaly Csikszentmihalyi (1990) referred to as “flow”, or optimal immersion of oneself in a task. Specifically, emotions are affective responses to the environment, based on the intuitive appraisal that something is good or bad for us. Feelings are reactions to experience and can be agreeable and disagreeable based upon an intuitive examination of a particular situation, manifesting in attraction or aversion. Consequently, an individual’s attraction or aversion demands an action, primarily consisting of approach (towards something appraised as good or beneficial) or avoidance (away from something appraised as bad or harmful). The feelings of attraction or aversion are accompanied by physiological changes that may facilitate the approach or withdrawal tendencies aroused.

Arnold outlined which feelings would be appraised in intuitive ways as beneficial/pleasant and/or harmful/unpleasant, or painful according to the individual’s situation:

- sensory functions,
- bodily movements,
- flow of ideas, thoughts, insights, understandings and images,
- physiological functioning, and
- emotions that tend toward something beneficial or unbeneficial.

Arnold built upon theories of emotion developed by McDougall (1926, 1928, 1933), Michotte (1951), and Gemelli (1949); whereby emotion was conceptualised as a
“functional connection” between subject and object, requiring an appraisal based on one’s goals (cited in Arnold, 1960b). For instance, elements of the functional connection between object and subject include:

- **Perception**: To know or perceive something requires the integration of the senses and impressions.

- **Object or situation of emotion**: May be the present, past, in anticipation of a future event, or imagined. To have an emotion it is necessary to perceive or know the object, situation, or mental state, whether accurately or inaccurately.

- **Appraisal process**: The object is appraised as desirable or undesirable, valuable or harmful. To arouse an emotion there must be some personal meaning related to unique experiences or aims, therefore creating attraction or avoidance.

- **Primary appraisal**: Arouses an emotion, which is direct, immediate, deliberate, instinctive, and intuitive.

- **Secondary appraisal**: Arouses an emotion, based upon a reflective judgement, which can influence the primary appraisal. For example, a child sees a dog barking and the intuitive appraisal creates fright. He sees that the dog is barking at a ball, not him, so the secondary appraisal leads to a calmer state.

- **Emotional expression and action**: The intuitive appraisal leads to an action that is felt as an emotion, expressed in bodily changes and, possibly, action. The attraction or repulsion is psychological and the impulse to action brings specific, emotionally linked physiological changes, which can be recognised by other people and may lead to further appraisals. This description has links to the EI trait of understanding emotions in one’s self and others (Luebbers et al., 2007).

- **Residual emotional attitudes and intellectual attitudes**: The attraction or repulsion continues while attention is focused and perception is filtered through the initial appraisal. The appraisal influences later perceptions and appraisals, so if we are attracted, our view is focused on attractive aspects.
The concept of a “constancy of perception and appraisal” suggested how emotion changed the world around us. In human experience, expectation remains constant until another experience contradicts it. Similarly, the initial appraisal and emotions would be generalised to a whole class of objects rather than an individual example. The intensity of the emotion will be linked to the degree of appraised good or harm associated with the situation. Therefore, following an intensely emotional situation, “emotional conditioning” is the expectation that a future situation will also be threatening. In this way, the individual could often provoke what they actually expected, for example, rejection. “The expectation that others will act towards us as people resembling them have done in the past is an essential feature of the process by which we appraise others and their effect upon us” (Arnold, 1960b, p. 184). Therefore, if a person tries something new, but their appraisal is based on fear, the attempt will be done in desperation rather than confidence, because fear provokes expectations of negative responses from others. Emotional management and control (Luebbers et al., 2007) is a dimension of EI and directly relates to this aspect of Arnold’s model.

**Emotional attitude:** This results from the expectation of constancy, and is based upon the emotion that follows the appraisal or the residue the emotion leaves behind. Once an emotion is experienced, it is re-experienced more quickly with similar stimuli, eventually resulting in a stable emotional attitude and, potentially, an emotional habit. Arnold’s emotional attitude has implications for the EI trait entitled Emotional Management and Control.

**Intellectual attitude:** Intellectual attitude stems from a reflective appraisal that a judgement is correct in regard to a wider issue such as religion, politics, or education, because emotions play a role in forming such convictions.

Arnold’s Appraisal Theory suggests that intense emotions provide a lens through which the child will appraise their world, as either safe or unsafe, leading to definite emotional attitudes. For example, the child may consider that others will like him or dislike him. The psychological and physiological effects of a traumatic experience, repressed or remembered, can affect conscious or unconscious attitude until a corrective reappraisal takes place. The child will realise emotionally what they had known
reflectively, that the situation has changed or whether they can cope with it. This model of appraisal is a formative element in the theory of EI (Salovey & Mayer, 1990).

Richard Lazarus (1991) continued research on the appraisal theory, concurring that people make both conscious and unconscious appraisals. He also asserted that cognition and, to a lesser extent, motivation, has a bidirectional major role in emotion. Motivation is defining what is important or unimportant, and therefore what is emotional. As Lazarus explained in the following quotation:

Without cognitive activity to guide us, we could not grasp the significance of what is happening in our adaptational encounters with the environment, nor could we choose among alternative values and courses of action. Emotion without thought would be mere activation without the directionally distinctive impulses of attacking in anger or fleeing in fear. Motivation without cognition too would be merely a diffuse, undifferentiated state of activation, a tissue tension that does not specify the consumatory goal or means to attain it. Finally, integration of behaviour would also be impossible without cognitive direction (Miller, Galanter, & Pribram, 1960); there would be no possibility, for example, of feedback control of behaviour if we did not have the ability to take cognizance of what is happening. This, of course, is old and has been said many different ways. (Lazarus, 1991, p. 353)

Lazarus describes the causative functional role of cognitive activity in emotion as both sufficient and necessary, because emotions require thought and thoughts can produce emotions. Therefore, emotion may influence subsequent thoughts and produce feedback, leading to further thoughts or physiological effects, which are emotional. This cyclical system contains cognitive and emotive elements. Sartre (1948) adopts a phenomenologist perspective, reasoning that emotion is a phenomenon of consciousness rather than just an accumulation of facts:
We have said in our introduction that the signification of a fact of consciousness comes down to this: that it always indicates the total human-reality, which becomes moved, attentive, perceiving, willing, etc. The study of emotions has quite verified this principle: an emotion refers back to what it signifies. And, in effect, what it signifies is the totality of the relationships of the human reality to the world. (Sartre, 1948, p. 93)

Lazarus and Smith make a slight shift, by asserting that knowledge can be classified in specific contexts, without a personal interest, and can be cold or non-emotional. The individual and cultural differences that subsume emotion are influenced by knowledge. Children and adolescents are able to use their knowledge of themselves and their world, to appraise the significance of encounters and learn from experiences. Nonetheless, some ideas may be kept out of individual’s consciousness as an Ego Defence Mechanism (A. Freud, 1946).

Evidently, knowledge structures and stages of cognitive development impact appraisals, which assist in the formation of emotions. Lazarus asserted that appraisals could be developed automatically at a preconscious or unconscious level, and deliberately at a conscious level: “…much of the time we know instantaneously about what is good or bad for us without complex and time-consuming inference processes” (Lazarus, 1991, p. 358). Hence, pre-conscious evaluations of social situations may be combined with refined conscious evaluations. Personal meaning and emotion is extrapolated from relationships within our social environment.

From a neurological perspective, Rolls suggested that emotions are fundamental to the design of any adaptive brain with flexible behaviour and are “states elicited by rewards and punishers” (Rolls, 1998). Punishers are anything that a human will try to avoid, and rewards are something they will work to obtain. Some stimuli are unlearned or innate “primary” reinforcers, such as the provision of food when a person is hungry. While other stimuli are “secondary”, reinforcers learned through stimulus-reinforcement association. Positive and negative stimuli can be delivered, omitted, or terminated, provoking a consequential emotional state. Rolls examined the brain systems responsible for the implementation of behavioural, autonomic, and endocrine responses to emotion-
provoking stimuli, suggesting emotions have many functions that may occur concurrently.

The examination of emotions, the function of emotions, and their associated brain mechanisms questions the specific role played by conscious and unconscious thoughts and memory. Rolls argued that remembered neuronal states are similar to those produced by a real sensory input during most of the stages of sensory processing (Rolls, 2000, 2004; Rolls & Treves, 1998; Saarni, 2000). Rolls (1999, 2000, 2004) suggested there are ten basic functions of emotions, which are outlined with reference to related research findings as follows:

1. **The elicitation of autonomic responses and endocrine responses:** A considerable body of research indicates that emotions influence children’s wellbeing. For example, emotional stress raises heart rate and blood pressure, while depressing the immune system and the digestive system, as blood flows to the heart, brain and extremities to mobilise the body for action. This stressed emotional state may lead to constipation, ulcers, or infectious illness (Berk, 2003; Gunnar, 2000; Gunnar & Nelson, 1994). Gunnar studied children in Romanian orphanages and compared them to age peers who were adopted shortly after birth. When compared to their adopted peers, the children from orphanages displayed heightened levels of the stress hormone cortisol in their saliva (Gunnar, 2000).

2. **Flexibility of behavioural responses to reinforcing stimuli:** This suggests that humans encountering an emotional stimulus can perform any appropriate response to obtain reward or avoid punishment, unlike the fixed behavioural response of classical conditioning. As this skill develops, so does the child’s self-awareness. This human awareness that the individual has the ability to change their behaviours to affect events in their surrounding environment, is referred to as a sense of self-efficacy (Harter, 1998).

3. **Motivation:** Positive reinforcement elicits motivation so people will work for rewards or to avoid negative stimuli. If the positive stimuli are removed, demotivation and frustration from non-reward may arise. When no action is possible, depression may occur. Rolls (1999) noted a depressed state, which
lasts for a short time may be seen as being adaptive (by preventing continuing attempts to regain the positive reinforcer which is no longer available). However, the depression may last for a very long time perhaps because long-term explicit (conscious) knowledge in humans enables the long-term consequences of loss of the positive reinforcer to be evaluated and repeatedly brought to mind, this may make long-term (psychological) depression maladaptive (Rolls, 1998, pp. 68 - 69).

(4) **Communication:** This may have survival value for groups and individuals, because body and facial communications are major forms of interaction. Rolls suggests that neural systems in the amygdala and overlying temporal cortical visual areas are specialised for the facially-related aspects of this processing (Granato & Bruyer, 2002). Children’s emotional signals affect the social behaviours of others (Berk, 2003).

(5) **Social bonding:** An example of social bonding is the emotions associated with the attachment of parents to their children. Dawkins’ Selfish Gene Theory suggests that parental care increases the survival of genes in their offspring (Dawkins, 1989). Depression may disrupt a parent’s capacity to bond with their child, potentially leading to serious emotional problems such as Radical Attachment Disorder (Berk, 2003).

(6) **Survival** is the amalgamation of autonomic and endocrine responses, motivation, communication, social bonding, and flexibility of behavioural responses. Anything that is positively reinforcing has survival value. Dawkins (1989) suggested that humans who are successful in genetic competition often explore new environments. Comparably, Dawkins (1989) asserted natural selection through negative reinforcement, for behaviour with low survival value, may also be important to the health of the species.

(7) **Current mood state** can affect the cognitive processes and evaluation of events or memories. Blaney (1986) reviewed empirical literature and uncovered the significant effect of mood on mnemonic processing. Rolls explained the neural functions and laterality effects in human emotion processing, where high or low anxiety can impair thinking, but moderate
anxiety can be facilitating (Sarason, 1980). Fredrickson (2005) found positive emotions expanded the individual’s attentional scope and thought-action ranges. Carl Rogers viewed the relationship between cognition and emotion as bidirectional and interwoven with the development of cognitive processing (cited in Magai & Haviland-Jones, 2002).

(8) **Memory storage:** Emotion may facilitate the storage of memories. For example, episodic memory is facilitated by emotional states. Secondly, the current emotional state may be stored with episodic memories, providing a contextual retrieval cue.

(9) **Persistent motivation:** This is the process of enduring for a period of time after a reinforcer, which may lead to persistent motivation.

(10) **Memory recall:** Emotions may trigger the recall of memories stored in neocortical representations (Rolls, 1998; Rolls & Treves, 1998). A sensation or a state of mind, such as sight, sound, taste, smell, touch, memory, or imagining, may yield positive or negative emotion, affecting the desire to repeat the experience.

**B.2.1.6 EI: Social Constructive and Cultural Theory of Emotion**

Social constructive theories of emotion draw upon the pragmatics of social perception and cognition, with people attempting to understand each other in order to direct their own behaviour in pursuit of their goals. The basis of social intelligence considers how individuals develop their social worlds, perceive and interact with others, set their personal goals and manage their behaviours within a culturally framed social interpretation (Parkinson et al., 2005). This is the foundation of emotion from a social theoretical perspective, which is one of the theoretical elements that influences the construct of EI (Salovey & Mayer, 1990).

William James (1890) referred to “pragmatic thinking” as the ability to control attention processing in social settings. With higher levels of acquaintance and communication between individuals, more behaviour can be appraised; therefore, the predictive reliability of an individual’s anticipated behaviour increases. Social dominance rating of self and others can be based on a number of factors, and leads to expectancies within and between groups. A subordinate’s ability to attain goals depends upon the goals
of the more powerful person; consequently, subordinates may pay more attention to influencing those in power. Control-deprived people encode social information more carefully. Depression creates the perception of little control and motivates people to seek diagnostic information, often emphasising negative effects.

Sartre (1948) suggested an emotion is directed by consciousness, which enables us to understand facts and is essential to human perception and social/environmental interactions. Humans include emotions when they construct meaning from the world, and these emotional perceptions and appraisals are initially unconscious, becoming conscious if unresolved:

At present, we can conceive of what an emotion is. It is a transformation of the world. When the paths traced out become too difficult, or when we see no path, we can no longer live in so urgent and difficult a world. All the ways are barred. However, we must act. So we try to change the world, that is, to live as if the connection between things and their potentialities were not ruled by deterministic processes, but by magic. Let it be clearly understood that this is not a game; we are driven against a wall, and we throw ourselves into this new attitude with all the strength we can muster. Let it also be understood that this attempt is not conscious of being such, for it would then be the object of a reflection. Before anything else, it is a seizure of an object being impossible or giving rise to a tension, which cannot be sustained, consciousness simply seizes it or tries to seize it otherwise. (Sartre, 1948, pp. 58 - 59)

Therefore, Sartre (1948) provides a basis for social cognition and perception from an interpersonal, intragroup, and intergroup perspective. These underpin the EI domains of using feelings to facilitate thought, and regulating emotion in oneself and others. They also have a strong link to the cognitive appraisal theory of emotions (Smith et al., 1993), and linking relationships between emotions and core relational themes, as outlined by Arnold (1960a) and Lazarus (1995). Nezlek (2008) found primary relationships in the appraisal of: other-blame to anger; self-blame to guilt; danger/threat to fear; loss/helplessness to sadness; achievement to joy; and positive encounters to love. He also found individual differences in cross-relationships between other appraisal-emotion
associations, which could be influenced by culture or individual differences in emotional sensitivity. Further, Gross (1994) noted there were individual differences in emotional sensitivity for gifted students, whereby gifted students were frequently extremely emotionally sensitive. Generally, the sociological view focuses on individual differences in emotions in light of the social or cultural norms within micro or macro groups.

Susan Fiske (1993) suggests that, to develop social cognition, perceptions must be accurate and should create a workable structure in tune with a person’s goals, motives, and needs. Many social models focus on intra and interpersonal skills as a means to predict what a person is likely to do. People perceive the traits of others as manifestations of their goals and evaluate their ambitions based on their own concept of self. By the middle of the first year, infants have well organised emotional expressions and can communicate their internal state. The dynamic systems perspective argues that children coordinate separate skills into more effective systems as the central nervous system develops with the influence of experience (Berk, 2003). Therefore, the social constructive theory of emotion suggests bidirectional social interactions influence our emotions, thoughts, and behaviour.

Fiske (1993) argued that people can construct meaning from their social environments, which enables adaptive actions. People use personalities or stereotypes to determine what they will feel alongside ongoing observations, expediting the ability to appraise social situations. Often, a person’s goals can be formulated in a story format. However, too much emphasis on predicted traits might increase the possibility of inaccurate appraisals. In social cognition and perception, most people use automatic and intentional strategic allocation of attention, based upon their goals, with some social decisions benefiting from fast action, and others from careful consideration:

People make meaning by abstracting relevant essential structures, which then substitute for the original. The familiarity and simplicity of the abstracted structure then make it workable for everyday undertakings. In person perception, the simple, familiar “extracted characters” are most likely to be traits, stereotypes, and stories. (Fiske, 1993, p. 162)

The impact of memory on social cognition and perception is a major focus, specifically the effects of expectations on information recall. Therefore, this research
should consider teachers’ expectations of students and students’ expectations of teachers. For example, a teacher may form an impression that a student is academically weak and act accordingly, which may make a poor outcome more likely (Jussim & Eccles, 1992).

Gender differences in personality traits appear to be larger in prosperous, egalitarian cultures (Schmitt, Realo, Voracek, & Allik, 2008), which would influence social relationships. For example, women tend to have stronger social memory (Skowronski, Betz, Thompson, & Shannon, 1991).

Parkinson et al. (2005) asserted an individual’s emotions are influenced by their position within groups, subcultures, and broader society. Consequently, emotions are intrinsic to three levels of social analysis from an Interpersonal, Intragroup and Intergroup perspective, as outlined below:

- **Interpersonal**: Refers to the emotion stemming from relationships between specific individuals, that can be affected by individual differences in one’s perspective and the appraisal of one’s own emotions (Bugental et al., 1993). Relationships influence power structures, roles, or conflicts between people, and the nature of the interpersonal connection determines the intensity of the emotion.

- **Intragroup**: Refers to an individual’s emotions, which are shaped by their group identity, such as family, school class, or adolescent peer group. A group creates an, “us and them” social structure with varying strengths of social identity and group roles. Group allegiances and conflicts impact appraisals, and social appraisals can be normatively determined according to how they impact on the group’s goals and identity. Different display rules may apply to members and non-members, so emotional regulation may be influenced by social orientations.

- **Intergroup**: Refers to emotions as large groups stratify, the emotions stemming from relationships between groups or cultures that form major social norms. For instance, the cultural norms that influence an individual’s emotional expression based on the accepted cultural or groups norms. Anthropologists have related how social norms shape the emotion categories of different societies (Ekman, 1972). For example, Jean Briggs
(1971) found that the Utka Eskimos developed a society in which displays of anger are virtually eliminated. Cultural norms influence the appraisal, display, and regulation of emotions, and most people regulate their spontaneous emotions to ensure they fit into the social order. For example, Western culture often values personal achievement, whereas Eastern cultures tend to adopt shared goals.

Hence, the social constructive and cultural theories of emotion are based on the pragmatics of social/cultural/group perception and cognition. An individual can be considered according to their group affiliation, gender, culture, society, interpersonal roles, and intrapersonal roles. The individual’s changing cognitive stage of development affects the ability to process emotional information that is both universal and unique to their social context, shaping their emotions.

In conclusion, this review of the definitions and theories of emotion, and the interaction between emotions and intelligence, provided an overview of the theoretical origin of EI in the current study. The theories of emotion have illustrated the extensive body of research that has been developed from an evolutionary, feeling, cognitive, functional and social perspective. Therein, the nature of emotion has been debated since the time of the Ancient Greek philosophers, and has been researched within a range of academic disciplines, including the philosophical, psychological, neurological, physiological, anthropological and evolutionary disciplines. Nonetheless, the essential role of emotion in providing fundamental information to support one’s survival, particularly in a group, remains consistent with Darwin’s seminal theory of emotion (1874). The innate construct of emotion is understood with reference to: one’s genetic predisposition; the individual’s stage of development; both conscious and unconscious functions; based on one’s appraisal of their ability or inability, to attain their goals; and is shaped by social and culture norms, which are formative to one’s survival.

Damasio (Johnson, 2004) suggested the rapid expansion of technological advancements, particularly the internet and the increasing speed and pace of modern life, place the current generation who are working in a globalised economy, under more pressure to process both cognitive information and emotional information at a quicker speed; in order to keep up with the rising speed and volume of communications they
encounter on a daily basis. Damasio suggested the cognitive system should be able to process information at an increasing speed. However, this was not the case with the emotional system as it takes longer for the emotional system to develop; therefore, some students may be at risk of not having the necessary time and support from others to develop their emotional systems with somatic markers, in the future. Importantly, the interaction of both emotions and cognition are required to provide information to the student and enable them to learn (Carter & Pasqualini, 2004). Hence, Damasio (Johnson, 2004) conceded that without the benefit of both cognitive and emotional systems processing information, the individual’s ability to be rational and to take part in the social process of learning at school may be compromised in the future.

Therefore, collectively the theoretical models of emotion have provided a formative theoretical and developmental understanding of the importance of emotions to support optimal human development throughout the human lifespan. However, there were few theories of emotions that incorporated the role of emotion and cognition from a multifaceted or holistic theoretical perspective (Zeidner et al., 2003). This limitation in the literature was addressed with the introduction of EI as a theoretical model, which acknowledged the importance of emotions to inform intelligent behaviour and introduced the concept of thinking intelligently about emotions (Mayer et al., 1990; Salovey & Mayer, 1990). Therefore, the theories of intelligence are now outlined in more detail, with references to the role of intelligence and the relationship between intelligence and emotions to underpin the construct of EI.

B.2.1.2 EI: Models of Intelligence
Historically, the theories, models and definitions of intelligence have been contentiously debated from a range of theoretical perspectives: philosophical, evolutionary, biological, neurological, psychological, psychosocial, and developmental. The nature of intelligence can be linked to early philosophical theories of intelligence. Plato (427–347 B.C.) and his student Aristotle (384–323 B.C.) developed a philosophy that acknowledged the importance of both reason (rationality) and the passions (irrationality) to influence in human development. Anaxagoras (499–428 B.C.) developed a philosophical theory asserting the senses as the sole origin of knowledge, and reason as the regulating faculty of the mind (Lewes, 1857, p. 63). Based on Anaxagoras’ premise,
all information passed through the senses, which therein determined human knowledge that was subsequently used in reasoning. The first known reference to the term “intelligence” stems from Cicero (106-43 B.C.) who translated Aristotle’s Greek term *dianoetic* into Latin as *intelligentia*, which was later Anglicised into the word “intelligence” as reported by Jensen (1998). The introduction of the term intelligence signalled the starting point for the debate related to definitions, theories, models and assessment of intelligence, which continues to date. Notably, Herbert Spencer (1898) was one of the earliest theorists to consider individual differences in intelligence from an evolutionary perspective.

Stemming from these philosophical debates regarding the conceptualisation of intelligence, contemporary researchers have continued to question the meaning and measurement of intelligence (Gottfredson, 1994). In addition, with the relatively recent introduction of the concept EI (Mayer et al., 1990; Salovey & Mayer, 1990) researchers have increasingly sought to question if intelligence relates to non-cognitive factors such as emotion, and may also influence human learning and behaviour. Contemporary theoretical models of intelligence models have been commonly classified as models based on a single common factor, a dual factor or a multifactorial model.

The focus of the current study is on the relationship between AEI, IQ and gender in academic achievement. Consequently, the single and dual factorial models of intelligence will be reviewed as they contribute to an understanding of intelligence in the traditional sense of abstract reasoning. Single factorial intelligence models were proposed by Galton (1869) and Spearman (1904); and the hierarchical model was proposed by Horn and Cattell (1966), and Carroll (1993). Further, the developmental nature of cognition as the individual grows within their environment is also acknowledged. Furthermore, intelligence has been considered from a developmental perspective. Piaget (1959) has outlined a developmental theory of cognition, outlining the hierarchical stages of cognitive growth. Whereas, Vygotsky (1929) considered the development of intelligence from a sociological and cultural perspective. Finally, multiple factorial models of intelligence will be reviewed as they contribute to a theoretical understanding of EI. A three-factor intelligence model was developed by Thorndike (1920a) and
Sternberg (1985); with multiple factor models proposed by Thurstone (1938), Guilford (1967), and Gardner (1993a). Therefore, the following section outlines the:

- **B.2.1.2.1 Single and Dual Factorial Models of Intelligence**
- **B.2.1.2.2 EI: Theory of Social Intelligence**
- **B.2.1.2.3 EI: Theory of Cognitive and Non-Cognitive Factors of Intelligence**
- **B.2.1.2.4 EI: Theory of Multiple Intelligences**
- **B.2.1.2.5 EI: The Triarchic Theory of Human Intelligence**

**B.2.1.2.1 Single and Dual Factorial Models of Intelligence**

Galton outlined his theoretical perspective of intelligence in his publication *Hereditary Genius* (1869). Galton illustrated the role of genetics in the development of intelligence, which was strongly influenced by Darwin’s theory of evolution, as articulated in his publication *The Origin of Species* (1858). Subsequently, Galton (1883) published *The Human Faculty and Its Development* which presented formative concepts that remain relevant to current psychology and psychometrics. Galton’s theories formed new directions for statistical research, by introducing such concepts as the “law of deviation from an average”. Galton also addressed the concept of genetics, through the examination of inherited mental ability; and he contributed the concept of human intelligence, by referring to and explaining the terms general mental ability and special abilities. Genius was studied by reviewing eminent men of high reputation in regard to their characteristics and individual differences. Galton identified both high levels of mental energy and sensitivity as characteristics of intellectually gifted individuals. The characteristics outlined by Galton continue to be acknowledged in intellectually gifted individuals by contemporary theorists (Gross, 1994; Piechowski, 1991). Galton suggested that the information, which forms the basis of what we know, is passed through the senses. Consequently, Galton asserted that the more perceptive the senses, the wider the scope and complexity of information obtained and processed by the individual. The formative role of the sense in developing knowledge was consistent with the philosophical perspective previously articulated by Anaxagoras (499–428 B.C.).

Alfred Binet (1905) in his article “*New Methods for the Diagnosis of the Intellectual Level of Subnormals*” presented the first formalised “measuring scale of intelligence”, consisting of 30 tests to measure the intellectual capacity of a child. Binet
aimed to determine if the child was normal or retarded in comparison to his chronologically aged normal peers. Further, Binet sought to determine how many years an individual was advanced or retarded compared to his peers; therein, he developed the concept of the Intellectual Quotient (IQ). The IQ referred to an individual’s mental age (MA) divided by their chronological age (CA) and multiplied by 100: For example, $\text{MA/CA} \times 100 = \text{IQ} (12/8 = 1.5 \times 100 = \text{IQ} 150)$:

Our purpose is to evaluate a level of intelligence. It is understood that we here separate natural intelligence and instruction…This necessity forces us to forego a great many exercises having verbal, literary, or scholastic character. (Binet & Simon, 1905, Section 1, *The Psychological Method*, Paragraph 5)

Binet explained the phenomena of intelligence included sensation, perception, reasoning, judgment (good sense, practical sense, initiative, and the facility of adapting one’s self to circumstances), comprehension, memory, and attention. Binet asserted intellectual qualities were not superposable, or able to be placed on top of another. Consequently, they could not be measured as linear surfaces but are a classification, a hierarchy among diverse intelligences; their classification forming the measure. These factors, or, as Binet defined them, as manifestations of intelligence are still incorporated in contemporary models of intelligence and measures such as the Stanford-Binet Intelligence Scale (E. L. Thorndike et al., 1986) and the Wechsler Intelligence Scale for Children (Wechsler, 1991).

Levy Vygotsky (1929) in his paper entitled *The Problem of the Cultural Development of the Child*, reviewed the biological, cultural and social factors that influence a child’s intellectual development and behaviour. Vygotsky (1929, The Genesis Section, para. 4-6) was critical of Binet’s intelligence testing, for not valuing and including the essential influence of social and cultural theory into his testing regime. For example, Binet’s “simulation of memory” subtest was criticised for measuring “fictitious development” instead of the organic or real development. Vygotsky asserted that the maturation of the child provides him with the biological/genetic condition with which to develop, but the culture provides the motivation and means. “The active part is here
played by the organism which masters the means of cultural behaviour supplied by the environment” (1929, The Genesis Section, para. 10).

Vygotsky outlined four stages of Intellectual Development, each stage dependent upon the child’s internalisation of the problem or thought process at hand and evidenced in the externalisation of his behaviour as follows:

Stage 1) Primitive Behaviour or Psychology: the younger child utilises his natural means to solve problems to the degree he is interested.

Stage 2) Naive Psychology: the child uses the simplest of tools (language was cited by Vygotsky as a major tool), such as their own body or available objects available. For example, to remember a list of words, the child uses pictures.

Stage 3) External Cultural Method: The child follows the method of learning that is shown to him or one that he develops. The child learns how to internalise a picture, rather than refer to an external picture, to help him remember the list of words.

Stage 4) Growing in of the External Method to the Internal Method: The external means becomes internal and the inner stimuli are substituted for the external ones.

“The mnemotechnical map which lies before the child becomes his internal scheme” (Vygotsky, 1929, The Genesis Section, Par. 21). The child internalises the influence of the culture and this becomes an internal part of how he thinks or solves problems and develops his “external habit”. Vygotsky (1978) also presented the concept of the “Zone of Proximal Development” (ZPD) that conceptualises and delineate the child’s learning point. That is, identifying the functions or abilities just emerging, but those that are still just beyond the child’s reach without support. Importantly, Vygotsky placed significant focus on the interaction of the child’s natural development with the social/cultural environment in which he was located to develop intelligence.

Jean Piaget worked at Grange-Aux-Belles Street School run by Alfred Binet and began to focus on the common errors some students made when he was correcting some intelligence tests. He found there were clear patterns of their cognitive processing and he also studied his own children’s intellectual development in depth. Piaget hypothesised that intelligence of children was developed hierarchically. Within the process of intellectual development, cognitive processing occurred schematically, with the organisation and reorganisation of mental schema according to the child’s developmental
stage. Piaget’s (1959) articulated in his theory of intellectual development within the framework outlined in *The Stages of Cognitive Development*, explaining the child’s conception of reality was provided insight into their stage of intellectual development. Piaget’s (1959) interactive scheme also incorporated elements of Spearman’s theory and illustrated how Spearman’s g factor was displayed or evident in the hierarchical stages of cognitive development. Vernon (1965, cited in Jensen, 1980) found that the Piaget tasks were loaded on the general factor to about the same level as standard psychometric tests, such as the Stanford-Binet (Terman, 1916) and the Raven’s Standard Progressive Matrices (J. C. Raven, 1938).

Spearman’s (1904) seminal research into the general common factor or mental energy/power in human intelligence, together with the theoretical explanation (Spearman, 1923) of general intelligence has been pivotal in understanding intelligence. Spearman found that almost every test involving any kind of complex mental activity correlated positively with any other test involving complex mental activity, regardless of the specific content of the test. Using factor analysis to check his hypothesis, Spearman maintained that all tests of intelligence measured a single common factor “general intelligence” referred to as ‘g’, and that each test also measured something specific to itself, ‘s’. He identified two distinct processes in the measurement of g: eductive ability or the ability to educe relationships and correlate (i.e. inferring a general rule from specific instances and recognising specific instances from the general rule) and reproductive ability, based on recall of acquired information (i.e. remembering information that is taught in school).

Spearman (1927), in his book *The Abilities of Man, Their Nature and Measurement* prefaced his theory of intelligence with a theoretical overview of how his research fit into “the general order of things”. Interestingly and infrequently reported in literature reviews of Spearman’s theories, he asserted that a person’s ability to cognise was inseparable from conation and affection; however, he did not formally attempt to measure the affection referred to in the following quotation:
… the process of cognition cannot possibly be treated apart from those of conation and affection, seeing that all these are but inseparable aspects in the instincts and behaviour of a single individual, who himself, as the very name implies, is essentially indivisible. In general, a person’s total cognitive ability may be regarded as an instrument or organ at the disposal of any of his conative activities. (Part 1, The Rival Doctrines, Chapter 1, The Problem, Spearman, 1927, pp. 2-3)

Raymond Cattell, who studied under Charles Spearman, developed concepts of multivariate experimental analysis (1941); made conceptual distinction between two aspects of $g$, fluid and crystallized (1952); and developed the concept of a culture fair non-verbal intelligence test (1940), as demonstrated in The Cattell Culture Fair IQ Test. Cattell (1963) defined fluid intelligence ($gf$) or eductive intelligence as the capacity for new conceptual learning and problem solving; independent of any learning accrued in a specific culture or structured educational setting. Tests measuring fluid intelligence generally exclude cultural and academic content. Cattell considered “formative fluid ability” influenced the development of crystallised intelligence and was shown not to have a significant correlational loading with personality factors. Crystallised intelligence ($gc$) was thought to develop as a result of being learned, as explained by Cattell “skilled judgement habits have become crystallised (hence its name) as the result of earlier learning application (1963, p. 2-3)” and developed intellectual skills. Horn was a student of Cattell’s and completed his PhD with a thesis that developed the factor analysis model of fluid and crystallised intelligence as interrelated factors of $g$ (Horn & Cattell, 1966). Horn and Cattell tested adolescent and adults to find importantly that adolescents had higher levels of $gf$ which reduced in adulthood, while $gc$ was lower in adolescence and higher in adulthood (Horn & Cattell, 1966).

General intelligence has been presented as a significant factor in the prediction of academic achievement (Jensen, 1969; Neisser et al., 1996). Cattell suggested traditional intelligence tests confounded fluid and crystallised intelligence and contained some of the factors in academic achievement; therefore, sought to predict factors it already contained. The development of the theory and testing of $gf$ and $gc$ provided educators with broader tests with which to determine individual potentialities. It enabled the measurement of
fluid intelligence or as Jensen (1998) described, the purest form of “g” which is reflected in abstract intelligence. The Raven’s Standard Progressive Matrices was developed as a culture fair test of “gf” or abstract reasoning by John Raven as initially presented in his thesis dissertation (J. C. Raven, 1936). It has been used widely to measure gf and has enabled educators to identify their students’ innate intellectual potential and to a degree more accurately predict the differentiation between their current aptitude and academic achievement and their intellectual potential.

Cattell and Horn’s (1978) development of the theory of fluid intelligence (culture-fair analytical ability to determine the degree of complexity of hierarchical relations, through the senses) and crystallised intelligence (achievement or accumulated knowledge) was reviewed with the inclusion of new multi-sensory subtests. These multi-sensory subtests were included in response to criticisms of The Raven’s Standard Progressive Matrices for using one sensory mode to measure gf. Cattel and Horn utilised the newly developed multisensory gf test to measure gf in two groups of racially and socially diverse children. The results indicated for Group A (Anglo-Saxon children from middle to upper socio-economic area) the two factors gf and gc correlated at about the same level ($r = .50$). In contrast, for Group B (African American children from a rural slum, with few incentives for academic achievement) the major determinant of academic performance was gf. The factor analysis findings support the theory of fluid and crystallised intelligence as independent factors and the validity of fluid intelligence in identifying innate abstract reasoning. Both fluid and crystallised intelligence, on a practical level, remain important factors of intelligence that facilitate the identification and understanding individual differences in innate and learnt intellectual abilities and aptitudes, respectively.

**B.2.1.2.2 EI: Theory of Social Intelligence**

The construct of EI can be theoretically traced to multifactorial models of intelligence, such as social intelligence. Salovey and Mayer (1990) seminally defined emotional intelligence as, “the subset of social intelligence that involves the ability to monitor one’s own and others’ feelings and emotions, to discriminate among them and to use this information to guide one’s thinking and actions” (pp. 189, Note: Italics in original). Edward L. Thorndike (1904) asserted that traditional tests only measured
abstract intelligence. Subsequently, Thorndike (1920b) checked the reliability and significance of verbal and non-verbal tests and found that each tested something different, and concluded that intelligence was multifactorial. In response to Thorndike’s assertion “that the mind possesses an infinite number of abilities all mutually independent”, Spearman (cited in Deary, Lawn, & Bartholomew, 2008, p. 124) maintained the validity of g, describing g as the “mind power” using an analogy of horsepower (Monroe, 1931, p.151-152, cited in Deary et al., 2008, p. 126). Therein, Thorndike (1920a) suggested three major types of intelligence: abstract intelligence, as measured by standard intelligence tests; mechanical intelligence, as the ability to visualise relationships among objects; and social intelligence, as the ability to function in interpersonal situations. Specifically, social intelligence was argued to be “the ability to understand and manage men and women, boys and girls—to act wisely in human relations” (E. L. Thorndike, 1920a, p. 228). Thorndike (1927) found some success in measuring the constructs in social intelligence, however the task remained challenging.

Robert Thorndike and Stein (1937) reviewed the major measures of social intelligence used in the 1930s. They concluded the “ability to deal with people” was not satisfactorily measured, due to a dependence on verbal skills and the overlapping of social and abstract intelligence tests. For example, they found the George Washington Social Intelligence Test correlated with abstract intelligence tests rather than social intelligence. Consequently, Thorndike and Stein (1937) suggested research should focus on “getting closer to the social reaction and further from words” (p. 284). Since this research, social intelligence has focused on verbal and non-verbal communication and has influenced psychology and education. Therein, Thorndike and Stein’s research influenced theoretical models of EI, which have sought to focus on social/emotional models and test (Mayer, 1999, 2001).

Louis Thurstone (1924a) proposed that g was a statistical artefact, and used factor analysis to investigate latent constructs within observed intelligent behaviour. Thurstone (1938) also proposed a number of independent factors were included in intelligence. Therein, Thurstone presented the Primary Mental Abilities, which included: word fluency, verbal comprehension, spatial visualisation, number facility, associative memory, reasoning, and perceptual speed (Cunningham & Radford, 1938). Individuals
with similar IQ scores often had different primary abilities, making his factors useful for clinical practice. However, Thurstone (1958) later found that the factors were not completely independent, so identified a general factor. This model formed the basis of future research into hierarchical (Carroll, 1993) and multiple intelligence theories (H. Gardner, 1993a, 2006; Sternberg, 1988).

Cronbach (1960) reviewed the research on social intelligence and concluded that it remained largely immeasurable and ill defined. For example, The Six Factor Tests of Social Intelligence, developed by O’Sullivan, Guilford and deMille (1965) had limited reliability and validity. During the late 1970s and 1980s, interest in social intelligence became resurgent (Frijda, 1986; Izard, 1977; Oatley & Johnson-Laird, 1987; Salovey & Birnbaum, 1989; Sternberg, 1985). Mayer and Salovey (1993) acknowledged the development of social intelligence as being theoretically formative to the construct of EI. Further, Mayer and Salovey suggested it was possible that EI may have a higher psychometric discriminatory validity than that of social intelligence, when compared to general intelligence. Therefore, Edward Thorndike’s seminal concept of social intelligence has been subject to debate and central to the development of contemporary theories of EI (Bar-On, 1997a, 2006; Brackett, Rivers, & Shiffman, 2006; Caruso, 2004; Mayer, Caruso, et al., 1999; Mayer, Salovey, et al., 2000c). Subsequently, Wechsler proposed that combining cognitive and non-cognitive factors in intelligence tests could be an important, but overlooked approach, which warranted discussion.

**B.2.1.2.3 EI: Theory of Cognitive and Non-Cognitive Factors of Intelligence**

The psychologist, David Wechsler (1896–1981), developed intelligence tests for adults and children that included standard deviation. In The Psychometric Tradition: Developing the Wechsler Adult Intelligence Scale (1981), Wechsler published the Wechsler-Bellevue Intelligence Test, in 1939, and the Army–Wechsler Intelligence Test in 1942. He later developed the Wechsler Intelligence Scale for Children (WISC) (1949, 1991), the Wechsler Adult Intelligence Scale (WAIS) (1955) and the Wechsler Preschool and Primary Scale of Intelligence (WPPSI) (1967). Wechsler included performance and verbal test items in his assessment of IQ. Further, he used the standard deviation (SD) quotient instead of the mental age (MA) to chronological age (CA) ratio, to quantify an individual’s IQ. Wechsler found that factorial analysis of his tests seldom explained more
than 60–70% of the total extractable variance in intelligence. Therefore, Wechsler concluded that other factors affected test performance, including non-cognitive factors and personality traits, such as drive, motivation, persistence, and goal awareness.

Wechsler (1958) developed his concept of intelligent behaviour, with reference to the insight he gained into human behaviour from his interactions with mentally ill patients. He found that some patients, with average or above average IQ were strongly influenced by their emotions, which impacted on their intellectual function and behaviour. Hence, patients’ emotions could have a positive effect on their behaviour, for instance by heightening their attention, determination, and adaptability. Alternatively, patients’ emotions could have a negative effect on their behaviour, for example, by impairing their ability to access their intellectual skills, rendering social interactions challenging and reducing their adaptability. Therefore, Wechsler (1943) asserted that intelligence was one aspect of behaviour that could be impacted upon by one’s emotions. “To be rated intelligent, behaviour must not only be rational and purposeful; it must not only have meaning but it must also have value, it must be esteemed” (Wechsler, 1950a, p. 136). Wechsler’s observations have subsequently been supported with MRI research, (Dolcos, Iordan, & Dolcos, 2011; Dolcos & McCarthy, 2006), which confirmed the significant role of emotions on cognitive processing. Therein, Wechsler’s theory of intelligence and his clinical experience of how other non-intellectual factors, such as emotions, could influence individual’s’ cognition and direct their behaviour to be rated as intelligent or unintelligent, was formative to the theoretical conceptualisation of EI as asserted by Salovey and Mayer (1990) and Mayer, Caruso, et al. (1999).

**B.2.1.2.4 EI: Theory of Multiple Intelligences**

Gardner (1993b) drew upon earlier theoretical multifactorial models of intelligence (Guilford, 1967; Thurstone, 1938) to develop his theory of multiple intelligences. Gardner (1993b) proposed a multifactorial model of intelligence incorporating both cognitive and non-cognitive factors: “I have concluded that human beings are best described as having a number of relatively autonomous intellectual capacities or potentials, which I call multiple intelligences” (H. Gardner, 2003, p. 46). Gardner asserted that standard general intelligence tests probed only linguistic and logical-mathematical intelligences, with some using spatial intelligence. Gardner initially
listed seven different kinds of intelligence in his model. However, Gardner subsequently expanded his model to include nine intelligences entitled: (1) linguistic, (2) musical, (3) logical-mathematical, (4) spatial, (5) bodily kinaesthetic, (6) naturalist, (7) existential, (8) interpersonal, and (9) intrapersonal (H. Gardner, 1993a, 1993b, 1999).

Gardner’s model was criticised for lacking correlational evidence in relation to other intelligences (Waterhouse, 2006). In response, Gardner (2003) argued that the correlations in his model were yet to be determined. Visser, Ashton and Vernon (2006a) investigated Gardner’s intelligence domains and indicated a large ‘g’ factor for the linguistic, logical-mathematical, spatial, naturalistic, and interpersonal domains. Visser et al (2006a; 2006b) asserted that the model showed statistically significant variance between domains. In response to this criticism, Gardner (2006) reiterated that the Multiple Intelligence Theory aimed to broaden definitions of intelligence and determine whether individuals could complete intelligent roles relevant to their culture.

Gardner’s intrapersonal intelligence has been referred to as a component of multiple intelligence, which has historically and theoretically been formative to the development of the EI model presented by Mayer and Salovey (1993). Intrapersonal intelligence is argued to be the ability to understand one’s own “feeling life–one’s range of affects or emotions: the capacity instantly to effect discriminations among these feelings and, eventually, to label them, to enmesh them in symbolic codes, to draw upon them as a means of understanding and guiding one’s behaviour” (H. Gardner, 1993a). Whereas interpersonal intelligence refers to understanding other people in social situations and acting accordingly (H. Gardner, 1993b). Gardner’s model of multiple intelligence, particularly intrapersonal intelligence and interpersonal intelligence has been theoretically linked to both trait and ability models of EI (Bar-On, 1997a; Bar-On, Brown, Kirkcaldy, & Thome, 2000; Goleman, 1995; Mayer & Salovey, 1993).

**B.2.1.2.5 EI: The Triarchic Theory of Human Intelligence**

Sternberg (1985) developed his conceptualisation in *The Triarchic Theory of Human Intelligence* (1988) and *The Theory of Successful Intelligence* (Sternberg, 1997, 2003). Sternberg made a theoretical shifted from defining intelligence as purely cognitive functioning, to an adaptive interaction of intelligence in socio-cultural environments. The model has drawn criticism from traditional theorists who maintain that intelligence is a
single factor $g$ (Gottfredson, 2003). Sternberg defined “successful intelligence” as the “ability to achieve success in life in terms of one’s personal standards, within one’s social context” (2003, pp. 55-56).

Sternberg’s model (2003) asserts that successfully intelligent people determine their strengths and adapt by shaping the environment to suit. Success is attained through analytical, creative, or practical intelligences. Analytical intelligence is the ability to analyse, evaluate, judge, compare, and contrast. Creative intelligence is the ability to create, invent, discover, explore, and suppose. Sternberg et al. (2000) explained practical intelligence is the ability to adaptively apply, use, put into practice, and to implement based on one’s experiences to attain goals. Typically, other people are present, so verbal and non-verbal social skills are important (Sternberg, Lautrey, & Lubart, 2003, p. 65). Underlying these abilities are metacomponents, such as the executive processes to plan, monitor and evaluate performance and knowledge acquisition components, which are encompassed in learning how to solve problems (Sternberg, 1985). The concept of tacit knowledge is a hallmark of practical intelligence (Wagner, 1987). Tacit knowledge is defined as “what needs to be known to work effectively in an environment that has not been explicitly taught or even verbalised” (Sternberg et al., 2003, p. 65). It allows effective functioning in an environment (Neisser, 1976; Sternberg et al., 2000; Wagner, 1987).

Wagner (1987) identified the three contents of tacit knowledge, managing self, others, and tasks, within a local or global context. Wagner assessed tacit knowledge by using 12 simulated work-related situations or challenges, which were ranked according to the most tactical course of action. Reliable differences in tacit knowledge were found in groups with different levels of professional advancement. An analysis confirmed that the model explained shared variance in terms of a single general factor of tacit knowledge. Consequently, the initial studies indicated practical intelligence included general aptitudes, acquired knowledge, and tacit knowledge. Practical intelligence has particular relevance for EI because it incorporates elements of using cognition and emotions within social environments. Elements of successful intelligence have been expressed in Maslow’s *Theory of Human Motivation* (1943); in Vygotsky’s emphasis on the
interaction of intelligence with socio-cultural factors (1929); and in the theoretical model of EI developed by Mayer and Salovey (1993, 1997).

In conclusion, the multifactorial theories of intelligence outlined are historically linked to the theoretical development of EI models (Goleman, 1995; Mayer & Geher, 1996; Payne, 1985; Petrides & Furnham, 2001). In particular, Wechsler’s (1943) theory of general intelligence, which asserted the additional role of non-intellective factors such as emotions in intelligent behaviour, underpins the theoretical framework of EI (Salovey & Mayer, 1990). Three theoretical models of EI are now analysed, which for the purpose of the current study are entitled the psychodynamic model of EI, the ability model of EI and the trait model of EI.
APPENDIX C
Part Two: EI Theoretical Models and Measures

C.2.2.1 EI: Three Theoretical Models
In order to review this wide range of research, the literature review in the current study refers to three theoretical EI models, which are entitled the Psychodynamic Models of EI, the Ability Models of EI and the Trait Models of EI. Therein, Section 2.3 reviews the theoretical models of EI from three perspectives, as follows:

2.3.1 Psychodynamic Model of EI
2.3.2 Ability Model of EI
2.3.3 Trait Model of EI

As the body of research in the field of EI has become so extensive, it was not practical to review all the formative research that has influenced the theoretical development of EI models and measures to date. Therefore, a representative overview rather than exact list, of the seminal, empirical or key publications, which have made a formative contribution to the development of EI theories, models and measures, are presented chronologically in Table C.1.

In Table C.1 the contemporary psychometric models EI are classified into two theoretical models of EI, entitled the ability model of EI and the trait model of EI (Petrides & Furnham, 2000b). The EI literature has encompassed terminology associated to theoretical frameworks, which have referred to EI models that are not based on the ability model of EI (Salovey & Mayer, 1990) as: trait models of EI (Petrides & Furnham, 2000b); mixed models of EI (Mayer, Roberts, et al., 2008); or competency models of EI (Boyatzis, Goleman, & Rhee, 2000); therein, the efficacy of each conceptual and theoretical perspective of EI remains acknowledged and subject to academic debate (Matthews, Roberts, et al., 2004). For instance, Petrides and Furnham (2000b) considered the theoretical distinction between the trait and ability EI models as a natural progression in the field of EI research. Conversely, Mayer, Salovey, et al. (2008) expressed theoretical and psychometric concerns about the validity of EI mixed models. While Boyatzis et al. (2000) suggest the clustering of competencies in EI provides the most effective insights into the utilisation of EI in a variety of settings, such as the workplace. Each of these theoretical perspectives will be subsequently acknowledged and discussed
within this literature review. However, by acknowledging each of the three theoretical perspectives outlined and it is possible that all three terms could be utilised to refer to one research publication in Table C.1; which would be confusing. Therefore, in this study one term will be selected to refer to research encompassed in the trait, mixed and competence models of EI.

The reference to trait model of EI as outlined by Petrides and Furnham (2000b) has been widely acknowledged in the academic literature (Furnham & Petrides, 2003; Gugliandolo, Costa, Cuzzocrea, Larcan, & Petrides, 2015; Petrides, 2011) by a range of leading EI researchers including Saklofske, Austin (Austin et al., 2004; Di Fabio & Saklofske, 2014; Saklofske et al., 2003) and Tett (Tett & Fox, 2006; Tett et al., 2005). Therefore, in the current study the term “trait model of EI” is utilised as a general term that collectively encompasses reference to the three terms outlined (trait, mixed and competence), and which describe EI models that are not classified as ability models of EI (Boyatzis et al., 2000; Mayer, Roberts, et al., 2008; Petrides & Furnham, 2000b). Hence, the term trait model of EI encompassed trait, mixed and competence models of EI that are presented in Table C.1.
<table>
<thead>
<tr>
<th>Year</th>
<th>Author</th>
<th>Reference</th>
<th>Model</th>
<th>Measure</th>
<th>Title/Brief Description of Main Point</th>
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<tbody>
<tr>
<td>1953</td>
<td>Van Ghent</td>
<td>Novel</td>
<td>Fictional</td>
<td>Reference</td>
<td>The fictional author Dorothy Van Ghent wrote <em>The English Novel: Form and Function</em>. In the novel Jane Austin’s character was described as displaying “emotional intelligence”. Reference to emotional intelligence was made three times in the novel (pages 103, 106 and 107).</td>
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<tr>
<td>1966</td>
<td>Leuner</td>
<td>Journal</td>
<td>Psychodynamic</td>
<td></td>
<td><em>Emotional Intelligence and Emancipation: A Psychodynamic Study of Women</em> in Praxis der Kinderpsychologie und Kinderpsychiatrie, 15 (Aug.-Sept.), p.193-203. Dr Barbra Leuner presented a seminal psychodynamic conceptual model of EI with reference to human development from infancy to adulthood. The development of EI was outlined with reference to the infant’s development within relationships with their family and broader social groups in society. The psychodynamic model of EI refers to research by Spitz, Klein, Sartre, Camus, Hegel, Erikson, Beauvoir and Freud.</td>
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<tr>
<td>Year</td>
<td>Author(s)</td>
<td>Type</td>
<td>Perspective</td>
<td>Text</td>
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<tr>
<td>1987</td>
<td>Beasley</td>
<td>Magazine Article</td>
<td>Trait</td>
<td>Registered a copyright on his thesis in 1986. In the <em>Mensa Magazine</em> Keith Beasley, a philosopher wrote an article entitled, “The Emotional quotient: Is our EQ–Emotional Quotient–more important than our IQ?” Therein, Beasley published the term EQ. He simple defined EQ as one’s “ability to feel”, and defined IQ one’s “ability to think”. Beasley acknowledged that he was not an academic or teacher; however, he considered EQ an important factor from a philosophical perspective.</td>
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<tr>
<td>1988</td>
<td>Bar-On</td>
<td>Unpublished Thesis</td>
<td>Trait</td>
<td>The doctoral thesis by Bar-On was entitled, <em>The Development of a Concept of Psychological Well-being</em> and was reported to have seminally included the term “Emotional Quotient” (EQ). The thesis was accepted at Rhodes University, South Africa, however, the author was not able to obtain a copy of the thesis in order to review the primary source.</td>
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<tr>
<td>1989</td>
<td>Greenspan</td>
<td>Chapter</td>
<td>Psychodynamic</td>
<td>Greenspan presented Chapter 9, which was entitled, “Emotional Intelligence” in <em>Learning and Education: Psychoanalytic Perspectives, Emotions and Behavior: Monographs</em> (Monograph No.6). Greenspan provided a psychodynamic analysis of EI. Greenspan also outlined a theoretical model of EI with reference to the development of both emotion and cognition. The role of EI in human development, learning, and academic achievement was also discussed.</td>
<td></td>
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<tr>
<td>1990</td>
<td>Mayer, DiPaolo &amp;</td>
<td>Journal</td>
<td>Ability ✔️</td>
<td>The first journal article conceptualising EI from a psychometric perspective was entitled, “Perceiving Affective Content in Ambiguous Visual Stimuli: A Component of Emotional Intelligence” in the <em>Journal of Personality Assessment</em> by Mayer, DiPaolo and Salovey. “The Emotional Perception Questionnaire” was also introduced and seminally psychometrically measured one component of EI. Test was developed with two parts. Part One: Visual perception</td>
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of emotion in multiple stimuli, which included (a) Emotional
Consensus Across Faces, (b) Colours, and (c) Designs. Part
Two: Included three criterion measures (a) Scale of Empathy;
(b) Scale of Alexithymia; and the (c) Brief form of Eysenck
Personality Inventory including neuroticism and extraversion.

<table>
<thead>
<tr>
<th>Year</th>
<th>Authors</th>
<th>Source</th>
<th>Type</th>
<th>Sub-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>Salovey &amp; Mayer</td>
<td>Journal</td>
<td>Ability</td>
<td></td>
<td>Second seminal journal article entitled, Emotional Intelligence in the journal Imagination, Cognition and Personality. Seminal article provided a psychometrical model of EI. A clear operational definition and theoretically framework to support the conceptualisation of EI.</td>
</tr>
<tr>
<td>1995</td>
<td>Salovey, Mayer, Goldman, Turvey &amp; Palfai</td>
<td>Chapter</td>
<td>Ability</td>
<td>✓</td>
<td>Emotional Attention, Clarity, and Repair: Exploring Emotional Intelligence Using the Trait Meta-Mood Scale. The development of the Trait Meta-Mood Scale (TMMS), based on a factor analysis three components of emotional intelligence were identified: Attention to Feelings, Clarity in Discrimination of Feelings, and Mood Repair.</td>
</tr>
<tr>
<td>1995</td>
<td>Goleman</td>
<td>Book</td>
<td>Trait</td>
<td></td>
<td>Emotional Intelligence: Why it can matter more than IQ by Daniel Goleman attained worldwide sales and stimulated international debate regarding the conceptualisation and validity of EI.</td>
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</tbody>
</table>

1988 Schutte, Malouff, Hall, Haggerty, Cooper, Golden, Dornheim Journal Trait ✓ Development and Validation of a Measure of Emotional Intelligence. Based on the EI model by Salovey and Mayer 1990, (N =360) 62 items represented elements of EI. A factor analysis confirmed 33 items had internal consistency. A common general emotional intelligence factor was identified. The factors loaded onto the model presented by Salovey and Mayer in 1990. The 33-item scale correlated with other psychological constructs such as alexithymia, predicted college grades, higher scores for therapists than for clients or prisoners, higher for females, not related to cognitive skills, were associated to personality. This EI scale was subsequently referred to as the Self-Report Emotional Intelligence Test (SREIT) (Brackett & Mayer, 2003) or the Assessing Emotions Scale (Schutte et al., 2001).

1999 Mayer, Caruso & Salovey Journal Ability ✓ Emotional Intelligence Meets Traditional Standards for an Intelligence. Multi-Branch Emotional Intelligence Scale (MEIS), utilised to provide evidence that was asserted to confirm EI met standards required to be classified as a “traditional intelligence”.


2000 Boyatzis, Goleman & Rhee Chapter Trait ✓ Clustering competence in emotional intelligence: Insights from the Emotional Competence Inventory (IEC). The Emotional Competency Inventory (ECI) and assessment of EI based on Goleman’s Model (Goleman, 1995). ECI V1.0 encompassed the dimensions entitled: Emotional Self-Awareness, Accurate Self-Awareness, Self-Confidence, Self-Control, Trustworthiness, Conscientiousness, Adaptability, Achievement Orientation, Initiative, Empathy, Organizational Awareness, Developing
<table>
<thead>
<tr>
<th>Year</th>
<th>Authors</th>
<th>Journal</th>
<th>Type</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>Mayer, Caruso, Salovey, Formica &amp; Woolery</td>
<td>Ability</td>
<td>Multi-Branch Emotional Intelligence Scale (MEIS) correlation with 16 PF subscales in college students (N=186). Positive correlations with Reasoning ( r = .19 ), Sensitivity ( r = .22 ), Vigilance ( r = .17 ), Openness to Change ( r = .14 ), and Self-Reliance ( r = .21 ).</td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>Petrides &amp; Furnham</td>
<td>Trait and Ability</td>
<td>On The Dimensional Structure of Emotional Intelligence. The psychometric properties of EI measured by Schutte (1998) using the SREIT were examined with a confirmatory factor analysis. The results indicated the test did not have a unifactorial element of EI. In addition, confirmatory factor analysis results did not load onto the EI model developed by Salovey and Mayer (1990). Therefore, Petrides theorised that the Self-Report EI test by Schutte and colleagues (1998) was more effectively classified as a Trait model of EI that was more strongly associated with the field of personality. Whereas, the ability model of EI developed by Salovey and Mayer (1990) was more strongly associated with human mental ability.</td>
<td></td>
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<tr>
<td>2000</td>
<td>Martinez-Pons</td>
<td>Trait</td>
<td>✓ Emotional Intelligence Self-Regulation Scale.</td>
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</tr>
<tr>
<td>2000</td>
<td>Petrides, Furnham &amp; Mavroveli</td>
<td>Trait</td>
<td>✓ Trait Emotional Intelligence Model and Questionnaire (TEIQue). Factor analyses formally differentiated the theoretical differences between the Trait and Ability EI Models.</td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>Stough &amp; Palmer</td>
<td>Trait</td>
<td>✓ SUEIT: Swinburne University Emotional Intelligence Test.</td>
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<td>Examining the Relationship Between Leadership and Emotional Intelligence in Senior Level Managers. The relationship between EI as measured by the SUEIT and leadership styles was examined. The findings confirmed the SUEIT was predictive of transformational, transactional and laissez-faire leadership styles.</td>
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2002 Mayer, Salovey & Caruso, Test Manual: Ability, Mayer-Salovey-Caruso Emotional Intelligence Test V2.0 (MSCEIT); published the MSCEIT Version 2.0 user's manual.


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<td>The correlation between EI and gray matter volume in university students. Findings confirm neural correlates of the EI model Schutte Self-Report Emotional Intelligence Scale (SSREIS).</td>
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<td>Mayer–Salovey–Caruso Emotional Intelligence Test (MSCEIT), the Multi-Branch Emotional Intelligence Scale (MEIS) and overall, verbal, and non-verbal intelligence: Meta-analytic evidence and critical contingencies.</td>
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<td>Ability</td>
<td><em>What Is the Ability Emotional Intelligence Test (MSCEIT) Good For? An Evaluation Using Item Response Theory.</em> Found the MSCEIT V2.0 more effectively discriminates individuals in the lower end of the EI measure. In contrast, MSCEIT V2.0 is less effective in discriminating between individuals in the average to high end of the measure.</td>
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C.2.2.2 Psychodynamic Model of EI

As previously outlined in Chapter One, the psychological origins and seminal reference to the term “emotional intelligence” in the academic literature, was traced to Barbara Leuner in 1966.

C.2.2.2.1 Leuner, Barbara

Leuner (1966) published a journal article written in German entitled, “Emotionale Intelligenz und Emanzipation. Eine Psychodynamische Studie Uber die Frau [Emotional Intelligence and Emancipation. A Psychodynamic Study of Women]”. Therein, Leuner (1966) seminally asserted the importance of EI from a psychodynamic developmental perspective and noted the formative nature of both EI and abstract reasoning to an individual’s psychological wellbeing, cognition, and optimal development, which was referred to as “emancipated development”.

The development of EI was understood by Leuner (1966) within the context of formative relationship between the mother, father and the child, referred to as the family. The relationship between the mother and child was formative to the development of EI in the child. For example, Leuner (1966) noted the infants’ attachment with their mother was essential to their emotional development; contributing to the infant’s disrupted or undisrupted emotional development that was formative to their EI. Leuner (1966) noted that the fostering and differentiation of EI was the fundamental function of the family as they lived within their community, which was nested within the wider social structure of their state or country:

The family facilitates the individual moulding [sic] of the human being, the individual formation of standards–within the framework of the superordinate powers, such as the state and the church–to which the father and the mother are obligated. The role of the family lies in negotiating the gap between experiencing individual differences as a natural phenomenon to be embraced–not only emotionally but also in an abstract sense–and the demands of the well adapted group that can only be fulfilled through the ability of human beings to assimilate and fit in. (Leuner, 1966, p. 196)
Therein, Leuner (1966) noted the importance of developing an individual’s EI to meet both their internal psychodynamic needs and to support their adaptive and assimilative behaviour to fit in and effectively function within the context of a wider social group. Hence, to develop a child’s EI there needs to be a balance between: (a) being able to express and satisfy their own individual emotional drives; while (b) also learning to delay their gratification and to regulate their emotions, in order to effectively adapt and assimilate with the group in order to enable the attainment of the group’s goals. Therein, Leuner (1966) asserted the individual’s growth in EI was contextualised within their stage of human development and further differentiated by their experiences in relationships within their family and social groups.

Leuner (1966) explained the infant's EI was formatively developed and differentiated within the context of their primary formative relationships; such as with their mother and father, in their family group. When explaining the disrupted and nondisrupted development of EI in children Leuner made reference to research by Spitz (1949), who investigated the growth of infants who were placed in nurseries or orphanages and therefore had disrupted contact with their mothers. For example, it was typical that one nurse was looking after ten babies, who were in the preverbal phase. The emotional deprivation experienced in infancy led to a lack of emotional integration in the children (Spitz, 1949). Consequently, the babies displayed physical defence mechanisms to their emotional deprivation, which included loss of appetite, diarrhea, cachexia and at times death (Spitz, 1949). Similar child and infant developmental reactions to an inadequate emotional relationship with a mothering figure were also confirmed by Reichelderfer and Rockland (1963). Bowlby (1982) also concluded that maternal deprivation during the early years of childhood had ill effects on the development of the child, as theoretically framed in the attachment theory. Hence, Leuner (1966) proposed infants' "preverbally disrupted or undisrupted emotionality" was formative to the development of their EI, which developed within the context of their primary relationships, i.e. that of the child and mother.

Leuner (1966) also explained EI developed within the family, which was in turn subject to the social and emotional norms outlined by larger social organisations or groups that formed their society. Hence, the mother and father were required to adapt and
assimilate to the rules of social organisations, such as the state government that
delineated the laws of the society. Therein, as described by Leuner (1966) the theoretical
model of how EI developed encompassed the interaction between the individual and
society, which was partially reflective of the ecological model of human development by

Leuner (1966) also outlined the importance of developing both EI and abstract
intelligence to optimise human development and potentially reach emancipated
development. Leuner (1966) concluded that it was not possible to reach emancipated
development by only developing EI or abstract intelligence. Moreover, developing both
abstract intelligence and EI was considered to be essential to enable an individual to
reach the stage of emancipated development. More recently, Gemelli (2013) who is a
psychiatrist, suggested an adolescent who has attained emancipated development, has
developed self-autonomy, a realistic self-image, a stable identity and a sense of continuity
between their past experiences and current wishes, goals and beliefs. Therein, the
formative nature of both emotions and cognition to underlie adolescent emancipated
development (Gemelli, 2013), as previously theorised by Leuner (1966), remains
theoretically relevant to adolescent development.

Finally, a review of Leuner’s psychodynamic model of emotional intelligence was
conducted by Mayer, Salovey, Caruso, and Cherkasskiy (2011). The review asserted: “In
a prefeminist German article on motherhood, the author speculated that women might
reject their roles as housewives and mothers due to a lack of emotional intelligence…”
(Mayer et al., 2011, p. 528). However, this review seems to over-simplify the seminal EI
research presented by Leuner, who conceptualised the construct of EI as developing from
infancy and throughout the human lifespan.

C.2.2.2.1.2 Payne, Wayne

Subsequently, Payne (1985) published his PhD thesis entitled A Study of Emotion:
Developing Emotional Intelligence; Self-Integration; Relating to Fear, Pain and Desire.
Payne was a psychotherapist and presented his thesis to illustrate a philosophical and
theoretical framework of EI, encompassing how EI developed and the significant
function and role of EI in self-actualisation. Therein, Payne suggested emotions could be
understood with reference to one’s inner experiences and outer expressions of emotions,
which provided a natural and valued system of emotional information that was essential
to the development of one’s emotional intelligence. He also asserted the importance of EI
to an individual’s psychological wellbeing, cognition and education.

Payne (1985) asserted that while the Western education system acknowledged the
role of cognition in learning; in contrast, the role of emotions in learning and the
educational process was largely ignored, misunderstood or overlooked. He deduced that
Stoicism and traditional Christian ideology, which strongly influenced the establishment
of the Western education system, typically considered emotions to be disruptive to
cognition or rational thought and therefore, behaviour. The presumption that emotions
disrupted rational thought, led to the widespread desire to suppress or control one’s
emotion, in order to think more rationally and become more knowledgeable. Further, as
emotions were presumed to limit one’s rationality, there was little need to develop the
language and skills for understanding, describing or utilising one’s emotional
information. However, Payne (1985) suggested the traditional presumption that emotions
were not to be trusted and should be discarded, controlled or suppressed, provided a
distorted view of human nature. In addition, Payne proposed that the unnecessary strain
driven by the need to suppress one’s emotions in order to assimilate with social norms
could lead to excessive stress, which in turn could lead to mental health problems, such
as anxiety and depression. Therefore, Payne (1985) recommended that EI be included in
the school curriculum. He proposed the EI should be taught in schools due to the essential
role of EI in human development, wellbeing, learning and behaviour. Payne defined EI as
follows:

To begin with, EI has all the characteristics we attribute to the basic
concept of intelligence, pages 158-161[sic]. However, the facts, meanings,
truths, relationships, etc., are those that exist in the realm of emotion.
Thus, feelings are facts - - as concrete in the realm of emotion as words
and numbers are in the realm of the intellect. The meanings are felt [sic]
meanings; the truths are emotional truths; the relationships are
interpersonal relationships. And the problems we solve are emotional
problems, that is, problems in the way we feel. (Payne, 1985, p. 165)
Payne (1985) largely discarded the theories of Freud and Jung, suggesting they provided little insight into the nature of EI. Instead, Payne created a new paradigm for discussing personality changes arising from the development of EI. Payne formed a framework consisting of the physical, emotional, intellectual, and visual realms, viewed from an inner and outer perspective. Payne (1985) asserted that consciousness could also be understood in relation to emotional problem solving, particularly emotional awareness, memory, imagination, and intelligence. Emotions could also be: (a) adaptive and organising; and/or (b) maladaptive and disorganising; therein, emotions impacting the perception of life and providing motivation to direct one’s actions or behaviours (Payne, 1985, p. xi). In addition, Payne (1985) presented “The Holographic Theory of Emotions”, which provided a theoretical framework to conceptualise EI.

The Holographic Theory of Emotions initially outlined the stimulating event for an emotion, the evaluation of the emotion, and the individual’s response, which integrated the constructs of emotion with cognition, meta-emotional analysis, and a further cognitive analysis. Emotion was considered problematic when an individual’s growth and development was obstructed by their emotions and they were unable to find a way out of their emotional problem. Payne proposed that the normative and chronic suppression of emotion “presenting an image to the world that is different from what one is experiencing” (Payne, 1985, p. 293) was a major problem in Western society that warranted further attention. Payne (1985) suggested that defining and identifying the emotional problem with the theoretical framework of EI was essential for human development, as the solution normally lay in the emotional problem. Payne’s EI theoretical framework and concepts were underpinned by Eastern yoga, philosophy, psychoanalysis, physiology, historical principles, and personal experience as a therapist.

Payne (1985) aimed to provide a psychodynamic theoretical model of EI in his thesis to guide individuals to learn how to relate to their emotions intelligently; hence, to use their emotions intelligently to effectively solve rather than create problems. Becoming emotionally intelligent encompassed a process of “self-integration”. The process of self-integration encompassed the growth and change precipitated by combining inner and outer emotional experiences together into a whole. The subsequent integration of one’s emotions and cognition was required in the process that led to self-
actualisation. The theoretical model of EI presented by Payne encompassed emotional self-awareness, processing emotional information cognitively, integrating emotional knowledge, and regulating or managing emotions to promote the development of one’s EI. In 1999 Mayer, Caruso and Salovey cited Payne’s (1985) thesis by noting that, “Although emotions often have been regarded with respect in the West, there also exists a widespread negative view of people who think emotionally (Payne, 1986)” (Mayer, Caruso, et al., 1999, p. 295). Nonetheless, elements of Payne’s (1985) theoretical EI model and some of the EI traits he outlined are evident in the contemporary EI theories (Bar-On, 1997b; Mayer & Salovey, 1997; Oatley, 2004; Salovey, 1999). Four years after Payne’s EI thesis was published, Greenspan (1989) also published a chapter on EI that also noted the importance of EI in relation to human development, wellbeing, learning and education.

C.2.2.1.3 Greenspan, Stanley

Greenspan (1989) published chapter nine entitled Emotional Intelligence in Learning and Education: Psychoanalytic Perspectives; Emotions and Behavior Monographs: Monograph No. 6 (1989) wherein he also acknowledged that education primarily focused on developing students’ cognitive or intellectual development via focusing on the curriculum content to attain skills, such as learning to read, write and do arithmetic. Therein, Greenspan (1989) noted the Western traditional educational system and the learning process were historically conceptualised from an impersonal perspective and were largely devoid of developing students thinking intelligently about emotional tasks. Greenspan (1989) questioned how the educational system could negate the formative nature of emotions in the process of learning and achieve their aim to prepare students for the challenges of life? Particularly when the education system primarily focused on developing students’ cognitive thinking while paradoxically ignoring the importance of developing students’ emotional thinking or emotional intelligence in the process of learning.

Further, Greenspan (1979) in his book “Intelligence and Adaptation: An Integration of Psychoanalytic and Piagetian Developmental Psychology” outlined a unified model of intelligence. Whereby, Piaget’s cognitive developmental model was considered from a dynamic psychoanalysis perspective, which encompasses drive-related
emotional phenomena and relationships, suggesting that cognitive development and emotional development focus on differentiated stimulus. However, both have hierarchical developmental stages throughout the human lifespan. Further, an individual’s cognitive development and emotional development may differ in their level of maturation; with both systems synergistically influencing how a child processes information and therefore learns. Greenspan (1989) postulated that from a developmental perspective, the stages of cognitive and emotional development were not just maturational milestones, rather, they were “levels of learning open to change through experience”. The process of learning was delineated with reference to three organisational principles entitled: somatic learning, consequence learning and representational learning (Greenspan & Porges, 1984). Hence, the development of EI was understood hierarchically in light of: (a) somatic learning, which refers to the biological development of the individual as an organising principal of information in their environment; (b) consequential learning, which refers to the stimulus response learning as a result of behavioural consequences; and (c) representational-structural learning, which represents “higher-order” learning incorporating the formation of mental imagery and symbols (Greenspan, 1989). Accordingly, the structural level of cognitive development and affective development influences the student’s internal experiences, learning and behaviour:

From prenatal life and the early postnatal period, emotional, social, and “cognitive” learning must be viewed as occurring together. Programs must begin at the “beginning” to support all domains of “intelligence”. Therefore education cannot wait until school age. There must be an integration of our educational, health, and human development policies. An implication of this view for school-based education would be a shift from static to dynamic education. Children must be taught to reason in emotionally relevant contexts. (Greenspan, 1989, p. 239)

Greenspan concluded that learning was influenced by both cognitive intelligence and emotional intelligence. Based on that premise, educational provisions should consider a student’s affective and cognitive organisational levels and provide learning experiences that are developmentally targeted to optimise their growth and development.
Hence, despite the formative and seminal nature of the EI research provided by Leuner (1966), Payne (1985), and Greenspan (1989), their work has been widely acknowledged but infrequently reviewed in contemporary research. For instance, Mayer, Salovey, et al. (2000c) noted the use of the term emotional intelligence had been used for several decades, and research by Leuner (1966) and Greenspan (1989) that focused on Piaget’s work was considered noteworthy but unrelated to their current work. Further, the dissertation by Payne (1985) was assessed as making the most interesting contribution to EI research, as Payne provided a theoretical and philosophical framework to explore EI and asserted in his abstract “the mass suppression of emotion throughout the civilized world has stifled our growth emotionally” (Mayer, Salovey, et al., 2000c, p. 396).

In sum, the three psychodynamic models of EI that have been reviewed conceptualised EI as being formative to human development, wellbeing, learning and adaptive behaviour (Greenspan, 1989; Leuner, 1966; Payne, 1985). Further, the three psychodynamic models of EI did not make reference to each other (Greenspan, 1989; Leuner, 1966; Payne, 1985); therefore, each researcher appeared to develop their own EI model independently. Hence, it does not appear that these publications were widely referred to or acknowledged in the academic community. A range of possibilities may have partially contributed to their limited acknowledgement. For instance, it is possible that these three seminal EI research publications were not widely acknowledged due to the absence of EI psychometric models and assessments. Alternatively, the EI theories presented may have been dismissed by the wider academic community as implausible or irrelevant, due to the traditional view that intelligence was a cognitive process (Herrnstein & Murray, 1994), therefore emotions were of little consequence to intelligence. Nonetheless, the three EI psychodynamic models did address a range of common theoretical, conceptual and developmental questions (Greenspan, 1989; Leuner, 1966; Payne, 1985). The three psychometric models of EI considered: What is EI; How does EI develop; What is the relationship between EI and cognition, and vice-versa; Is EI a mental ability; What is the impact of high or low EI on human development; What important factors and outcomes is EI associated with, such as emancipated development, psychological wellbeing, physical health, learning and academic achievement; Can EI be developed, learned/taught; and should EI be incorporated in the school system? These
formative questions and concerns, which stem from research presented by Leuner (1966), Payne (1985), and Greenspan (1989), continue to be central to the development and growth of contemporary EI theories, models and research questions.

Since 1990, contemporary EI theories have primarily focused on the construct of EI based on the factor-analytic approach, which encompassed the development of operationalised theories and psychometric EI assessments. Following research presented by Petrides and Furnham (2000b), models of EI have been categorised into two groups, referred to as the ability model of EI and the trait model of EI. With reference to both ability and trait EI models, researchers and critiques have raised some common questions, which have subsequently directed the development of EI theoretical models and psychometric assessment. For example:

- Does the theoretical construct of EI, with reference to its definition, theoretical framework and assessment measures, meet adequate psychological and psychometric criteria to be considered a skill, trait or ability?
- Does the construct of EI meet the traditional standards and criteria to be classified as a traditional “intelligence”?
- What is the relationship between the definition, theoretical framework and measurement of EI and personality?
- How can EI be measured: Do self-report, expert or consensus scoring methodology meet psychometric standards, i.e. adequate levels of validity and reliability, to effectively measure EI?
- Does EI development throughout the lifespan; therein, does EI improve with age and experience?
- Does EI have a correlative or predictive relationship with outcomes that are recognised as significant factors in human development or function?
- Does EI predict academic achievement?

A review of contemporary EI research is now provided in light of these and other relevant questions. To commence the review, the historical and theoretical frameworks of the ability models of EI are now described and analysed.
C.2.2.3 Ability Model of EI

The ability model of EI primarily originated with the empirical theories, models and seminal research from Mayer, Salovey and Caruso, while also working with a range of their colleagues over the past 25 years. From the initial EI theory and psychometric measurement that was presented in 1990 an extensive body of research has since developed, which has continued to be extended and refined.

C.2.2.3.1 1990 Seminal Measurement of EI Component: Visual Perception of Emotion in Multiple Stimuli

In 1990, two landmark articles based on the psychometric model of EI were published. The first seminal article to be published by Mayer, DiPaolo, and Salovey (1990) was entitled *Perceiving the Affective Content in Ambiguous Visual Stimuli: A Component of Emotional Intelligence*. In the first article, EI was considered to “involve the accurate appraisal and expression of emotions in oneself and others and the regulation of emotion in a way that enhances living” (Mayer et al., 1990). Previous research studies attempted to design a psychometric measure to determine individuals’ “emotion-receiving ability”; however, researchers had a range of difficulties in developing a measure with adequate levels of reliability. These psychometric limitations were addressed with a focus on self-report assessments with a broader measurement of the participants’ responses and the inclusion of a wider range of emotional stimuli. The objective of the study was to investigate the measurement of one component of EI, the visual perception of emotional qualities of objects in the environment. “The ability to recognise emotional content of visual stimuli may be related to a variety of personality traits that have been identified with emotional intelligence (or lack thereof) – empathy, alexithymia, and neuroticism” (Mayer et al., 1990, p. 774).

Mayer et al. (1990) investigated a study sample that was composed of undergraduate students aged from 17 to 63 years (N = 139). The study examined two hypotheses: (1) The emotional perceptual system was not “preprogrammed to perceive affect only in stereotyped facial patterns, but can also evaluate the emotional content of novel colours and designs…” (Mayer et al., 1990, p. 775). Further, perceptual accuracy in one domain would be related to others. (2) “Second, it was hypothesised that such an ability would be related to several personality characteristics”. (Mayer et al., 1990, p.
Those who could accurately perceive emotion were anticipated to have more insight into their own emotions, while those who were emotionally expressive were anticipated to be more empathetic.

The Emotional Perception Questionnaire was based on self-report measures and classified into two parts:

- Part One: Encompassed six facial images (happiness, sadness, anger, fear, surprise and disgust); six colours to represent emotions (red, blue, green, yellow, black and white); and six abstract designs. They were rated using a five-point rating scale and consensual accuracy was used to score the ratings.

- Part Two: Encompassed three criterion measures. A measure of Empathy with a 33-item scale; Alexithymia with a four-factor scale consisting of 26 items; and Neuroticism and Extraversion with the Eysenck Personality Inventory-Brief Form.

The study results found the ability to perceive emotional information from faces, colours and abstract designs was related to empathy. These findings supported the notion that the ability to effectively identify emotions was required prior to one being empathetic. A relationship was found between an individual’s internal negative emotional perception and their external negative perception of emotion. Further, a generalised consensus in emotional perception was evident in the three stimuli (faces, colours and abstract designs):

In conclusion, these results suggest that aspects of emotional intelligence appear to be abilities, in the traditional sense, that can be measured through the use of tasks… The acknowledgement that qualities, such as empathy, involve well-defined skills, rather than only attitudes and sentiments, suggests that individuals with interpersonal difficulties might suffer, not from attitude problems, but from skill deficits that can be assessed and ameliorated. (Mayer et al., 1990, p. 779)

These seminal study results presented by Mayer, DiPaolo, and Salovey (1990) provided psychometric evidence that emotional perception as one component of EI could be operationalised and measured. Further, the identification of a generalised emotional
consensus identified in the perception of emotional content supported the assertion that visual emotional perception was ability or skill that could be developed. These findings were formative to the second article published by Salovey and Mayer entitled “Emotional Intelligence” (1990).

**C.2.2.3.2 1990 Theoretical EI Model**

In the second article, Salovey and Mayer (1990) published an operationalised EI concept and framework. Therein, EI was seminarily defined as, “a set of skills hypothesized to contribute to the accurate appraisal and expression of emotion in oneself and in others, the effective regulation of emotion in self and others, and the use of feelings to motivate, plan, and achieve in one’s life” (Salovey & Mayer, 1990, p. 185). As outlined in this definition of EI, emotion was a formative element in the conceptualisation of EI.

Salovey and Mayer illustrated historical concepts of emotions by Woodworth (1940) and Leeper (1948) that defined emotion and its nature, function and relationship with cognition as being a hindrance. Woodworth (1940) concurred with the dominant and traditional concept of emotions in psychology, which considered emotions to be irrational, disorganising and disruptive elements to thinking. Further, as emotions interfered with cognitively intelligent decision making and problem solving, it was deemed that emotions should be either controlled or ignored. In contrast, Leeper (1948) viewed emotions as integrating and organising information, of motivating attention and directing behaviours in humans:

…emotional processes of all sorts (except perhaps in rarely intense forms) are organising in their influence and should be studied as an aspect of motivation…Such a change of theory of emotion would have significant implications, not only for many theoretical problems in psychology, but also for much of our practical understanding of human nature. (Leeper, 1948, p. 21)

Reference to emotions as factors in the concept of EI articulated by Salovey and Mayer (1990), were understood based on the functional model of emotion. Therefore, emotions were informative, organising and motivated adaptive responses. An individual’s
emotions were usually stimulated by an internal or external event, which had a positive or negative meaning for the individual based on their goals. Moods and emotions were differentiated, with emotions being shorter and more intense than moods. Consequently, emotions were fundamental to organising adaptive behaviours, which had the potential to lead to enrichment of one’s personal and social experiences.

Mayer et al. (1990) suggested EI was a construct that met the traditional definition of intelligence. This assertion was based on Wechsler’s concept and definition of intelligence as “the aggregate or global ability of the individual to act purposefully, to think rationally, and to deal effectively with his environment” (Salovey & Mayer, 1990, p. 186). Models of intelligence were acknowledged as both unidimensional and multidimensional. Salovey and Mayer (1990) noted that EI would not fit into the models of intelligence presented by: (1) Terman (1916), which considered abstract reasoning as intelligence; or (2) the unidimensional model of intelligence by Spearman (1904), which asserted that there was a common general factor “g” in intelligence, as it was theorised all mental abilities were intercorrelated. However, the model of social intelligence was conceptually linked and theoretically compatible with the model of EI as a recognised intelligence.

Furthermore, E. L. Thorndike’s (1920a) defined social intelligence as “the ability to understand men and women, boys and girls–to act wisely in human relations”. Salovey and Mayer (1990) suggested that the model of social intelligence previously developed by E. L. Thorndike (1920a) and their model of EI shared some commonalities. For example, both social intelligence and EI included similar concepts such as the ability to perceive one’s own and others’ internal states, motivations, and behaviours, then to use that information to direct future actions. Salovey and Mayer’s review of social intelligence theories concluded by noting that social intelligence was formative in the development of EI. “We define emotional intelligence as the subset of social intelligence that involves the ability to monitor one’s own and others’ feelings and emotions, to discriminate among them and to use this information to guide one’s thinking and actions” (Salovey & Mayer, 1990, p. 189). Further, Salovey and Mayer (1990) explained the conceptualisation of EI was also theoretically drawn from Gardner’s (1993a) concept of personal intelligence, encompassing both interpersonal and intrapersonal intelligence.
Based on this outlined theoretical history, Salovey and Mayer (1990) presented a seminal theoretical framework for the conceptualisation of EI. The conceptualisation of EI was operationalised into three components: (a) the appraisal and expression of emotion emotions; (b) the regulation of emotion; and c) the utilisation of emotion. The three components of EI were further operationalised as follows:

- **Appraisal and Expression of Emotion:**
  - self: verbal and non-verbal
  - other: non-verbal perception and empathy

- **Regulation of Emotion:**
  - in self
  - in other

- **Utilisation of Emotion:**
  - flexible planning
  - creative thinking
  - redirected attention
  - motivation.

Hence, Salovey and Mayer (1990) presented a seminal model of EI that reconceptualised and integrated a holistic conceptualisation of emotions and cognition, and the contribution of emotionality to personality. The EI model was presented as outlining emotional processes that were both common to everyone, while also acknowledging the individual differences in EI abilities or skills; for instance, individual differences in the ability to understand and express emotions. The EI model was also based on the premise that the underlying EI skills could be learned. Therefore, EI was purported to be a useful construct that may support processes to optimise mental health. A person with high EI was considered to be aware of their own and others’ feelings, open to positive and negative aspects of internal experience, and express emotion when appropriate. An emotionally intelligent person was anticipated to be able to regulate affect in themselves and others, to optimise wellbeing, growth and goal attainment. However, deficits in EI were anticipated to lead to adjustment problems, stemming from limited emotional identification, regulation and management.
Hence, by developing an operationalised model of EI, Salovey and Mayer provided an EI model that had the conceptual framework to support future psychometric measurement and research in the field of EI. Further, the methodological adjustments made to the design of The Emotional Perception Questionnaire by Mayer et al. (1990) included: (1) an increased range of emotional variables in the measure; and (2) a wider scope of possible responses for the participants’ answers. Following these adjustments to the test, The Emotional Perception Questionnaire (Mayer et al., 1990) results provided evidence that confirmed the reliability and validity of the EI assessment. Therefore, the operationalised EI theoretical framework and model (Salovey & Mayer, 1990) had the potential to support the future development of psychometric EI measures, which encompassed the total EI score and multiple components of EI: (a) of emotional appraisal and expression; (b) emotional regulation; and (c) emotional utilisation in one’s own and others’ development, processing and behaviour. Hence, the psychometric measurement of one component of EI (Salovey & Mayer, 1990) and the operationalised definition and theoretical framework in the EI model (Mayer et al., 1990), collectively provided the basis for future theoretical development and psychometric assessments in the field of EI.

Davies et al. (1998) analysed EI based upon Mayer and Salovey’s 1990 model in first year university students (N = 100) ranging in age from 18 to 52 years. At the time of the research there were few published measures, therefore Davies et al. (1998) developed a measure of EI by selecting a range of 18 affective measures, 13 of which represented various tests or subscales derived from affective self-report inventories and five objective indexes. The findings indicated EI measures based on consensual scoring and therefore had a low level of reliability. Further, the self-report measures were associated to personality factors, therefore had poor divergent validity. The findings by Davies et al. (1998) that found poor reliability and validity in EI measures stimulated theoretical and psychometric debate in the field of EI.

Further, Locke (2005) reviewed the concept of EI as presented by Salovey and Mayer (1990) and Goleman (1995), then concluded that EI was an invalid concept. From a theoretical perspective Locke (2005) explained the terms intelligence, rationality, irrationality and emotion. Intelligence was described as “one’s capacity to grasp abstractions” and rationality was “how one actually uses one’s mind”. Locke (2005) went
on to note that one could be both intelligent and irrational. “For example, a person’s thinking may be dominated by emotions, and they may not distinguish between what they feel and what they can demonstrate to be true” (Locke, 2005, p. 425). These theoretical assertions seem to reflect the Stoics’ philosophical perceptions (Baltzly, 2004), which considered emotion as a disruptive and irrational construct that needed to be controlled in order to allow one to think intelligently and hence rationally. Locke’s (2005) theoretical description of the construct of emotion as exemplifying irrationality and disrupting rational intellectual process was also in contrast to emotional theorists. Academic researchers of emotion asserted that emotions provided important information from a range of theoretical perspectives that assisted adaptive functioning and behaviour, which in turn supported one’s survival (Arnold, 1960b; Damasio, 1996; Darwin, 1874; Ekman, 2003; Fiske, 1993; Lazarus, 1991; Rolls, 2004).

In addition, Locke (2005) asserted that the construct of EI was too broadly defined by Salovey and Mayer (1990) and Goleman (1995). “Observe that the concept of EI has now become so broad and the components so variegated that no one concept could possible encompass or integrate all of them, no matter what the concept was called; it is no longer even an intelligible concept” (Locke, 2005, p. 426). In conclusion, Locke (2005) noted that the definition of EI was really just a conglomeration of habits, skills and choices rather than an actual intelligence. Rather, introspection encompassing the skill to monitor one’s own mind to determine the contents and processes being utilised was proposed as an important human function that wanted attention and impacted upon mental health and self-esteem. Hence, the theoretical critiques regarding the conceptualisation and definition of EI as outlined by Locke (2005) have continued to be widely referenced and subject to theoretical debate.

**C.2.2.3.3 1991–1993 EI: Theoretical Development**

Mayer, Salovey, Gomberg-Kaufman, and Blainey (1991) found the experience of a mood was influenced by both the emotional content and the mood management processes the individual utilised. Therefore, a mood necessarily encompassed mood states and emotions such as happiness, anger, fear or sadness. These emotions subsequently stimulated emotion-related experiences that could influence the individual’s physical, emotional and/or cognitive experiences. However, the findings also confirmed that an
individual’s mood management processes that were considered within three dimensions (a) thoughts or plans for action, (b) suppression, and (c) denial – could also enhance or reduce the experience of the mood (Mayer et al., 1991).

It was plausible that these findings were reflective of defence mechanisms (A. Freud, 1946). Further, from an evolutionary perspective, the three responses may have reflected survival functions of (a) approach, (b) avoid, and (c) elimination (Darwin, 1872). Moreover, the findings supported a multi-domain framework for the experience and management of mood; specifically, illustrating the meta-experience of mood that encompassed individual differences in mood management. The results confirmed individuals could use their mood management skills by attending, clarifying, and regulating their emotions in moods. These skills and regulation capacities to self-manage their mood, were considered to be emotionally intelligent skills (Mayer et al., 1991).

Mayer and Salovey (1993) published an editorial entitled *The Intelligence of Emotional Intelligence*. This editorial responded to some critiques from colleagues questioning the validity of EI, specifically for connecting the constructs of emotion and cognition, referring to the term intelligence, and considering emotions as a significant construct. The rebuttal provided by Mayer and Salovey (1993) asserted that the EI outlined framework (Mayer et al., 1990; Salovey & Mayer, 1990) provided the theoretical scope to encompass existing literature into a model that considered individual’s capacity to process and adapt to affective information problems. Processing emotional information necessarily required intellectually processing emotional problems. In contrast, the construct of general intelligence targeted the processing of non-emotional information, which potentially encompasses differentiated processing systems. In addition, the theoretical framework of EI was linked to the historical literature on intelligence, which accepted both social intelligence (R. L. Thorndike, 1936) and multiple intelligences (H. Gardner, 1993b) as recognised intelligence models. Therein, the construct of EI was aligned to the theoretical model of intelligence as a multi-dimensional model.

**C.2.2.3.4 1995 EI: Trait Meta-Mood Scale (TMMS)**

Salovey et al. (1995) published a chapter entitled *Emotional Attention, Clarity, and Repair: Exploring Emotional Intelligence using the Trait Meta-Mood Scale (TMMS).*
This chapter noted that formative investigations by researchers, such as Mayer et al. (1991) identified the meta-experience of mood and the individual differences in mood management. Subsequently, Mayer and Salovey (1995) asserted that the skills incorporated in the meta-experience of mood may also “characterise emotionally intelligent individuals capable of disclosing their feelings to themselves and other people”. In order to further investigate individual differences in the ability to reflect on, clarify and manage one’s moods, the measure entitled the State Meta-Mood Scale (SMMS) was selected. The SMSS was a self-report measure that focused on the individual’s current, going and moment–to–moment mood state, which was subject to change. However, it did not focus on mood as an emotional trait, which was a relatively stable individual difference in one’s “tendency to attend to their moods and emotions, discriminate clearly among them, and regulate them” (Mayer & Salovey, 1995, p. 128).

The SMMS was modified to focus on the measure of emotions and moods as a trait, the resulting modified measure was called the Trait Meta-Mood Scale (TMMS). Research was conducted to confirm: (a) the concurrent and predictive validity of the TMMS (N =200) 48 items in five domains; (b) the relationship between TMMS personality; and (c) TMMS relationship to ruminative thought, attending to feelings, clarity of emotions and emotional regulation. A laboratory experiment was conducted, where participants (N =200) watched a distressing film and provided reports of the thoughts and feelings. First, a factor structure of the TMMS found a three-factor solution, which was labelled: (1) attention to feelings; (2) clarity of feelings; and (3) mood repair. The 48 scales were loaded onto each factor and those with low loading were removed, resulting in 30 items. Second, another factor structure of the TMMS was conducted with a second sample of undergraduate students (N = 148). Third, a confirmatory factor analysis supported the TMMS three-factor model. The convergent and discriminant validity of the TMMS was supported with a range of recognised measures of mood and emotions (Salovey et al., 1995).

Therefore, Salovey et al. (1995) proposed the TMMS was a reliable and valid self-report psychometric measure of EI aspects, which was sufficiently differentiated from personality. The TMMS was also found to have adequate utility, evidenced by utilisation of the TMMS measure in the prediction of rumination in individuals after a
stressful event, i.e. after watching a distressing film. Therein, the TMMS was an operationalised psychometric self-report measure of aspects of EI (Mayer et al., 1990), which measured: (1) attention to feelings; (2) clarity in discrimination of feelings; and (3) mood repair (Salovey et al., 1995). Further, Palmer, Gignac, Bates, and Stough (2003) conducted a principal component factor analysis and structural equation modelling in a cohort of 310 participants to independently evaluate the TMMS by Salovey et al. (1995). Palmer, Gignac, et al. (2003) demonstrated the findings from the factor analysis identified three factors entitled Attention, Clarify and Repair, which were consistent with the previous finding by Salovey et al. (1995). In addition, two items from the TMMS items significantly loaded on a fourth factor. Internal consistency was confirmed in three factors (Attention, Clarify and Repair), while the alpha of .62 in the fourth factor was too low to meet the criteria for internal consistency. The results of the structural equation modelling provided further support of the construct validity of the emotional management as a component of EI (Palmer, Gignac, et al., 2003).

C.2.2.3.5 1996 EI Measures: Self-Report versus Performance

Mayer and Geher (1996), in “Emotional Intelligence and the Identification of Emotion”, aimed to identify and measure individual differences in the ability to associate one’s own and others’ thoughts and emotions. It was theorised that those who could connect with their own feelings and thoughts, may also be more skilled at understanding others feelings. It was hypothesised that the ability to understand others emotions was a component of EI. The undergraduate study participants (N = 321) read eight short stories and then anticipated what the writer would be thinking and feeling. The participants reported thoughts about each story and completed a standardised scale of 12 dichotomous items with reference to the Present Reaction Scale (PRS). In addition, the study participants also completed a range of self-report assessments for mood, such as the Emotional Accuracy Research Scale (EARS) and an empathy scale (Mayer & Geher, 1996).

The participants’ responses were evaluated using a range of criteria: (a) self-report, which is based on the individual’s internal feelings; (b) degree of agreement between the target (individual self-report) and a judge (person evaluating how the target is feeling); (c) consensus agreement, wherein the target’s feelings are scored relative to
the consensus of a number of judges (irrespective of their self-report); and (d) expert
judge, specialist in emotion i.e. a clinical psychologist, evaluates the target or determines
the correct emotional response (Mayer & Geher, 1996).

Hence, the ability to infer another person’s emotions from their thoughts is one
skill encompassed in EI. This skill was operationalised and measured with two criteria to
determine the accuracy of the participants’ judgments: (1) the degree that the individual’s
judgment agreed with a target who initially reported their judgment; and (2) the degree
that the individual’s judgment agreed with the group consensus. The results found these
two criteria were uncorrelated. Mayer and Geher (1996) explained there were differences
between the target person and the group consensus, indicating differences between what a
person was feeling and what they were judged to be feeling. The target group selected a
number of socially desirable responses, which were not selected by the judges. Therefore,
it was possible that individuals selected more socially desirable responses based on what
they perceived they should say in public as opposed to what they actually felt.

Nonetheless, measures of target and consensus agreement were positively
correlated with self-report measures of trait empathy and negatively correlated with
defensiveness. Further, consensus agreement correlated with intellectual ability as
measured by SAT scores. Mayer and Geher (1996) concluded that despite these original
findings, performance scales were considered to be more effective than self-report
measures. In this study Mayer and Geher (1996) deduced the performance measure of an
individual’s ability to infer another’s thoughts and feelings, was more effectively
operationalised than in a self-report measure. A self-report measure was argued to be
more fallible due to potential distortions attributed to a range of factors, such as: faulty
self-knowledge, defensiveness, the individual’s self-concept or the limitations in the
attributes of the scale used in the self-report (Mayer & Geher, 1996).

C.2.2.3.6 1997 EI: The Four Branch Model

Mayer and Salovey (1997) presented a revised definition and model of EI, in the
chapter entitled “What is Emotional Intelligence?” In response to the publication by
the article in Time Magazine (Gibbs, 1995) entitled “The EQ Factor” and other journal
articles related to EI, Mayer and Salovey (1997) expressed concern that the definition of
EI had become too broad and was not clearly operationalised. Further, the broad definition of EI presented by Goleman (1995) was associated with assertions that EI was related to a broad range of variables, such as IQ. Consequently, Mayer and Salovey (1997) provided a revised definition of EI as follows:

Emotional intelligence involves the ability to perceive accurately, appraise, and express emotion; the ability to access and/or generate feelings when they facilitate thought; the ability to understand emotion and emotional knowledge; and the ability to reflectively regulate emotions to promote emotional and intellectual growth. (Mayer & Salovey, 1997, p. 10)

This definition of EI was theoretically conceptualised and operationalised in The Four Branch Model of EI, which was illustrated by Mayer and Salovey (1997, p. 11). The Four Branch Model of EI delineated four EI factors in the model, which provided an operationalised EI framework and a developmental scope of the EI abilities related to each factor in the model. The Four Branch Model of EI incorporated four EI psychological constructs or factors, which were referred to as “branches”. The four EI branches were hierarchally arranged. Branch One commenced with more basic psychological processes, while Branch Four concluded with more complex and integrated psychological processes (Mayer & Salovey, 1997). The four EI branches outlined in the model included:

- Branch One: Perception, Appraisal, and Expression of Emotion;
- Branch Two: Emotional Facilitation of Thinking;
- Branch Three: Understanding and Analysing Emotions, Employing Emotional Knowledge; and
- Branch Four: Reflective Regulation of Emotions to Promote Emotional and Intellectual Growth.

The EI factors in each EI branch, were further conceptualised with reference to four EI abilities (Mayer & Salovey, 1997). The four EI abilities associated to each EI branch were developmentally sequenced. The four EI ability groups included EI abilities that were progressively more complex and subsequently developed at later stages in the human lifecycle. Therein, the group of EI abilities reflected an increasing level of
psychological skills or abilities. For instance, the first group EI abilities appeared relatively early in human development. While, the fourth box or group of EI abilities encompassed the most advanced EI developmental abilities outlined in the model.

The Four Branch Model of EI is outlined below consisting of four EI abilities, as precisely transcribed from Mayer and Salovey (1997, p. 11) and subsequently discussed with reference to the appropriate research:

**C.2.2.3.6.1 Branch One: Perception, Appraisal, and Expression of Emotion**

1. “Ability to identify emotion in one’s physical states, feelings and thoughts.
2. Ability to identify emotions in other people, designs, artwork, etc., through language, sound, appearance and behaviour.
3. Ability to express emotions accurately, and to express needs related to those feelings.
4. Ability to discriminate between accurate and inaccurate, or honest versus dishonest expressions of feeling” (Mayer & Salovey, 1997, p. 11).

Mayer and Salovey (1997) asserted that emotional perception, appraisal and expression were EI skills that formatively developed from infancy to adulthood. The developmental maturation of emotional recognition, appraisal and expression skills throughout the lifespan is widely acknowledged (Arnold, 1960b; Darwin, 1872; Ekman, 2003). This assertion was consistent with that made by Leuner (1966), who also noted the importance of the relationship between the preverbal infant and a primary carer, typically the infant’s mother, in developing their EI skills such as emotional recognition, appraisal and expression. Therefore, those with higher skills in emotional perception, appraisal and expression were more likely to be able to identify emotions in themselves, in others, and in other objects in their environment (Mayer & Salovey, 1997).

**C.2.2.3.6.2 Branch Two: Emotional Facilitation of Thinking**

1. “Emotions prioritise thinking by directing attention to important information.
2. Emotions are sufficiently vivid and available that they can be generated as aids to judgement and memory concerning feelings.
3. Emotional mood swings change the individual’s perspective from optimistic to pessimistic, encouraging consideration of multiple points of view.

4. Emotional states differentially encourage specific problem approaches such as when happiness facilitates inductive reasoning and creativity” (Mayer & Salovey, 1997, p. 11).

Mayer and Salovey (1997) stated that emotions interacted with cognition in the process of thinking. This assertion was consistent with the theory of emotion by Dewey (1894, 1895), who also asserted the essential connection between emotion and cognition in prioritising one’s attention, thinking and behaviour. For instance, emotions signalled important changes in the person or their environment, which directed their attention and potentially changed their behaviours adaptively. Mayer and Salovey (1997) also noted the effect of emotions to influence feelings and how one thinks or processes information, by facilitating or impeding intellectual processing. The contention that emotions influenced thinking was consistent with research by Fredrickson (2005), who found positive emotions were associated with a broader scope of attention and thought-action responses.

C.2.2.3.6.3 Branch Three: Understanding and Analysing Emotions; Employing Emotional Knowledge

1. “Ability to label emotions and recognise relations among the words and emotions themselves, such as the relationship between liking and loving.

2. Ability to interpret meanings that emotions convey regarding relationships, such as that sadness often accompanies a loss.

3. Ability to understand complex feelings: simultaneous feelings of love and hate, or blends such as awe as a combination of fear and surprise.

4. Ability to recognise likely transitions among emotions, such as the transition from anger to satisfaction, or from anger to shame” (Mayer & Salovey, 1997, p. 11).

Mayer and Salovey (1997) stated that understanding emotions, analysing emotions and utilising emotional knowledge was a psychologically complex developmental EI skill. This assertion was consistent with research by Saarni, Campos, Camras, and Witherington (2007) which indicated that children begin to label their
emotions and perceive relationships between emotions, labels, and behaviours from the second year of life. As children develop, so too does the child’s ability to analyse the emotional complexity of their interactions and relationships with others who have different goals, desires and emotions. Hence, interactions with others and the associated social skills become more complex as the individual develops, so the complexity in emotions becomes more evident and multiple contradictory emotions may be experienced simultaneously. Consequently, the maturing person becomes more attuned to subtle distinctions and transitions between emotions, which influences how they utilise their emotional knowledge.

C.2.2.3.6.4 Branch Four: Identification Regulation of Emotions to Promote Emotional and Intellectual Growth

1. “Ability to stay open to feelings, both those that are pleasant and those that are unpleasant.

2. Ability to reflectively engage or detach from an emotion depending upon its judged informativeness or utility.

3. Ability to reflectively monitor emotions in relation to oneself and others, such as recognise how clear, typical, influential, or reasonable they are.

4. Ability to manage emotion in oneself and others by moderating negative emotions and enhancing pleasant ones, without repressing or exaggerating information they may convey” (Mayer & Salovey, 1997, p. 11).

Branch Four of the EI Model presented by Mayer and Salovey (1997) stated that the identification and regulation of emotions to promote emotional and intellectual growth was the most complex psychological skill in the EI model. The ability to identify, regulate and utilise emotions adaptively to support the individual’s growth was also influenced by an individual’s stage of development. A functionalist working definition of emotion is “…the person’s attempt or readiness to establish, maintain, or change the relationship between the person and her or his changing circumstances, on matters of significance to that person” (Saarni et al., 2007, p. 227). Therefore, the importance of one’s ability to identify and regulate their emotions in order to optimise their growth and development is partially reflective of the functionalist theory of emotion. Finally, Mayer and Salovey (1997) contended the conscious regulation of emotions to augment
emotional and intellectual growth required acknowledgement of all feelings, and the ability to moderate the impact of negative emotions. Therein, an individual was required to learn to experience and control emotions, rather than suppress them; which was also asserted by Payne (1985).

Davies et al. (1998) examined the assertion that EI was a construct that met the criteria for a traditional cognitive ability. Three studies were conducted \((N = 530)\), which examined the relationships between EI, cognitive abilities and personality. The results identified three factors that corresponded to two aspects of EI that were outlined by Salovey and Mayer (1990), appraisal of emotion in the self and appraisal of emotion in external stimuli, which, were both independent of fluid and crystallised intelligence (Davies et al., 1998). However, the findings also demonstrated that the appraisal of emotion in the self and emotional perception were not significantly related, therefore these EI abilities were not conceptually related. In addition, the emotional perception measures had low internal consistency and therefore did not have adequate reliability. Further, the use of consensual scoring as an objective evaluation of emotional content was not considered to be the most accurate way to measure emotional responses. Hence, Davies et al. (1998) concluded that the construct reliability and validity of EI was limited by the design and development of EI measures.

**C.2.2.3.7 1999 EI: Meets Criteria for Intelligence: Multifactor Emotional Intelligence Scale (MEIS)**

Mayer, Caruso and Salovey published a seminal article entitled *Emotional Intelligence Meets Traditional Standards for an Intelligence* (1999). Therein, the article provided an operationalised conceptualisation of EI based on the Four Branch Model (Mayer & Salovey, 1997), which also formed the theoretical framework for the development of the Multifactor Emotional Intelligence Scale (MEIS). The MEIS was a psychometric assessment of EI that was conceptualised on the four EI branches: (a) perceiving, (b) assimilating, (c) understanding, and (d) managing emotions. The four EI branches in the MEIS were assessed with 12 subscales that were designed to measure individual’s EI ability. The MEIS 12 subsets were scored with reference to one or more of three possible assessment modalities. The EI assessments included a consensus score, expert score and target score, as previously delineated by Mayer and Salovey (1997). The
MEIS provided the first psychometric assessment of EI abilities, which was subsequently utilised in two studies. The first study was based on an adult cohort (\(N = 503, 17–70\) years of age). The second study was based on an adolescent cohort (\(N = 229, 12–16\) years of age). The findings of both studies were analysed to determine if EI as measured by the MEIS did meet the psychological criteria and psychometric standards required to be classified as a traditional intelligence (Mayer, Caruso, et al., 1999).

Mayer, Caruso, et al. (1999) asserted the study results confirmed EI, as measured by the MEIS, did meet the traditional standards required to be classified as an intelligence. The three criteria entitled: conceptual, correlational and developmental, were attained to an adequate psychometric standard as outlined:

1. Conceptual Criteria: (Study 1) EI was conceptualised in the MEIS as a set of operationalised abilities, which encompassed reliable and valid measures of EI. Therefore, the first criterion was supported as the findings provided evidence that EI was an operationalised set of abilities.

2. Correlational Criteria: (Study 1) In the MEIS the 12 subscales intercorrelated, which indicated the subscales were related to each other. Further, a general emotional intelligence (\(g_{ei}\)) factor was identified. The \(g_{ei}\) was found to encompass three EI factors: perception, understanding and managing. The \(g_{ei}\) was moderately correlated to verbal intelligence, which was a recognised measure of IQ. Therefore, the second criterion was supported as the findings provided evidence that EI was a related set of abilities that accounted for unique variance and was moderately related to a pre-existing intelligence.

3. Developmental Criteria: (Study 2) A comparison of the adults in study one and the adolescents in study two found the adults had higher EI skills. Therefore, the third criterion was supported as the findings provided evidence that EI developed with age and experience (Mayer, Caruso, et al., 1999).

The MEIS factor structure of the 12 consensus scored subscales identified a three-factor dimensional structure of EI (Mayer, Caruso, et al., 1999). The first factor loaded on all subscales, and therefore was interpreted as a general emotional intelligence (\(g_{ei}\)). The second factor was managing versus perceiving emotions, which differentiated emotional reasoning from emotional perception. The third factor illustrated tasks focused on
regulating emotions in oneself and in others, which was entitled managing emotions. Hence, general emotional intelligence \((g_{ei})\) loaded onto three factors, referred to as emotional perception, understanding and managing (Mayer, Caruso, et al., 1999). The general emotional intelligence \((g_{ei})\) factor was significantly related to criterion variables, such as verbal intelligence \(r = 0.36, p < 0.001\) and empathy \(r = 0.33, p < 0.001\). The moderate correlations between general emotional intelligence and verbal intelligence and empathy, indicated EI was related to other recognised constructs; however, was not the same as the other constructs.

Mayer, Caruso, et al. (1999) also analysed the three-factor model with structural equation modelling. The findings provided moderate psychometric support for a four-factor model, which encompassed emotional perception scales, managing scales and divided the emotional understanding scales into two groups, entitled the revised understanding scale and the assimilation scale. In conclusion, Mayer, Caruso, et al. (1999) suggested these findings provide seminal evidence to support the significant predictive variance of EI, which may further extend the current predictive variance of general intelligence.

Roberts, Zeidner, and Matthews (2001) questioned if EI did actually meet the traditional psychometric and theoretical standards to be classified as an “intelligence”. Therein, they examined \((N = 704)\) the MEIS by Mayer, Caruso, et al. (1999) with: (1) intelligence, as measured by the Armed Services Vocational Aptitude Battery; and (2) personality, as measured by the Trait Self-Description Inventory. The findings indicated the MEIS had a moderate correlation with intelligence, therefore showed convergent validity with intelligence (Roberts et al., 2001). Further, the MEIS had a minimal correlation with personality, which confirmed its divergent validity from personality. However, expert and consensus scoring methodology provided inconsistent results. Further, the factor analysis identified problematic issues of psychometric reliability. Therefore, Roberts et al. (2001) concluded that it was not clear if EI, as operationalised by the MEIS, was as a major construct of intelligence that was comparable with the construct of general intelligence in identifying individual differences in human behaviour.
Subsequently, Mayer, Salovey, and Caruso (2002c) investigated the relationship of the ability model of EI to personality. In a cohort of 183 participants, the MEIS was found to measure a construct that was distinct from standard personality traits. This finding provided evidence of the discriminant validity of the ability model of EI (Caruso, Mayer, & Salovey, 2002b), which concurred with the findings presented by Roberts et al. (2001).

**C.2.2.3.8 Mayer–Salovey–Caruso Emotional Intelligence Test**

Following the development of the MEIS by Mayer, Caruso, et al. (1999), the researchers continued to work towards refining the psychometric reliability and validity of the assessment of EI based on the ability model using target, consensus and expert assessment criteria. Hence, the first research version of the Mayer, Salovey and Caruso Emotional Intelligence Test (MSCEIT) was developed (Mayer, Salovey, & Caruso, 1999). Mayer, Caruso, and Salovey (2000) described the MSCEIT RV 1.1 as an ability measure of EI that provided a general score of EI, which was drawn from four Branches or subscale scores entitled emotional perception, facilitation, understanding, and management. A range of ability subtests, as outlined, measured each EI branch of the MSCEIT (Mayer, Caruso, et al., 2000):

- **Branch One: Perception of Emotion**—Tasks involve perceiving emotion in a range of stimuli.
  - faces
  - landscapes
  - abstract design.

- **Branch Two: Emotional Facilitation**—Tasks involve confirming if emotion was utilised to facilitate cognitive activities.
  - synaesthesia to identify similarity between an emotional feeling and an internal feeling.

- **Branch Three: Understanding Emotion**—Tasks involve understanding emotions.
  - blending emotions—matching joy and acceptance to another emotion
- Emotional transitions—identifying what happens when an emotion intensifies or changes.

- **Branch Four: Managing Emotion**—Tasks concerning the best way to regulate emotions in oneself and others.
  - Describes a person with a goal, who is then required to manage a changing feeling or maintain their current feeling.

Mayer, Caruso, et al. (2000) initially examined the reliability and validity of the MSCEIT RV 1.1 in a cohort of 277 participants. The initial examination of the branch alpha scores ranged from .59 to .87. However, it was anticipated that these scores would increase as a result of the removal of test items with low internal consistency, as identified in the research trial.

Mayer, Salovey, et al. (2001) made reference to the MEIS and the newly developed MSCEIT V2.0 to address some of the concerns raised by Roberts et al. (2001) regarding the validity and reliability of EI assessments. Therein, the MSCEIT V2.0 was an ability scale that encompasses 141 items. The experts scoring criteria was based upon the responses of 21 members of the International Society of Research in Emotion (ISRE), rather than the two experts utilised in the MSCEIT RV1.0. Over 2,000 participants completed the standardisation assessments for the MSCEIT V2.0, their responses were formative to determining the general consensus scores. The expert and general consensus scores were correlated $r = .98$ (Mayer, Salovey, et al., 2001). This finding provided support for the validity and reliability of the expert-consensus scoring, as opposed to emotional conformity. Therein, Mayer, Salovey, et al. (2001) asserted there were correct answers in the ability model of EI, as assessed by the MSCEIT V2.0. Subsequently, Mayer, Salovey, and Caruso (2002a) published the MSCEIT Version 2.0 user’s manual.

Mayer, Salovey, Caruso, and Sitarenios (2003) provided a more detailed review of the standardisation of the MSCEIT V2.0 based on a cohort of 2,112 participants who were 18 years of age or older ($M_{age} = 26.25$ years, $SD = 10.51$) from 36 separate academic settings in a range of countries. Further, the reliability of the scores provided by the emotion experts was higher than those of the general sample. Hence, subject to further research findings to confirm this finding, the expert consensus criteria for scoring warrants further consideration for inclusion in future EI assessments. Figure 2.7 provides
an outline of the MSCEIT V2.0 model that reflects the findings of the factor analyses, which confirmed the identification of a one-, two-, and four-factor EI model.

Figure C.1 MSCEIT Model by Mayer et al. (2002)

As illustrated in Figure C.1, the MSCEIT model presented a one-, two-, and four-factor EI model. Mayer et al. (2003) explained that the one factor model of EI was evident with a common EI factor loading on all eight MSCEIT tasks. The one common factor model for EI was reflective of the one general common factor model for intelligence (\( g \)). The two-factor model was illustrated with the division of the MSCEIT scale into the “Experiential” area and the “Strategic” area. The four-factor model also loaded onto the four branches in the MSCEIT V2.0. Consequently, Mayer et al. (2003)
asserted these findings offered further evidence to support the psychometric reliability and validity of the MSCEIT V2.0.

Palmer et al. (2005) independently re-examined the scoring, reliability and factor structure of the MSCEIT V2.0. A cohort of 431 participants who were 18 to 79 years of age ($M_{\text{age}} = 37.39$, $SD = 14.3$) completed the MSCEIT V2.0. The results of the confirmatory factor analysis provided support for the reliability of the MSCEIT model based on the total score, the two areas and the four branches. An EI model with a first-order general factor was found to fit the model. Consequently, the general common EI factor that was identified in the initial factor analysis by Mayer et al. (2003), was also identified in the factor analysis and the study by Palmer et al. (2005). Conversely, an EI model with three first-order branch factors was confirmed to have the best fit in the model, as the model did not provide support for the Experiential area or the Facilitating Thought Branch. Hence, Palmer et al. (2005) concluded that the results of the factor analysis provided partial support for a four-factor model, which was initially presented by Mayer et al. (2003).

In addition, Gignac (2005b) evaluated the MSCEIT V2.0 and found psychometric errors in the factor analysis results that were associated with the “close fit indices”. Therefore, a reanalyses of the data presented by Mayer et al. (2003) was conducted. Based on the reanalysed data, Gignac (2005b) concluded that the general common EI factor model and the two-factor model did not provide a good fit to the model. Further, two branch factors Perceiving Emotion and Facilitating Thought were found to be collinear, therefore negating the psychometric validity of the four-factor model of EI. Gignac (2005b) concluded that a hierarchical EI model, encompassing an overall EI factor and three nested factors would provide a more effective EI model. Mayer, Panter, Salovey, Caruso, and Sitarenios (2005) acknowledged and confirmed the psychometric concerns raised by Gignac (2005b). The discrepancy in the initial analyses of the MSCEIT by Mayer et al. (2004) and the reanalyses of the data by Gignac (2005b) was attributed to differences in the versions of AMOS software utilised in the statistical analysis. Mayer, Panter, et al. (2005) affirmed the assertions made by Gignac (2005b) regarding the theoretical challenges and efficacy of considering a hierarchical EI model and/or the inclusion of more subscale in the MSCEIT V2.0.
Maul (2012) affirmed the value of the concept of EI, however, he asserted that the effectiveness of the MSCEIT V2.0 to measure individual differences in EI was debatable. Therein, Maul (2012) questioned the validity of the MSCEIT V2.0, in order to ensure the test performance measured was an effective reflection of the individual differences in the underlying EI ability. Specifically: the validity of the MCSEIT theoretical test design; scoring methodology, which encompasses expert consensus and general consensus scores; construct reliability; correlation with other EI ability measures; and the criterion correlational. Mayer, Salovey, and Caruso (2012) addressed the criticisms and questions raised by Maul (2012), which encompassed theoretical clarification of the four MSCEIT branches, further statistical analysis of the reliability of the MSCEIT and its subscales, and correlations between the MSCEIT and other EI ability scales (Mayer et al., 2012). Collectively, Mayer et al. (2012) concluded that the theoretical clarifications provided and the findings presented in the additional statistically analysis provided by further support for the validity of the MSCEIT, while also acknowledging the need for continued development and refinement of the measurement of EI.

Further, Fiori et al. (2014) analysed the MSCEIT V2.0 based on the Item Response Theory (IRT) in a cohort of 729 participants ($M_{age}$ 33.29 years, $SD = 12.55$). The findings indicated that the four EI branches were more effective in discriminating between individuals in the lower level of the EI branch and less effective in discriminating between those at the mean and higher level. Therefore, Fiori et al. (2014) suggested the assessment of EI could be further improved by more effectively discerning the responses of individual at the mean and higher level of EI. Consequently, the research findings highlighted the importance of identifying what aspects of EI the MSCEIT measured and how it measured individual differences in EI. Hence, the refinement of the item responses in the MSCEIT V2.0 may improve future EI assessments and the theoretical understanding of EI (Fiori et al., 2014).

Hence, the theoretical development of the EI ability model and psychometric measurements of EI with assessments such as the MSCEIT V2.0 by Mayer et al. (2012) has been widely analysed, reviewed and debated and is a psychometrically valid and reliable measure of EI. The theoretical scope and methodological approaches to EI from a range of models will now be examined.
C.2.2.3.9 EI Models: Specific Ability, Integrative and Mixed Models

Mayer, Roberts, et al. (2008) reviewed and clarified the theoretical scope and methodological approach utilised in EI research from 1990 to 2008. The models of EI were reviewed in three theoretical groups entitled: (1) Specific-Ability Approaches; (2) Integrative-Model Approaches; and (3) Mixed-Model Approaches. The following descriptions and examples of the three models were outlined as such:

- The “Specific-Ability Model Approaches to EI” encompassed specific abilities that were formative to EI. The specific-abilities focused on a skill that was fundamental to EI, for instance, emotional perception. The Diagnostic Analysis of Non-Verbal Accuracy Scales (DANVA) by Nowicki and Duke in 1994, was cited by (Mayer, Roberts, et al., 2008) as an example of the specific-ability model approach to EI.

- The “Integrative-Model Approaches to EI” incorporated the integration or joining of several specific abilities, in order to acquire an overall sense of EI as a cohesive, global ability. The four branch ability model of EI as measured by the MSCEIT (Mayer et al., 2003) was incorporated in the integrative-model of EI.

- The “Mixed-Model Approaches to EI” included EI models with mixed targets or focuses that included a variety of non-EI qualities. Consequently, the mixed-models of EI had broad definitions of EI and therefore were not classified within the boundaries of EI. An example of the mixed-model of EI is evident in The Emotional Quotient Inventory (EQ-i) by Bar-On (1997b).

The specific-ability model approach to EI incorporated tests that come directly from the field of emotions, such as the FACS Ekman (2003). To group tests of emotion and re-categorise them into a distinct theoretical approach to EI, seems to have limited theoretical value. This approach contradicted the working definition of EI provided at the start of the review, which makes a distinction between emotions per se and EI: “Emotional intelligence concerns the ability to carry out accurate reasoning about emotions and the ability to use emotions and emotional knowledge to enhance thought” (Mayer, Roberts, et al., 2008, p. 511).
The integrative-model was not operationally defined. However, the integrative-model was defined as: “several specific abilities to obtain an overall sense of EI” which was a generalised definition that could be broadly interpreted and therefore incorporate a very wide range of concepts. The four branch model of EI was classified as an integrative-model approach to EI. It could be argued that the integrative-model was essentially the re-categorisation of the previously known ability model of EI (Petrides & Furnham, 2000b), with a much broader theoretical classification of EI. In addition, the mixed-model approach to EI appeared to replace the previously categorised trait EI models (Petrides & Furnham, 2000b); the removal of the term “trait” from the category appears to be the most notable change. Hence, the classification of EI theory into the three categories outlined by Mayer, Roberts, et al. (2008) may provide further theoretical clarification, however, the utility of these categories may be open to debate in light of the previous classification of trait and ability models of EI by Petrides and Furnham (2000b).

In sum, the ability models of EI have continued to be developed and refined primarily originated with the empirical research and theoretical development driven by Mayer, Salovey and Caruso. They seminarily developed the EI ability theory, definitions, and models based the formative EI models of the 1990s. Their extensive research throughout 2000–2007 (Shaw et al., 2006); and the consolidation and re-categorisation of approaches to EI in 2008 entitled “Specific-Ability Model”, “Integrative-Model”, and “Mixed-Model” (Mayer et al., 1990; Mayer & Salovey, 1997; Salovey & Mayer, 1990), have continued to be refined and extended the psychological conceptualisation of EI. Over the past 25 years the theoretical and psychometric validity and reliability of the ability model of EI has been associated with a range of variables that significantly impact on human development, such as: leadership (Mayer, 2000; Mayer et al., 2004; Mayer, Salovey, et al., 2001), education (Mayer, Salovey, et al., 2008), coping (Caruso, Mayer, & Salovey, 2002a), special populations i.e. gifted children (Mayer & Cobb, 2000), and positive psychology (Salovey et al., 1999). Furthermore, Mayer, Salovey and Caruso have questioned the validity and reliability of the mixed or trait models of EI (Mayer, Perkins, et al., 2001). However, other researchers have argued that the omission of research based on the trait or mixed-model of EI theoretically limited the conceptualisations of EI (Salovey, Mayer, & Caruso, 2002).
As previously outlined, the ability model of EI focuses on one’s EI ability from an information-processing perspective, however the trait model of EI focuses on one’s EI traits as they relate to the psychological field of personality (Mayer, Salovey, et al., 2008). Hence, the mixed or trait models of EI will now be reviewed in order to clarify their theoretical and psychometric reliability, validity and relationship to other variables that are significant to human development, such as wellbeing, learning and academic achievement. The review of the trait models of EI will inform the methodological design of the current study.

C.2.2.4 Trait Model of EI

Over the past 25 years there has been extensive growth and development in the theoretical framework of the trait model and psychometric assessments of EI, which have been primarily based on self-report assessments. The trait EI models and measures can be further categorised into two subgroups: (a) theories and measures designed not to incorporate aspects of personality; and (b) theories and measures that are designed to include personality factors (Petrides & Furnham, 2000b; Petrides & Furnham, 2001, 2003).

This literature review of the trait model of EI will first outline the historical development of EI self-reports, which commenced with research by Mayer et al. (1990). Second, the literature review will analyse two representative trait models and measures of EI: (1) The Emotional Competence Inventory (ECI) as outlined by Goleman (1995); and (2) The Swinburne University Emotional Intelligence Test (SUEIT) developed by Palmer and Stough (2001c). The two trait models of EI with be analysed with reference to their theoretical models of EI and psychometric characteristics of their measures of EI, in order to critique the theoretical nature of what each EI construct measures and the psychometric validity and reliability of that measurement of EI (Mayer, Roberts, et al., 2008). A review of each EI trait model will examine the: (a) conceptualisation or definition of EI; (b) operationalised theoretical framework or scope of the EI model; and (c) the psychometric reliability and validity of the EI measure (Zeidner, Matthews, & Roberts, 2001).
**C.2.2.4.1 Development of EI Self-Report Measures**

Historically, EI self-report assessments were originally utilised in the assessment of components of EI by Mayer, Salovey and colleagues. First, Mayer, DiPaolo and Salovey (1990) initially utilised a self-report measure entitled the Emotional Perception Questionnaire to evaluate a component of EI. The measure aimed to determine individuals’ level of abilities or skill in the perception of emotional qualities in a range of visual stimuli. Further, the measure included self-report measures of empathy, alexithymia, neuroticism and extraversion. The ability to recognise emotional content of visual stimuli was related to some personality traits, such as empathy. Second, Salovey et al. (1995) developed the TMMS, which was also a self-report scale to measure aspects of EI. A factor analysis found the TMMS was found to measure three aspects of EI and was a reliable and valid measure. Third, Mayer and Geher (1996) sought to measure the ability to understand thoughts and emotions in oneself and others’ thoughts and emotions. The assessment encompassed self-reports, the degree of agreement between the target (self-reports) and a judge, consensuses agreement and an expert judge. Based on the results of this study Mayer and Geher (1996) asserted that the self-report measure of EI may be less effective than a consensus agreement or a judge’s assessment. Following these research findings Mayer, Salovey and colleagues decreasingly focused on self-report measures to assess EI in the MEIS (Mayer, Caruso, et al., 1999) and the MSCEIT V2.0 (Mayer et al., 2003).

Mayer, Salovey, et al. (2000c) initially noted that there was preliminary research on mixed models of EI that showed some progress. However, eight years later, Mayer, Roberts, et al. (2008) asserted that mixed models of EI incorporated attributes such as flexibility, which did not focus on emotion or emotional reasoning. In addition, Mayer, Roberts, et al. (2008) argued that the mixed-model theoretical structure of EI was associated with personality traits, and therefore did not accurately model the construct of EI. Further, Mayer, Roberts, et al. (2008) asserted self-reports of EI were not valid assessments, as they assessed one’s self-concept as opposed to one’s EI ability.
C.2.2.4.2 Goleman: Emotional Competence Inventory (ECI)

Goleman’s (1995) book entitled, *Emotional Intelligence: Why it can matter more than IQ* presented a formative conceptualisation and model of EI. Goleman’s (1995) publication on EI was included in the *New York Times* bestseller list for one and a half years reflecting the sales of 5,000,000 printed copies of his book in 40 languages. Goleman presented the concept of EI based on seminal publication by Salovey and Mayer (1990) entitled “Emotional Intelligence”. Interest in the psychological concept of EI, as presented by Goleman (1995), was associated with exceptionally high levels of media coverage; which, included an article in *Time Magazine*, entitled “The EQ Factor” by Gibbs (1995). This *Time Magazine* article described the concept of EI, as outlined by Goleman, and noted that, unlike IQ, EI could be developed (Gibbs, 1995). In addition, EI was described as a factor that was important in relation to other factors in human development, such as psychological wellbeing, leadership and academic success (Gibbs, 1995). Collectively, the two publications by Goleman (1995) and Gibbs (1995) aroused an unprecedented level of interest in EI from the general public and theoretical debate in the academic community (Matthews, Zeidner, et al., 2004; Mayer, Salovey, et al., 2000b; Roberts et al., 2001).

C.2.2.4.2.1 Goleman’s Mixed-Model of EI

Goleman (1995) defined EI as a key set of characteristics, as follows: …emotional intelligence: abilities such as being able to motivate oneself and persist in the face of frustrations; to control impulses and delay gratification; to regulate one’s moods and keep distress from swamping the ability to think; to empathize and to hope. (Goleman, 1995, p. 34)

This was not an operationalised definition of EI that would support the development of empirical psychological research studies and theoretical discourse; therefore, Goleman’s definition of EI was critiqued as being “sweeping and open to the criticism that it is overinclusive” (Matthews, Zeidner, et al., 2004). In addition, Goleman (1995) acknowledged that Salovey and Mayer (1990, p. 189) had presented a definition of EI in their researcher paper; however, he did not repeat or quote the definition of EI presented by Salovey and Mayer in his book *Emotional Intelligence: Why it can matter*
The lack of a clearly articulated definition of EI was problematic from an academic research perspective (Zeidner, Roberts, & Matthews, 2002).

Goleman (1995) did provide a theoretical framework for his model of EI. Initially, Goleman (1995) acknowledged and referenced the research and model of EI presented by Salovey and Mayer (1990, p. 189). However, when Goleman subsequently outlined five EI domains they did not clearly reflect or follow the original research model of EI articulated by Salovey and Mayer (Goleman, 1995, p. 43). Hence, the theoretical EI model published by Goleman (1995) had a broader theoretical scope of EI and a more generalised EI framework, which was only loosely related to the original EI theoretical framework published by Salovey and Mayer (1990, p. 190). Therein, Goleman (1995, pp. 43-44) outlined five EI domains that framed his EI model, which included:

1. Knowing one’s emotions.
4. Recognising emotions in others.
5. Handling emotions.

Based on Goleman’s (1995) model of EI, the theoretical construct of EI was broadly framed. Hence, Mayer, Salovey, et al. (2008) referred to Goleman’s EI model as a mixed-model of EI, as it mixed in other personality traits. For example, Goleman’s model of EI encompassed elements such as: “persistence, zeal, self-control, character as a whole, and other positive attributes” (Mayer, Salovey, et al., 2008, p. 504).

Further, prior to the publication of Goleman’s book in 1995, Mayer, DiPaolo and Salovey (1990) published one EI assessment, which only assessed one component of EI. The second psychometric EI assessment, the TMMS was published by Salovey et al. (1995), assessed three components of EI. Hence, prior to 1995 the development of psychometric EI models and assessments were at a very early and formative stage of development. Therefore, academics expressed critical concerns (Cobb & Mayer, 2000) in response to Goleman’s statement that:
No one can yet say exactly how much of the variability from person to person in life’s course it (emotional intelligence) \textit{(sic)} accounts for. But what data exist suggest it can be as powerful, and at times more powerful, than IQ (1995, p. 34).

This assertion that EI could account for more variance than IQ, sparked academic concerns that the estimated predictive variance of EI outlined by Goleman was inadequately supported by research evidence and therefore was possibly an over-inflated estimation of the psychometric strength of EI (Cobb & Mayer, 2000; Matthews, Roberts, et al., 2004). For instance, Neisser et al. (1996) acknowledged that IQ was a reliable and valid predictor of school performance that typically correlated with IQ at $r = .50$, which accounted for approximately 25% of the variance in academic achievement. Therefore, according to Goleman’s (1995) assertion that EI could be “as powerful, and at times more powerful, than IQ”; EI would have to account for 25% or more of the variance in academic achievement. In contrast to Goleman’s estimation, Mayer, Salovey, et al. (2008, p. 510) suggested any new psychological entity, such as EI, would be considered satisfactory at the $r = .10$ to .20 range, good in the $r = .20$ to .30 range, and very good if higher than $r = .30$. Hence, EI would be reasonably expected to account for between 1% and 9% of the variance in an important outcome such as academic achievement.

Consequently, the statistical accuracy of Goleman’s assertion regarding the predictive effect of EI was subject to debate (Matthews, Roberts, et al., 2004; Mayer, Roberts, et al., 2008; Mayer, Salovey, et al., 2008).

Hence, academics raised concerns about the theoretical and psychometric rigour of the construct and model of EI outlined by Goleman (1995). There were four primary concerns: (1) the concept of EI was not clearly outlined or operationally defined; (2) the theoretical structure and model of EI incorporated a very broad range of non-cognitive factors and personality traits from divergent fields, which were clustered together in groups; (3) the model of EI outlined had not been psychometrically assessed; and (4) in the absence of empirical psychometric evidence, Goleman had purported that EI accounted for the variance in fields of human performance (Cobb & Mayer, 2000; Matthews, Zeidner, et al., 2004; Mayer, Salovey, et al., 2000c, 2008).
On the other hand, Gibbs (1995) inferred that Goleman (1995) addressed the previously unacknowledged importance of EI by writing about EI in a manner that was designed to inform the general public. Therein, Goleman conducted (a) extensive interviews with academics, and (b) collated a broad range of academic publications drawn from multiple theoretical fields, such as philosophy, emotion, intelligence and neurology; which, collectively provided the basis of his EI publication (Gibbs, 1995). Hence, while some of the assertions made by Goleman (1995) were unsupported by empirical evidence based on the normal protocols in academic research; nonetheless, Goleman’s (1995) publication nonetheless created international interest in EI and has motivated theoretical debate and research in the field of EI (Matthews, Roberts, et al., 2004). Further, based on Goleman’s model of EI, Boyatzis et al. (2000) developed a psychometric measure of competence in EI, which will now be discussed.

C.2.2.4.2.2 Emotional Competence Inventory (ECI)

Goleman, Boyatzis, and Hay Group (1999) developed a measure of EI competencies, entitled the Emotional Competence Inventory (ECI). Sala (2002) provided a revision of the measure entitled ECI V.20. The term competencies was defined as “underlying characteristics of the person that led to or caused effective or superior performance” (Boyatzis & Sala, 2004). Further, the ECI: Technical Manual defined EI as:

…the capacity for recognizing our own feelings and those of others, for motivating ourselves and for managing emotions effectively in ourselves and others. An emotional competence is a learned capacity based on emotional intelligence that contributes to effective performance at work. (Wolff, 2005, p. 2)

The ECI V2.0 model included four clusters with 18 competencies, as outlined in Table C.2. The 18 competencies were allocated into one of the four clusters (Wolff, 2005). The ECI was a 360-degree tool that included both a self-rater scale and an other-rater scale. It was recommended that both self and other rater scales be utilised. The ECI V2.0 scale response set ranged from one to six. Numbers one to six were sequentially allocated to each of the following terms: never, rarely, sometimes, often, consistently, and don’t know.
### Table C.2

*Emotional Competence Inventory (ECI) V2.0*

<table>
<thead>
<tr>
<th>ECI V2.0 Cluster (4)</th>
<th>ECI V2.0 Competence (18)</th>
</tr>
</thead>
</table>
| **Self-Awareness:**Knowing one’s internal states, preferences, resources, and intuitions. | • Emotional Self-awareness  
• Accurate Self-assessment  
• Self-confidence |
| **Self-Management:**Managing one’s internal states, impulses, and resources. | • Emotional Self-control  
• Transparency  
• Adaptability  
• Achievement  
• Initiative  
• Optimism |
| **Social Awareness:**How people handle relationships and awareness of others’ feelings, needs, and concerns. | • Empathy  
• Organisational Awareness  
• Service Orientation |
| **Relationship Management:**Skills or adeptness at inducing desirable responses in others. | • Developing Others  
• Inspirational Leadership  
• Change Catalyst  
• Influence  
• Conflict Management  
• Teamwork and Collaboration |


Byrne, Dominick, Smither, and Reilly (2007) examined the validity of the ECI V2.0 self-rating scale. Participants in the study ($N = 324$) were aged from 20 to 63 years of age ($M_{age} = 31.23$, $SD = 8.16$). The findings indicated that the ECI had a small to moderate correlation with the Big-Five dimensions of personality (NEO). However, Byrne et al. (2007) completed a confirmatory factor analysis, which found the factor
structure in the ECI was differentiated from the factor structure of the dimensions in the Big-Five personality inventory. Therefore, these findings indicated there was a relationship between the ECI construct and personality, although both constructs had a distinct factor structure (Byrne et al., 2007). Therein, these findings highlighted the relationship between ECI and personality, which raised psychometric concerns regarding the independent validity of the ECI measure. Nonetheless, the study results also confirmed that the CEI was not related to academic performance or general mental ability.

Further, there was a small correlation between the ECI self-ratings and the judges’ ratings of the ECI, which provided positive but weak evidence of the convergent validity of the ECI (Byrne et al., 2007). The ECI self-reports had small but significant correlations with a range of factors such as emotionally competent behaviours, peer nominations of leadership, managerial skills and the number of promotions received. Conversely, with the exception of one emotional competency, these relationships were no longer significant when personality and age were controlled in the emotional competencies assessed (Byrne et al., 2007). Collectively, the results confirmed that the ECI self-ratings were positively, but weakly, related to a range of work related outcomes. Therefore, Byrne et al. (2007) noted that the small correlations between the ECI and the work-related outcomes provided positive but weak evidence, to supported the criterion-related validity of the ECI.

Hence, the research findings presented by Byrne et al. (2007) combined with the research findings summarised by Wolff (2005) in the ECI Technical Manual, supported the psychometric reliability, validity, and internal consistency the ECI V2.0. The factorial structure and psychometric characteristics of the Swinburne University Emotional Intelligence Test (SUEIT) are now examined.

**C.2.2.4.3 Swinburne University Emotional Intelligence Test (SUEIT)**

Ben Palmer and Con Stough developed and published the first version of the Swinburne University Emotional Intelligence Test (SUEIT) for the adult population (Palmer & Stough, 2001c). The SUEIT was developed with the aim of identifying the essential factors underlying the construct of EI and then developing a psychometrically rigours measure of those EI factors. Palmer and Stough identified six of the most
recognised EI tests that were developed before 2000, and then began to investigate their theoretical and psychometric properties. The six EI scales analysed were the:

- MSCEIT (Mayer, Salovey, et al., 1999)
- Bar-On EQ-i (Bar-On, 1997b)
- TMMS (Salovey et al., 1995)
- TAS-20 (Bagby, Parker, & Taylor, 1994)
- EI scale subsequently referred to as Self-Report Emotional Intelligence Test (SREIT) (Schutte et al., 1998)
- EI scale (Tett et al., 1997)

First, a factor analysis of each of the six EI measures outlined was conducted (Stough et al., 2002). Second, the dimensions identified from each factor analysis were collated and a factor analysis was conducted on these dimensions (Stough et al., 2002). The factor analysis accounted for 58% of the variance and loaded onto five factors, which were encompassed in the EI measure entitled the SUEIT (L. Gardner & Stough, 2002).

The five factors were entitled: emotional recognition and expression in oneself, emotions direct cognition, understanding of emotions external, emotional management, and emotional control. These five essential EI factors were not dissimilar to the four-branch model of EI developed by (Mayer & Salovey, 1997). These five EI factors were incorporated in the SUEIT model and measure of EI (Palmer & Stough, 2001c), as described in Table C.3.

Table C.3

**Swinburne University Emotional Intelligence Test V1.0**

<table>
<thead>
<tr>
<th>Emotional Recognition and Expression</th>
<th>The ability to identify one’s own and feelings and emotional states, and the ability to express those inner feelings to others.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotions Direct Cognition</td>
<td>The extent to which emotions and emotional knowledge are incorporated in decision making and/or problem solving.</td>
</tr>
<tr>
<td>Understanding of Emotions External</td>
<td>The ability to identify and understand the emotions of others and those that manifest in external stimuli.</td>
</tr>
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<td>-----------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Emotional Management</td>
<td>The ability to manage positive and negative emotions within both oneself and others.</td>
</tr>
<tr>
<td>Emotional Control</td>
<td>How effectively emotional states experienced at work, such as anger, stress, anxiety and frustration, are controlled.</td>
</tr>
<tr>
<td>SUEIT Total Score</td>
<td>Provides a measure of a set of related abilities that assesses the way individuals typically think, feel and act with emotions at work.</td>
</tr>
</tbody>
</table>

*Note. Adapted from the SUEIT (L. Gardner & Stough, 2002, p. 72).*

The SUEIT was developed as a self-report measure of EI that was initially designed for an adult working population (Palmer & Stough, 2001c). The self-report measure encompassed 64 items, which were assessed on a five-point Likert Scale (1 = Never, 5 = Always). The SUEIT was developed and normed with a cohort of 690 adult participants. The psychometric analysis of the SUEIT scales confirmed internal consistency, construct validity, and criterion validity (Palmer, Gardner, & Stough, 2003; Palmer & Stough, 2001c). The SUEIT full scale coefficient alpha score was: .90. The SUEIT subscales coefficient alpha score was: .91 in emotional recognition and expression, .70 in emotions direct cognition, .89 in understanding emotions, .83 for emotional management, and .77 for emotional control (Palmer, Gardner, et al., 2003; Palmer & Stough, 2001c). The SUEIT had discriminant validity from the personality constructs: neuroticism, extroversion and openness (Palmer, Gardner, et al., 2003; Palmer & Stough, 2001c). Hence, a psychometric analysis of the factors in the SUEIT confirmed they attained adequate levels of reliability and validity and met the required psychometric assessment standards (Palmer, Gardner, et al., 2003; Palmer & Stough, 2001c).

In addition, L. Gardner and Stough (2002) examined the relationship between EI, as measured by the SUEIT, and leadership styles in high-level managers ($N = 110$) with
an average age of 42.7 years. Participants were instructed to respond to each statement based on the way they typically thought, felt and acted at work. The SUEIT scale provided a measure of five EI factors and a total score, as outlined in Table C.3. Based on the study results, L. Gardner and Stough (2002) confirmed that EI as measured by the SUEIT, was predictive of transformational leadership. There was no relationship between EI and transactional leadership. Finally, there was a significant negative relationship between EI and laissez-faire leadership style. Consequently, L. Gardner and Stough (2002) concluded the study results provided further evidence to support the psychometric reliability and validity of the SUEIT as a measure of EI, which was predictive of different styles of leadership.

Palmer (2003) completed his PhD thesis, which analysed the relationships between a range of EI models and their measures. Also in 2003, the first version of the SUEIT was refined, which consequently led to the development and publication of the SUEIT Version 2.0 (Palmer & Stough, 2003). The second version of the SUEIT was also normed with two sets of normative data taken from the general population (N = 3000) and from the executive population (n = 1059). Further, Palmer, Stough, et al. (2003) developed the first version of an adolescent EI assessment, which was referred to as the SUEIT Adolescent Version (SUEIT: A). Therefore, in 2003 the SUEIT existed in the following three formats:

- SUEIT Workplace Version 2.0 with 64 items (self-report and other-report; A 360 Degree Assessment);
- SUEIT General Version 2.0 with 64 items (self-report and other-report; A 360 Degree Assessment); and
- SUEIT Adolescent Version with 59 items (self-report).

The SUEIT individual self-report reflects an individual’s knowledge of their inner self and how they deal with emotions. Therefore, the data provides information about the way an individual sees himself or herself typically dealing with emotions. Participants were asked to indicate the way they typically think, feel and act with emotions (at work or generally), in a five-point Likert Scale. The five options include: Almost Never; Seldom; Sometimes; Usually; or Almost Always (Genos Manual, 2003).
The SUEIT 360-degree report was generated from both: (a) the self-report, and (b) the other-report or other’s rating of the nominated individual. Ratings from others were based on the way others typically perceive the individual dealing with emotions (at work or generally), with reference to the nominated individual’s outward displays or behaviours. The 360-degree version of the SUEIT is a self-report and an other-report or rating scale. Asking participants to indicate the way the subject typically thinks, feels, and acts with their emotions: Almost Never; Seldom; Sometimes; Usually; Almost Always; or Not Sure (Genos Manual, 2003).

Thereafter, Gignac (2005a) revised the SUEIT with a confirmatory factor analysis of the 64 items in the assessment, based on 1,405 adult participants. The study was a formative component of Gignac’s (2005a) PhD thesis. The final analysis identified seven EI factors in the model. Consequently, Emotional Recognition and Expression was represented by two factors (Emotional Recognition in Self and Emotional Expression) and Emotional Management was represented by two factors (Emotional Management of the Self and Emotional Management of others) (Gignac, 2005a). Further, Gignac (2010c) conducted a factor analysis on the Genos Emotional Intelligence Inventory, which was an EI measure derived from the SUEIT (Palmer & Stough, 2001c). The factor analysis of the Genos Emotional Intelligence Inventory incorporated a review of the self-report and rater-report measures of EI. The results offered support for the seven-factor model of EI (Gignac, 2010c). While there were a number of changes in the seven-factor model to the revised Genos Emotional Intelligence Inventory (Gignac, 2010c), the factors outlined by Gignac were not entirely dissimilar to the five-factor analysis of the EI model originally identified in the SUEIT by Palmer and Stough (2001c).

Further, Gignac (2010b) asserted the conceptualisation of the ability and trait EI models could be considered in light of their capacity to represent one’s maximal performance or typical performance, respectively. Therein, it was suggested that the ability model of EI was reflective of the maximal EI performance test scores, representing the highest level of one’s performance on EI tasks, while trait model of EI was reflective of typical EI performance scores, representing how an individual was “most likely to behave, think or feel across a broad class of situations” (Gignac, 2010b, p. 133). Hence, the Genos model of EI included both self-reports and observer or rater-
reports (Palmer et al., 2009). Therefore, Gignac (2010b) concluded the Genos EI model utilised a multi-method approach to the assessment of EI and aimed to identify one’s typical performance.

**C.2.2.5 Conclusion: Theoretical Models and Measures of EI**

In summary, this literature review has presented an overview of the philosophical origins of EI, and the theoretical models of emotion and intelligence, which are formative elements in the conceptualisation of EI. The literature review was divided into three waves of research, which provided an overview and analysis of the key historical and theoretical models of EI.

The first wave of researchers developed psychoanalytical model of EI as presented by Leuner (1966), Payne (1985), and Greenspan (1989) who presented a formative historical, theoretical and a developmental perspective of EI. The psychodynamic models of EI provided three unique perspectives regarding the conceptualisation of EI, the theoretical model of EI and the association of EI with other important factors in human development and function throughout the lifespan.

The second wave of researchers worked towards developing contemporary psychometric theoretical models and measures of EI. The second wave of EI research commenced in 1990 with seminal studies by Mayer, Salovey, Caruso and colleagues (Mayer et al., 1990; Salovey & Mayer, 1990). Mayer et al. (2012) continue to be prolific in the development, refinement and publication of EI research, which was collectively referred to as the ability model of EI.

The third wave of researchers also worked towards developing contemporary psychometric theoretical models and measures of EI. The third wave of research commenced in 1995 with the formative publication by Goleman (1995). Therein, formative EI researchers including Bar-On (1996), Schutte et al. (1998), Petrides and Furnham (2000b), Boyatzis et al. (2000), Parker et al. (2001), Palmer and Stough (2001c), Zeidner et al. (2003), Tett et al. (2005) and Gignac (2010c) have contributed to the body of EI research, which is collectively referred to as the trait model of EI.

Hence, a wide range of EI models and measures have each contributed to the growing body of peer-reviewed publications that have built a collective body of research, which has established the construct of EI as a recognised psychological field of study.
(Stough et al., 2009). Psychometric research investigating EI has been conceptualised EI in two theoretical fields (Petrides & Furnham, 2000b), referred to as the ability model of EI (Mayer et al., 1990) and the trait model of EI (Schutte et al., 1998). Both the ability and trait models of EI have developed (a) EI theoretical models; (b) operationalised definitions of EI; and (c) psychometric assessments of EI, which have necessarily and primarily focused on the adult population.
APPENDIX D
The University of Melbourne Ethics Approval

20 October 2003

Dr E Care, Professor P Griffin & Ms M Ryan
Department of Learning & Educational Development

Dear Dr E Care, Professor P Griffin & Ms M Ryan

I am pleased to advise that the Arts and Education Human Ethics Subcommittee approved the following project:

The influence of emotional intelligence on academic achievement in gifted and mainstream students
Dr E Care, Professor P Griffin & Ms M Ryan
HREC No. 830575 A&E 3.434

The Project has been approved for the period: 16/10/03 to 31/12/03. It is your responsibility to ensure that all people associated with this particular project are made aware of what has actually been approved.

Research projects are normally approved to 31 December of the year of approval. Projects may be renewed yearly for up to a total of five years upon receipt of a satisfactory annual report. If a project is to continue beyond five years a new application will normally need to be submitted.

Please note that the following conditions apply to your approval. Failure to abide by these conditions may result in suspension or discontinuation of approval and/or disciplinary action.

(a) Limit of Approval: Approval is limited strictly to the research proposal as submitted in your application.

(b) Variation to Project: Any subsequent variations or modifications you might wish to make to your project must be notified formally to the Human Ethics Sub-Committee for further consideration and approval. If the Sub-Committee considers that the proposed changes are significant, you may be required to submit a new application for approval of the revised project.

(c) Incidents or adverse affects: Researchers must report immediately to the Sub-Committee anything which might affect the ethical acceptability of the protocol including adverse effects on subjects or unforeseen events that might affect continued ethical acceptability of the project. Failure to do so may result in suspension or cancellation of approval.

(d) Monitoring: Projects are subject to monitoring at any time by the ethics committee.

(e) Annual Report: You must submit an annual report on this project at the end of the year, or, at the conclusion of the project if it continues for less than a year. Requests for annual reports are sent out by the Human Research Ethics Office in November/December of each year. Failure to submit a progress report at the end of the year will mean approval for your project will lapse.

(f) Auditing: All projects may be subject to audit by members of the Sub-Committee.

If you have any further queries on these matters, or require additional information, please do not hesitate to contact me on telephone no. 8344 6096 or e-mail: jsa@unimelb.edu.au.

Please quote the HREC registration number and the name of the project in any future correspondence.

On behalf of the Sub-Committee I wish you well in your research.

Yours sincerely,

Ms Jacky Ang
Ethics Officer, Human Research Ethics

c.e. Chair, DHEAG, Learning & Educational Development
Ms M Ryan, PhD student.

Melbourne Research and Innovation Office
The University of Melbourne Victoria 3010 Australia
Telephone: +61 3 9344 7114 Fax: +61 3 9347 6339
http://www.unimelb.edu.au/research
Human Ethics Annual Research Report: Confirmation of Lodgment

**Request Number:** 30575  
**Date of Lodgment:** 21/4/2005 12:50

**Project Title:**
The influence of emotional intelligence on academic achievement in gifted and mainstream students

**Principal Investigators:**
E Care, Professor P Griffin & Ms M Ryan

**Other Investigators:**

**Field/School/Centre:**
Learning & Educational Development

Thank you for submitting the annual report for the above project. The information provided in the annual report satisfies the criteria for confirmation of continuing human research ethics approval. The project is now approved until 31st December 2005.

If it is planned to make any amendments to the research in the coming year, please note that they must be submitted for approval by the Human Research Ethics Committee, and written notification of approval must be received before they can be implemented.

If you have any queries regarding this approval, please contact the Human Research Ethics Secretariat within Melbourne Research and Innovation Office on 8344 2071.
APPENDIX F
Catholic Education Office Ethics Approval

In reply please quote:
GE05/0009
1066

28 February 2005

Ms M Ryan
8 Kindale Court
HIGHTON VIC 3216

Dear Ms Ryan

I am writing in regard to your letter of 7 February 2005 in which you referred to your forthcoming research project titled: The Influence of Emotional Intelligence on Academic Achievement in Gifted and Mainstream Students. I understand that this research is part of your doctoral studies at The University of Melbourne. You have asked approval to approach three Catholic Colleges in the Geelong region, as you wish to involve students in Year 12.

I am pleased to advise that your research proposal is approved in principle subject to the following standard conditions.

1. The decision as to whether or not research can proceed in a school rests with the School Principal. So you will need to obtain approval directly from the Principal of each school that you wish to involve.

2. You should provide each Principal with an outline of your research proposal and indicate what will be asked of the school. A copy of this letter of approval, and a copy of notification of approval from the University's Ethics Committee, should also be included.

3. A Criminal Record check is necessary for all researchers visiting schools. A certificate may be obtained on application to the Victoria Police and this must be shown to the Principal before starting the research in each school.

4. No student is to participate in the research study unless s/he is willing to do so and informed consent is given in writing by a parent/guardian.

5. You should provide the names of schools which agree to participate in the research project to the Knowledge Management Unit of this Office.

James Goldie
Director
Catholic Education Office

[Location Information]
APPENDIX G
Letter of Request to Schools

Maree Ryan
Principal and Senior School Executive Committee
(School Name and Address)

Dear Principal and Senior School Executive Committee,

RE: Request for student participation in PhD research project

I am currently conducting the following research, which will form the basis of my Doctorate of Philosophy (PhD) thesis at The University of Melbourne, in the Educational Psychology Unit of the Department of Learning and Educational Development. Professor Patrick Griffin and Dr. Esther Care are supervising my thesis research. I would like to request permission to conduct this research project at your school in (Year Nominated) with consenting Victorian Certificate of Education (VCE) Year 12 students. The proposed research project is entitled, ‘The influence of emotional intelligence on academic achievement in gifted and mainstream students.’

The research project will review the interaction of cognitive and emotional intelligence in gifted and mainstream adolescent students studying VCE Year 12, in terms of the influence of cognitive and emotional intelligence on academic achievement, as indicated by Equivalent National Tertiary Entrance Rank (ENTER) Scores and Study Scores. It is hypothesised that emotions play a far greater role in thought, decision making and individual success than is commonly acknowledged. Emotional Intelligence encompasses self-awareness and impulse control, persistence, zeal and motivation, empathy and social deftness. These are qualities commonly identified in people who excel both in the work place and in their personal lives. This research project will be the first to use recognised measures of both cognitive and Emotional Intelligence and is based on the work of Professor Con Stough. Professor Stough has developed a valid and reliable measure of Emotional Intelligence. Prior to 2002, the difficulties in the differentiation of self-esteem and anxiety trait when assessing Emotional Intelligence prevented the development of a statistically accurate and recognised measure of Emotional Intelligence. Results from this study may highlight how Adolescent Emotional Intelligence can be nurtured and strengthened. These strategies may have direct implications for future students, parents and educators.
It is proposed that the students will be tested with the Raven’s Standard Progressive Matrices to indicate their cognitive level of functioning. The students will also complete the Swinburne University Emotional Intelligence Test (SUEIT, Adolescent Version 2), which is a self-report test (2001). Finally, at the end of the year the students will be requested to allow me to record their VCE ENTER Score and Study Score. These three sets of data: cognitive intelligence as indicated by the Raven’s Standard Progressive Matrices; Emotional Intelligence as indicated by the SUIET (Adolescent Version 2); and academic achievement as indicated by each students VCE ENTER Score and Study Score will then be analysed. Both students will be reviewed to identify specific characteristics or patterns of Emotional Intelligence that are evident in students who academically overachieve for their intellectual level, achieve at a level commensurate with their intellectual level or underachieve for their intellectual level.

The collection of data would require one period in which the Raven’s Standard Progressive Matrices (35 min.) and the Swinburne University Emotional Intelligence Test, Adolescent Version 2 (15 min.) would be administered. The data pertaining to the student’s ENTER Score and Study Scores would be collected from the school with parent or guardian consent. The University of Melbourne Human Ethics guidelines would be adhered to, ensuring confidentiality of results and the appropriate use of research data. The results of this research may be published in educational forums, but neither the school nor any of its students will be identified, pseudonyms will be used if referring to specific cases. Normal statistical procedures will be followed and confidentiality of all results will be strictly adhered to. Parents may gain access to their child’s data following completion of the data collection and access to the total study results upon completion of the thesis. Students require parental permission to participate in the study, please refer to the attached Information and Consent Form for Prospective Research Participants for more details.

If you would like to discuss aspects of this research proposal please contact myself (03 5278 9999), Dr. Care (03 8344 0975) or the Human Ethics Research Office (03 8344 4071) and your enquiries will be promptly addressed. I look forward to hearing from you regarding my request to undertake research at your school.

Yours Sincerely,

Maree Ryan  
APPENDIX H
Prospective Research Participants Information

THE UNIVERSITY OF
MELBOURNE

Principal and Senior School Executive Committee
(School Name and Address)

Dear Principal and Senior School Executive Committee,

Subject: Request for participation in PhD research project, exploring the influence of emotional intelligence on the academic achievement of gifted and mainstream students.

I am currently conducting the following research, which will form the basis of my Doctorate of Philosophy (PhD) thesis at The University of Melbourne, in the Educational Psychology Unit of the Department of Learning and Educational Development. Professor Patrick Griffin and Dr. Esther Care are supervising my thesis research. I would like to request permission to conduct this research project at your school in (Year Nominated) with consenting Victorian Certificate of Education (VCE) Year 12 students. The proposed research project is entitled, ‘The influence of emotional intelligence on academic achievement in gifted and mainstream students.’

The research project will review the interaction of cognitive and emotional intelligence in gifted and mainstream adolescent students studying VCE Year 12, in terms of the influence of cognitive and emotional intelligence on academic achievement, as indicated by Equivalent National Tertiary Entrance Rank (ENTER) Scores and Study Scores. It is hypothesised that emotions play a far greater role in thought, decision making and individual success than is commonly acknowledged. Emotional Intelligence encompasses self-awareness and impulse control, persistence, zeal and motivation, empathy and social deftness. These are qualities commonly identified in people who excel both in the work place and in their personal lives. This research project will be the first to use recognised measures of both cognitive and Emotional Intelligence and is based on the work of Professor Con Stough. Professor Stough has developed a valid and reliable measure of Emotional Intelligence. Prior to 2002, the difficulties in the differentiation of self-esteem and anxiety trait when assessing Emotional Intelligence prevented the development of a statistically accurate and recognised measure of Emotional Intelligence. Results from this study may lead to insights into how Emotional Intelligence can be nurtured and strengthened. These strategies may have direct implications for future students, parents and educators.

It is proposed that the students will be tested with the Raven’s Standard Progressive Matrices to indicate their cognitive level of functioning. The students will also complete the Swinburne University Emotional Intelligence Test (SUEIT, Adolescent
Version 2), which is a self-report test (2001). Finally, at the end of the year the students will be requested to allow me to record their VCE ENTER Score and Study Score. These three sets of data: cognitive intelligence as indicated by the Raven’s Standard Progressive Matrices; Emotional Intelligence as indicated by the SUIET (Adolescent Version 2); and academic achievement as indicated by each students VCE ENTER Score and Study Score will then be analysed. Both the students’ scores will be reviewed to identify specific characteristics or patterns of Emotional Intelligence that are evident in students who academically overachieve for their intellectual level, achieve at a level commensurate with their intellectual level or underachieve for their intellectual level.

The collection of data would require one period in which the Raven’s Standard Progressive Matrices (35 min.) and the Swinburne University Emotional Intelligence Test, Adolescent Version 2 (15 min.) would be administered. The data pertaining to the student’s ENTER Score and Study Scores would be collected from the school with parent or guardian consent. The University of Melbourne Human Ethics guidelines would be adhered to, ensuring confidentiality of results and the appropriate use of research data. The results of this research may be published in educational forums, but neither the school nor any of its students will be identified, pseudonyms will be used if referring to specific cases. Normal statistical procedures will be followed and confidentiality of all results will be strictly adhered to. Parents may gain access to their child’s data following completion of the data collection and access to the total study results upon completion of the thesis. Students require parental permission to participate in the study, please refer to the attached Information and Consent Form for Prospective Research Participants for more details.

If you would like to discuss aspects of this research proposal please contact myself (03 5278 9999), Dr. Care (03 8344 0975) or the Human Ethics Research Office (03 8344 4071) and your enquiries will be promptly addressed. I look forward to hearing from you regarding my request to undertake research at your school.

Yours Sincerely,

Maree Ryan
APPENDIX I
Study Consent Form

THE UNIVERSITY OF MELBOURNE
DEPARTMENT OF LEARNING & EDUCATIONAL DEVELOPMENT/
EDUCATIONAL PSYCHOLOGY

Consent form for persons participating in research projects:

PROJECT TITLE: The influence of emotional intelligence on academic achievement in gifted and mainstream students

Name of participant:

Name of investigators: Professor Patrick Griffin, Dr. Esther Care (03 83440975) and Maree Ryan (03 52789999).

(1) I consent to participate in the project named above, the particulars of which - including details of the Raven’s Standard Progressive Matrices, a general problem solving test; the Swinburne University Emotional Intelligence Test (SUEIT: A); and the collection of the VCE ENTER Score and study scores from the results provided to the school, have been explained to me. A written copy of the information has been given to me to keep.

(2) I authorise the researcher or his or her assistant to administer the Raven’s Standard Progressive Matrices, the Swinburne University Emotional Intelligence Test and to collect my VCE ENTER Score and Study Score referred to under (1) above.

(3) I acknowledge that:
(a) The possible effects of the testing and collections of data have been explained to me to my satisfaction;
(b) I have been informed that I am free to withdraw from the project at any time without explanation or prejudice and to withdraw any unprocessed data previously supplied;
(c) The project is for the purpose of research and not for treatment;
I have been informed that the confidentiality of the information I provide will be safeguarded subject to any legal requirements.
Acknowledgement that participants will be referred to by pseudonyms and not identified by name in any publication arising from this research.
The findings of this research will have no effect on grades or assessments.

Thank you for taking the time to consider participation in this research study. If you do wish to participate please return this research consent form to (School Name) or Maree Ryan.

I do / do not consent to my son or daughter participating in the research study to examine the influence of emotional intelligence on gifted and mainstream students.

Student Name:

School Name:

Parent or Guardian Name:

Parent or Guardian Signature: Date:
APPENDIX J
Raven’s Progressive Matrices Standardised Edition

E10
APPENDIX K
Swinburne University Emotional Intelligence Test: AV

Adolescent Self-Report Version

Instructions

There are no right and wrong ways to feel in any one given situation, however, there are more and less effective ways of dealing with emotions. The Adolescent Version of the SUEIT has been designed to assess how effectively individuals deal with emotions. It contains a series of statements for which there are no right and wrong answers. Rather, your responses to the statements should indicate the way you typically deal with emotions.

The most accurate assessment is gained from people who respond to the statements honestly. Therefore it is essential that you are truthful about yourself, and that you do not answer in a way that you think sounds good or acceptable. In general, try not to spend too long thinking about responses. Most often the first answer that occurs to you is the most accurate. However, do not rush your responses or respond without giving due consideration to each statement. Below is an example.

Q. I am aware of my moods and emotions.

You are required to indicate on the response scale, the extent to which the statement is indicative of the way you typically think, feel or act. There are five possible responses to each statement (shown below). You are required to fill in the circle containing the number that corresponds to your answer where.....

1 = Very Seldom
2 = Seldom
3 = Sometimes
4 = Often
5 = Very Often

When considering a response, it is important not to think of the way you thought, felt, or acted in any one situation, rather how you typically think, feel or act. If you feel a statement does not apply to you, choose a response that gives the best indication of how you think you would typically think, feel or act. Some of the statements may not give all the information you would like to receive. If this is the case, please choose a response that seems the best even if you are not sure. There is no time limit to the test, however it should take between 15-20 minutes to complete. Thank you for taking the time to complete the Swinburne University Emotional Intelligence Test.
Adolescent Self-Report Version

Please answer each question on this form. Print information in the boxes provided. Please answer questions with 'bubbles' by completely filling in the bubble that corresponds with your answer.

Name (please print clearly)

Age (yrs):

Gender: ○ Male ○ Female

Level of Education:
○ Completing Year 7
○ Completing Year 8
○ Completing Year 9
○ Completing Year 10
○ Completing Year 11
○ Completing Year 12

Cultural and Ethnic Background
○ Oceanian (Australian, New Zealand, Melanesian, Micronesian, Polynesian)
○ North-West European (British, Irish, Western European, Northern European)
○ Southern and Eastern European (Southern European, South Eastern European, Eastern European)
○ North African and Middle Eastern (Arab, Jewish, Other North African and Middle Eastern)
○ South-East Asian (Mainland South-East, Maritime South-East Asian)
○ North-East Asian (Chinese Asian, Other North-East Asian)
○ Southern and Central Asian (Southern Asian, Central Asian)
○ People of the Americas (North American, South American, Central American, Caribbean Islander)
○ Sub-Saharan African (Central and West African, Southern and East African)
**Adolescent Self-Report Version**

Below are the series of statements, please fill in the circle containing the number that is most indicative of the way you **typically** think, feel, and act.

If you make a mistake simply cross it out and fill in the correct response!

<table>
<thead>
<tr>
<th>Statement</th>
<th>Using Rarely</th>
<th>Using Sometimes</th>
<th>Using Often</th>
<th>Using Very Often</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I can tell how others are feeling.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. I try to make myself feel good and happy to get over being frustrated.</td>
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<tr>
<td>3. Exploring feelings is useful in solving problems.</td>
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<tr>
<td>4. When I'm worried I can still concentrate on what I am doing.</td>
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<tr>
<td>5. I can tell whether others like each other or not.</td>
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<tr>
<td>6. When I'm under stress, I tend to get irritated by those around me.</td>
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<tr>
<td>7. I find it difficult to talk about my feelings with others.</td>
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<tr>
<td>8. I find it hard to tell how others are feeling from their body language alone.</td>
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<tr>
<td>9. Difficult situations bring out emotions in me that I find hard to deal with.</td>
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<tr>
<td>10. Others find it easy to pick-up on how I am feeling.</td>
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<tr>
<td>11. I find it difficult not to get stressed-out when I am under a lot of pressure.</td>
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<tr>
<td>12. My moods and emotions help me create new ideas.</td>
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<td>13. I can tell how others feel by the tone in their voice.</td>
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<tr>
<td>14. When I am worried, I find it difficult to express this to others.</td>
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<tr>
<td>15. I find it easy to change the moods and emotions of those around me.</td>
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<tr>
<td>16. I don't easily pick-up on the 'vibe' of the environment I'm in.</td>
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<tr>
<td>17. I can tell when others are trying to hide their true feelings.</td>
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<tr>
<td>18. When solving problems I tend to keep my emotions out of it.</td>
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<tr>
<td>19. I find it easy to control my anger.</td>
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<tr>
<td>20. I can describe my feelings on an issue to others.</td>
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<tr>
<td>21. I don't think it's a good idea to use emotions when making my decisions.</td>
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<tr>
<td>22. I find it hard to identify if somebody is upset without them telling me.</td>
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<tr>
<td>23. I find it hard to get people to cooperate with each other.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24. I come-up with new ideas using logic and clear thinking rather than my moods and emotions.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25. I find it hard to concentrate on a task when I'm really excited about something.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26. I am able to let people know how I am feeling by my body language.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27. I find it hard to determine friendships between people I don't know well.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28. I solve disagreements with other people by changing their moods and emotions.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29. I watch the way people react to things when I'm trying to be friendly with them.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30. I solve my problems using logic and clear thinking rather than feelings.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Adolescent Self-Report Version

Below are the series of statements, please fill in the circle containing the number that is most indicative of the way you typically think, feel and act. If you make a mistake simply cross it out and fill in the correct response!

<table>
<thead>
<tr>
<th>Statement</th>
<th>Very Seldom</th>
<th>Seldom</th>
<th>Sometimes</th>
<th>Often</th>
<th>Very Often</th>
</tr>
</thead>
<tbody>
<tr>
<td>31. I find it difficult to think clearly when I'm feeling worried about something.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>32. I have trouble finding the right words to express how I feel.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>33. I find it difficult to get others excited about things.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>34. I can pick-up on the 'vibe' of a discussion.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>35. I listen to my feelings when making important decisions.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>36. I overcome anger by thinking through what's causing it.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>37. Others know when I am worried.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>38. I readily understand the reasons why I have upset someone.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>39. I find it hard to reduce other people's worries.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>40. I weigh-up how I feel about ways of solving problems.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>41. I can be upset and still think clearly.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>42. I find it hard to let others know that I am worried.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>43. I can tell when another person's emotional reactions are out of place.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>44. I find it easy to comfort others when they are upset about something at school.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>45. Other's facial expressions reveal a lot to me about the way they are feeling.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>46. I find it difficult to control strong emotions.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>47. Feelings should be kept at bay when making important decisions.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>48. I easily notice the 'feel' or atmosphere of different environments.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>49. When something gets me down I find it difficult to snap out of it.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>50. I go with my 'feelings' when making important decisions.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>51. I can recognise my emotions when I experience them.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>52. When discussing an issue, I find it difficult to tell whether others feel the same way as me.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>53. Thinking about how fell in a certain situation helps me remember that situation.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>54. I can easily snap out of feeling down.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>55. I find it hard to tell which emotion I'm feeling.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>56. I can tell when someone feels the same way as myself about another person without actually discussing it.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>57. I find it difficult to maintain positive moods and emotions when I'm under stress.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>58. When others get worked-up I stay out of their way</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>59. I find it hard to tell exactly how other people feel when I have a problem with them.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>60. When something goes wrong in my life, I find it difficult to remain positive.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>61. Others can easily tell how I feel.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>62. I try to keep emotions out of my decision making.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>63. I can tell when someone doesn't really like me.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>64. When someone upsets me, I think through what the person has said and find a solution.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
</tbody>
</table>
APPENDIX L
Testing Instructions and Procedures for Teachers

**Standardised Test Instructions and Procedure for Teachers**

Thank you for assisting with the administration of these assessment tasks. The objective of this standardised testing is to have all students perform the same tasks under the same conditions. Therefore, a calm, silent, working environment needs to be established in the classroom to minimise the chances of disruptions and ensure the assessments are completed in standardised test conditions.

If you have any questions, please come and see Maree Ryan. You will have all the measures and equipment supplied. This includes: The Raven’s Standard Progressive Matrices booklet and answer sheet, the Swinburne University Emotional Intelligence Test (SUEIT: A) that has both the questions and an answer section on the same paper, pencils and rubbers supplied. If students have any questions they should raise their hand and then a supervisor will speak with them or raise the discussion with the group if appropriate.

Please administer the Raven’s Standard Progressive Matrices first, provide the students with a 15 to 20-minute break and then administer the Swinburne University Emotional Intelligence Test (SUEIT: A). If you have any concerns about the administration of the questionnaires or the students, please notify Maree Ryan (Ph. 0402451803) or the Principal as soon as is practical.

**Testing Schedule:**
- Raven’s Standard Progressive Matrices: Untimed version of the test, allow 50 minutes
- BREAK: 15 to 20 minutes
- SUEIT: A: 15 to 20 minutes

**Materials Required for Testing:**
- Raven’s Standard Progressive Matrices Booklet
- A Raven’s Standard Progressive Matrices Answer Sheet
- One pencil and an eraser
- SUEIT: A

**Group Administration Guidelines:**
- Room should be ventilated and seating should be arranged to ensure test-takers are unable to see each other’s papers. Avoid interruptions during the testing session.
- Two staff members will be available at each testing session, please lay out all testing materials before the students enter the room.
- Students have already been informed of the purpose of the tests and the nature of the tests. If any student appears anxious or you have any concerns, please contact Maree Ryan or the Principal.
- Standardised instructions for the administration of the test, sequence of tests and the time frames must be followed.
- Write up the time on the whiteboard and mark off each 15 minutes
- Raven’s Standard Progressive Matrices:
  - Photocopied instructions to be read out for the Raven’s Standard Progressive Matrices (pages 6, 7, 8 & 9 of the Manual) and you will need to hold up a booklet, to use to explain the examples to the students.
- Swinburne University Emotional Intelligence Test, Adolescent Version:
  - Please read out the first page in the SUEIT: A and confirm with the students that they understand what to do and are ready to proceed.
- At the end of the testing session, please collect all Raven’s Standard Progressive Matrices booklets and answer sheets; and SUEIT: A questionnaires and return to the main office when the testing is completed.

- Thank you for taking administering the testing session!
- Please thank the students for taking part in the research.
- If you have any concerns or a student has any concerns or questions, please contact Maree Ryan (Ph. 0402451803) or the Principal directly.