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**Positive Illusion Coping Styles:  
Adaptive denial, defensiveness, depression,  
and the protection of self-esteem**

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**A thesis submitted to the  
Melbourne School of Psychological Sciences**

**July 2017**

**The University of Melbourne**

**In fulfilment for the degree of Doctor of Philosophy**

## Abstract

The field of positive psychology has been gathering ground over the last decade and positive psychology approaches are now being used in mental health treatment settings. Criticisms of positive psychology include a proliferation in its claims of benefits, a re-packaging of well-established constructs, and a lack of empirical validation. Two common themes in positive psychology literature relate to adaptive psychological mechanisms and emotion regulation. One area that incorporates both of these is Positive Illusions, an entity first proposed by Taylor and Brown (1988). Taylor and Brown (1988) speculated that a functioning system of 'illusions' would serve to isolate threat, support self-esteem and maintain optimism and motivation. Sharp contrast was drawn between groups showing these positive biasing tendencies and depressed populations. In the years since this seminal article the construct has been routinely mentioned or utilized without being empirically tested.

Adaptive mechanisms that work need to demonstrate their effectiveness both over time and under challenge, however. This study examines whether natural buffering strategies exist in individuals, whether they have utility in the prevention of depression, how independently they function in relation to other psychological constructs, and whether they may be particularly helpful in the presence of negative life events or stressors.

A self-report measure was developed which demonstrated construct validity, reliability and consistency of performance over time. A 2-factor structure was clearly the best representation of the data. As represented by this scale, positive illusions (PIS) correlated negatively with depression, and positively with self-esteem, denial, and defensiveness. Higher self-esteem and higher overall PIS predicted significantly lower depression. Structural equation modelling was used to examine the performance of PIS over time, and its independence in relation to other constructs. PIS scores alone, only accounted for 1% of additional variance over and above other predictive variables in relation to depression, but nevertheless this was a statistically significant addition to the model. Self-esteem as an interaction term was found to be highly correlated with other variables and so was not incorporated in the final modelling sequence. Neuroticism was a significant setting factor for PIS, with PIS and neuroticism together accounting for a significant proportion of the variance in depression; yet the PIS construct also demonstrated its independence from Neuroticism.

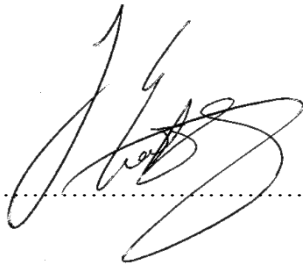
Positive illusions, denial and defensiveness showed very similar levels of correlation to depression – and to each other, implying that there may be a grouping of phenomena that acts similarly or together to influence depression outcomes. Given the negative correlations to Neuroticism, its opposite (i.e., Surgency) is likely to be a factor that allows the possibility of these types of operation to take place.

# Declaration

As the author of this thesis I declare that:

- The thesis comprises only my original work towards the degree of Doctor of Philosophy;
- Due acknowledgement has been made in the text to all other material used;
- The thesis is fewer than the maximum word limit in length, exclusive of tables, maps, bibliographies and appendices as approved by the Research Higher Degrees Committee.

Signed:.....

A handwritten signature in black ink, appearing to read 'Jari Claudia Evertsz', written over a dotted line.

Jari Claudia Evertsz

## Acknowledgements

First and foremost I would like to express my deepest appreciation to my supervisor Professor Henry Jackson. His exceptional patience, wisdom, and immense depth of knowledge have guided this project over the long period to its completion. His gentle humour and kindness combined with unwavering high standards have long set the bar for others to follow. I owe the majority of my academic progress to him; he is one of a kind as an academic and a mentor.

Special gratitude is owed to The University of Melbourne for the wonderful teaching standards that it upholds and for its fantastic facilities – it has been a true privilege to study here.

I am very grateful to Galina Daraganova and Jeromy Anglim for their expert guidance on statistical matters and to Chris Newton for his great support and advice in compilation.

My wonderful Master's /Doctoral cohort are stellar examples in their dedication to their chosen fields and their exceptional academic achievements. They are an inspiration.

And finally to my entire family – Bill and Margarita; Claude and Annabel; Asha, Natalia and Marina; Mark and Ann; Rick, and Elnaz - my thanks and gratitude for your constant interest, humour and encouragement: as always, you make every difficult task worthwhile.

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# CHAPTER ONE: Introduction to Positive Psychology and the Science of Wellbeing: A Growing Field

The field of what we now call positive psychology began a very long time ago and has shown an underlying progression since between the two World Wars. Whilst Napoleon Hill's book "Think and Grow Rich" was published in 1937 and Norman Vincent Peale's book "The Power of Positive Thinking" (1952) both reached a worldwide audience, the term *positive psychology* was first publicly coined by Abraham Maslow in his publication "Motivation and Personality" (1954). More recently it has greatly broadened its reach and developed the areas that it seeks to address. As well as the notion of "happiness" there are strands of positive psychology dedicated to assisting with issues as diverse as trauma and general personal growth (Joseph & Oinley, 2008; S). A current major figure in the positive psychology movement is the author Martin Seligman. He described it as focussing upon "at the subjective level, valued subjective experiences...at the individual level, it is about positive individual traits...at the group level, it is about the civic virtues" (p.5, 2000). Martin Seligman's web homepage "Authentic Happiness" describes positive psychology as "the scientific study of the strengths that enable individuals and communities to thrive" (p.1, 2014). Demonstrating how far the credibility of positive psychology has become established, Seligman's site goes on to list programs such as the Master's degree at the University of Pennsylvania which teaches therapists how to harness its techniques for the benefit of clients, and details questionnaires and techniques addressing areas as diverse as negative affect, one's ability to help and support others, character strengths, and abilities in relationships.

Interest in the determinants of wellbeing have their roots not only in the humanistic school of psychology from the mid-20th century but much further back: the world's major religions and philosophers from Socrates to John Stuart Mill have advocated attitudes and actions thought to promote happiness - in many ways along very similar lines to 'positive psychology'. For example, the Bible recommends:

For this very reason, make every effort to supplement your faith with virtue, and virtue with knowledge, and knowledge with self-control, and self-control with steadfastness, and steadfastness with godliness, and godliness with brotherly affection, and brotherly affection with love. For if these qualities are yours and are increasing, they keep you from being ineffective or unfruitful (2 Peter 1: 5-9, English Standard Version).

A clear recommendation of the supposed linkage between character virtues and positive outcomes. The Dalai Lama in his book "The Art of Happiness" (1998) advocates that "the more sophisticated your level of education and knowledge about what leads to happiness and what causes suffering, the more effective you will be in achieving happiness" (p. 50). The "Character, Strengths and Virtues (CSV)" handbook by Peterson and Seligman (2004) lists 24 positive human traits that have been analysed as supportive of human

happiness and achievement. The handbook itself credits the world's societies and religions as having promoted these same qualities over the years.

Since Seligman's first major foray into the field in 1988, significant criticisms have also emerged of the positive psychology movement, and these tend to fall into four main groups:

1. the proliferation of claims of benefits from ever-burgeoning areas under its umbrella (Held, 2004),
2. As a re-iteration of well-established methods of supporting wellbeing (Sample, 2003),
3. As trivialising serious issues in mental health or in events causing distress, and therefore contributing to a culture of victim-blaming (Ehrenreich, 2009),
4. In endorsing the pervasive and uncritical culture of 'positive thinking', especially in the USA (Ehrenreich, 2009).

Schrank, Brownell, Tylee, and Slade (2014) echoed these concerns and added the question of how feasible it is to differentiate *positive* and *negative* variables. Added to these potential criticisms, this thesis will argue that there is a lack of empiricism in the field of positive psychology, in that instruments that are being promoted (for example, on the Seligman website) do not typically have the type of track record of extensive trialling across populations or review in peer-reviewed journals demonstrated by most accepted psychological instruments. Furthermore, the larger part of the volume of writing on positive psychology appears to be either the development of new ideas and theories, or resides in the publication of semi-populist books (such as "Learned Optimism" – Seligman (1991), "Flourish" – Seligman (2011); and "The Happiness Track" (Seppala, 2016)). Upadhyay and Arya (2015) noted the frequency of meta-analytical studies in the positive psychology field, and pointed out that whilst some studies (e.g., Sankaranarayan & Cycil, 2014) have used empirical methods to examine the outcomes of positive psychology methods such as the Penn Resiliency Program, there is yet very little to demonstrate efficacy in terms of actual reductions in psychopathology. Schrank, Brownell, Tylee, and Slade (2014) note that positive psychology approaches are now being used in mental health treatment settings. However, methodologies vary; the concepts and interventions vary widely, and there has been little outcome data for people suffering from significant mental health conditions. Kalisch, Muller, and Tuscher (2015) urged the psychology community to re-appraise its models for testing resilience, and to (a) use time-tested empirical methodology and (b) use cross-disciplinary approaches (using concepts from brain science, social and behavioural psychology) to form an understanding of the processes underlying resilience across cultures.

### **A Specific Aim in Positive Psychology: Emotion Regulation**

While "Happiness" is a difficult area to assess, other aspects of the positive psychology dynamic may be more accessible to investigation. This includes the area of the maintenance of positive emotion. The notion that maintenance of positive emotions and emotional self-regulation contribute to health is not new, being widely mentioned in the Bible, for example, "A sound mind makes for a robust body, but runaway

emotions corrode the bones,” Proverbs 14:30, The Message Bible. Positive psychology authors such as Fredrickson and Joiner (2002) note that positive emotions act not only as markers of wellbeing but also increase people's ability to make decisions and take action, hence building a repertoire of resources (i.e., Fredrickson's *broaden and build* theory). While a major tenet of positive psychology is that these approaches can be taught, it acknowledges that there can also be natural variations in people's ability to self-regulate and deal with experiences that challenge wellbeing. For example, the trait of emotional stability (as compared to Neuroticism) has been found to produce lower vulnerability to negative mood phenomena (Clark, Watson, & Mineka, 1994; Ormel, Oldehinkel, & Vollebergh, 2004). Genetic differences in the basis of the trait of emotional stability/Neuroticism have been suggested in twin studies (Kendler, Gardener, Gatz, & Pedersen, 2006). This thesis will aim to examine whether naturally occurring buffering mechanisms are present in individuals, which can assist in mood stability and regulation. It does not have the scope to differentiate between self-taught or informally-learned adaptive strategies, and those that may be genetic in origin.

Adaptive mechanisms that work, need to demonstrate their effectiveness (a) over time and (b) under challenge. This study seeks to address the existence of natural buffering strategies that may exist in individuals; and whether these may be helpful in the presence of negative life events or stressors. The effectiveness of such mechanisms would be demonstrated in lower levels of negative psychological phenomena: e.g., depression.

## **Influences upon Depression**

The psychological literature has featured a great deal of empirical and theoretical work examining the origins and features of depression. Many studies (Bradley, Mogg, & Lee, 1997; MacLeod & Hagan, 1992; McCabe & Gotlib, 1993; Zuroff, Blatt, Bondi, & Pilkonis, 1999) have focused on vulnerability factors in depression and to a limited extent, links have been made between depression and the stability of self-esteem (Roberts & Monroe, 1994). However, little attention has been paid to explaining resistance to depression. Cognitive theories dominate the field in providing psychological explanations for depression. Since Beck's development of a cognitive theory of depression in 1967, more than 10,000 articles have appeared to theorise, review or describe empirical studies in the area. A major strand of the cognitive literature has explored the cognitive features thought to form a latent predisposition to depression. The premorbid existence of negative schemata and negative thinking (Clark, 2001; Topper, Emmelkamp, & Ehling, 2010), depressive attributional style, and pessimism (Seligman, Abramson, Semmel, & von Baeyer, 1979) for example, have been implicated as vulnerability factors for depression. The cognitive theories of depression generated to date however, have to acknowledge that the onset of depression is also associated with environmental factors such as lack of social support (Brown, Harris, Woods et al, 2012; Gray, Hellzen, Romild, & Stordal (2012), life events (Kenneth, Kendler, Laura, & Carol, 1999; Riso, Miyatake, & Thase, 2002) and biological factors (Maletic, Robinsons, Oates et al., 2007; Plomin, DeFries, McClearn, et al., 2001). This implies that depression is (or can be) a complex, multifactorial condition. This was notably

accepted by Shaw (1985) and is now a common basis for researching aetiological factors in depression (Baillie, McCabe, & Priebe, 2009; Sjolholm, Lavenbratt, & Forsell, 2009).

A great deal of the cognitive literature has treated depression as if it were a ‘stand-alone’ phenomenon, rather than one linked to other aspects of emotional functioning – for example, coping skills, or self-image. However, Ingram (1990) developed a meta-construct model of the psychopathologies, proposing that factors in psychopathology act both independently and interdependently. For example, low self-esteem (Becker, 1979) and negative self-focussed attention (Ingram & Smith, 1984; Ingram, Lumry, Cruet, & Sieber, 1987) were often found to correlate with depression, yet parcelling out the influence of one factor on depression does not significantly alter their correlations with one another. Since Ingram’s review, negative self-focussed attention continues to be linked to negative affect and depression (Dunn, Dalglish, & Lawrence, 2007; Flory, Raikkonen, Matthews, & Owens, 2000; Mor & Winquist, 2002). Self-esteem has been another construct thought to bear a close relationship to depression. Tennen and Herzberger (1987) found that low self-esteem is more reliably related to the type of attributions usually thought to characterise depression, than depression itself. These authors proposed that failure in the task of self-esteem maintenance can contribute to depression. Sowislo and Orth (2012) conducted a meta-analysis of 95 studies. She found that low base levels of self-esteem were predictive of higher depression levels. The occurrence of depression however, did not reliably predict a subsequent lowering of self-esteem. Conversely, self-esteem and anxiety reciprocally affected each other no matter which came first: hence, there may be a particular and specific role for low self-esteem to produce depressive vulnerability in a person. In forming a broader understanding of the development (and avoidance) of depression then, we need to consider the contribution of constructs known to be related to depressive symptoms or vulnerability to the same.

### **Empirical and Less Empirical Studies of Self-Protection Mechanisms**

Empirical research from the areas of psychoanalytic, medical and personality psychology have, from very differing theoretical bases, investigated the impact of naturally occurring protective strategies upon mental health outcomes. Sackeim and Gur (1979) for example, found self-deception to be inversely related to (self-reported) psychopathology. Since then there have been sporadic studies on self-deception and these tend to focus upon confirmation of a link between self-deception and wellbeing protection (Erez, Johnson, & Judge, 1995; Robinson & Ryff, 1999; Mannion, 2009). Following Haan’s (1965) early work on denial and well-being, an important strand of medical research looked at the use of denial in cardiac patients. Several studies (Cassem, Hackett, & Wishnie, 1968; Levine et al., 1987; Soloff, 1980) found that denial in this patient group, was associated with lower psychiatric morbidity, notably in the areas of depression and anxiety - though denial either in the acute stage of a cardiac event or after discharge from hospital, had an adverse impact upon help-seeking behaviours. Kobasa (1979) was a key researcher in the origin of research into hardiness and Kobasa, Maddi, and Kahn (1982) theorised that resilience (termed ‘hardiness’) is made up of identifiable personality factors and cognitive coping strategies. This group’s studies found that these

variables modulated the relationship between stress and (physical) illness, producing less illness in individuals who were stressed but hardy. Such findings have remained consistent in the years since, with hardiness found to reduce perceived stress (and hence, suicidal ideation- Abdollahi, Talib, Yaacob, & Ismail 2015); and even moderate some key markers for heart disease, indicating a profound relationship with stress (Bartone, Valdes, & Sandvik, 2016). While Maddi (2006) considered hardiness to arise mainly from personality attributes, Bartone, Valdes, and Sandvik (2016) indicate that in addition to personality style, hardiness and resilience are likely to include aspects of cognitive, emotional, and behavioural responses. Sinclair and Tetrick (2000) found indications that hardiness is a constellation of attributes which differentially impact upon perceived stress and depression – and which themselves bear relationships to personality factors, particularly Neuroticism. More recent authors tend to specify which aspect of hardiness they are examining, for example cognitive hardiness (Orme & Kehoe, 2014); and dispositional resilience (Escolas, Pitts, Safer, & Bartone, 2013).

These studies from diverse domains serve to illustrate that mental processes and strategies can provide a protective function in the presence of demonstrated stressors. Developments from the area of positive psychology may eventually provide answers to the question of resilience, which so far has been poorly attended to by cognitive research. Taylor is an author who has written on a theorized set of natural buffering strategies from the 1980's right up until some more relatively recent contributions to positive psychology (Taylor, Kemeny, Reed, Bower, & Gruenwald, 2000). This began when Taylor (1983) in reviewing the attempts of breast cancer patients to adjust to their circumstances, found a consistent pattern in their use of apparent self-sustaining illusions. Later widening this out to a review of studies on normal populations, Taylor and Brown (1988) described a picture of widespread tendencies within the normal population to systematically screen out negative information, and bias ambiguous or interpretable information in a positive direction. For example, that people find it easier to remember information related to success, than that relating to failure (Silverman, 1964) and characterise positive traits as more descriptive of themselves than negative ones (Brown, 1986). People choose comparison targets that are worse off than themselves, and then compare themselves favourably (Crocker, 1982). Negative elements of feedback are likely to be dismissed (Swann & Read, 1981) or even ignored (Shrauger & Schoeneman, 1979). Finally, people with high self-esteem perceive negative feedback as lacking in relevance or credibility (Shrauger & Kelly, 1981).

### **The Emergence of the Concept of Positive Illusions**

Defining three categories of 'positive illusions', Taylor and Brown (1988) concluded that healthy functioning requires the use of active strategies that support people's self-esteem, their ability to control events, and their hopes for the future. Sharp contrast was drawn between groups showing these positive biasing tendencies and depressed populations. Depressed people tend to show 'depressive realism', and are more likely to recall negative material (Kuiper & MacDonald, 1982) and attribute negative characteristics to themselves (Watson & Clark, 1984). They do not seem to harbour the 'illusions of control' that characterize well-adjusted individuals (Abramson & Alloy, 1981) and forecast more negative elements in their futures

(Brown, 1985; Pyszczynski, Holt, & Greenberg, 1987). Depressed people therefore, seem to be lacking the positive biasing mechanisms that may be buffering normal people from negative information, and helping to keep negative affect at bay.

Taylor and Brown (1988) speculated that a functioning system of ‘illusions’ would serve to isolate threat, support self-esteem and maintain optimism and motivation. If these illusions do act in this way, they would form the operational set which is directly opposite to the mechanisms which cognitive theorists commonly accept as leading to a cognitively-mediated depression; a process where, under challenge, positive cognitions and interpretations are supported and extended, and a positive mood state is the outcome. Several problems exist with positive illusions as described by Taylor and Brown (1988) and subsequent theorists (Baumeister, 1989; Janoff-Bulman, 1989; Snyder, 1989). An outstanding issue is that the concept has remained almost entirely untested and so its very existence remains as conjecture. No dedicated reliable instruments have been developed to measure the construct and test the impact it may have in interacting with the distress associated with life events. Given this lack of research, it is possible that positive illusions may not be a ‘stand-alone’ entity but overlap or be subsumed by constructs such as neuroticism or attributional style. Clear distinctions need to be made about the terminology used in investigating the area. Taylor and Brown (1988) for instance, used the term positive illusions for both the potential belief set, and the many possible operations used to bias information. Whilst proposing that positive illusions would have a favourable impact upon mental health, their definitions of ‘mental health’ and ‘psychopathology’ remain vague and need to be defined in terms of quantifiable clinical entities.

Taylor and Brown (1988) cited a very wide range and number of studies as demonstrating the tendency towards self-protective biasing in healthy populations. The possibility exists of there being an important and consistent buffering mechanism which is widely used - but which appears to be absent in depressed populations. Snyder (1989) gave indications of the possible origins of positive illusion phenomena residing in learning and modelling experiences, and Baumeister (1989) and Janoff-Bulman (1989) have proposed optimum levels and patterns of use.

### **Empirical Testing of the Positive Illusions Concept**

The second chapter of this thesis briefly considers cognitive theories of vulnerability towards depression, and reviews the shortcomings of these and related empirical studies, in explaining susceptibility to depression. Chapter Three provides a review and critique of the construct of positive illusions as it has been described in the literature so far, and indicates directions for research. Chapter Four describes the background to the empirical studies of this thesis.

The empirical studies (Chapters Five, Six, and Seven) seek to answer some of the basic questions about positive illusions, and further develop the testing of the illusions concept. This set of three studies attempts the development of a reliable and predictive instrument, and examines the interrelationships

between positive illusions and the distress associated with life events, self-esteem, and other related concepts such as denial. Finally, the concept is tested in a prospective format to explore the interaction between positive illusions and stressors on the development of depressive symptoms (see Chapter Seven). That study (Chapter Seven) aims to test the construct's validity and predictive power, and define the degree of overlap with existing concepts such as neuroticism, defensiveness and attributional style. Chapter Eight discusses the findings across all the studies and considers the implications for the credibility of positive illusions as a useful psychological entity.

## CHAPTER 2: Vulnerability and Resilience to Depression

This chapter defines depression and briefly provides data on the prevalence of the disorder, looks at the issue of whether the incidence of depression is increasing, and examines gender differences in depression, comorbidity, impairments to functioning, and causation factors. It then goes on to examine cognitive and processing factors active in the depressive process and finally, preventive factors including positive cognitions.

Depression is a well-known and well-described disorder that has been discussed for the best part of 2,000 years being mentioned both in the Bible (“The Lord is near to the brokenhearted and saves the crushed in spirit” Psalm 34:18, NIV) and by Shakespeare (“They can be meek that have no other cause. A wretched soul, bruised with adversity we bid be quiet when we hear it cry” *The Comedy of Errors* Act 2 Scene 1, W. Shakespeare, 1594). It has long been known to affect the functioning of sufferers and has been associated with suicidality and completed suicides (Kendler, Aggen, & Neale, 2013). As a syndrome, it can occur in the context of many other disorders, either as a part of the clinical presentation (e.g. schizoaffective disorder, mixed phase bipolar disorder, organic disorder), or as a phase of a disorder (e.g., bipolar disorder, depressed phase) or as a consequence of a primary disorder (e.g., following a psychotic disorder such as schizophrenia). For the purposes of this thesis only major depressive disorder as a primary stand-alone disorder or syndrome will be the focus of attention.

Depression is defined by the DSM-5 (American Psychiatric Association, 2013) and the ICD-10 (World Health Organisation, 2010) in slightly differing ways. The DSM-5 specifies at least five symptoms are present for at least 2 weeks for Major Depressive Disorder. Briefly they are: depressed mood; markedly diminished interest in activities, significant weight loss/weight gain, insomnia or hypersomnia, psychomotor agitation or retardation, fatigue/loss of energy, feelings of worthlessness or excessive guilt, diminished ability to concentrate, and recurrent thoughts of death. The symptoms cause “clinically significant distress or impairment” and the episode is not attributable to a medical condition or effects of a substance. The symptoms are not better explained by another disorder and there has never been a manic or hypomanic episode (American Psychiatric Association, 2013, pp.162, 160-161). A single or recurrent episode can be specified, along with severity and course specifiers (American Psychiatric Association, 2013, p.162).

The ICD 10 (World Health Organisation, 2010) names the disorder Depressive episode (F32). It takes a more dimensional approach than the DSM, separating mild (F32.0), moderate (F32.1) and severe (F32.2) episodes. Rather than specifying at least five symptoms from a list, it describes that “the individual usually suffers from depressed mood, loss of interest and enjoyment, and reduced energy leading to increased fatigability and diminished activity” (p.100). It then describes other “common symptoms” (p. 100). These are:

- reduced concentration and attention,
- reduced self-esteem and self-confidence,
- ideas of guilt and unworthiness,
- bleak and pessimistic views of the future,
- ideas or acts of self-harm or suicide,
- disturbed sleep, and
- diminished appetite.

The text goes on to describe and discuss typical presentations and symptom profiles. It comments that differentiations depend upon clinical judgement. It guides diagnosis by outlining the frameworks to mild, moderate and severe episodes and outlining somatic and psychotic symptoms that may accompany the presentation.

### **Prevalence of Major Depressive Disorder**

The World Health Organisation (2012) estimated that 350 million people worldwide suffer from depression. The DSM-5 (American Psychiatric Association, 2013) estimates the prevalence of major depressive disorder in the USA as around 7%, with women showing an incidence one and a half to three times higher than men. Most international prevalence studies arrive at similar figures. A comparative study on prevalence was designed to compare the incidence of depression in American and Canadian community populations (Vasilisadis et al., 2007). Despite the significant differences in the two countries' health systems and points of access, the rates of DSM-defined Major Depression (MD) were very similar with the United States estimated at 8.7% and Canada, 8.2%. Parenthetically, it was noted that while 55.7% of those diagnosed with depression in Canada accessed a mental health service and exactly the same proportion of the diagnosed US population with health insurance did so – only 36.5% of American patients diagnosed with depression and who were uninsured, accessed a service.

The WHO organised and supported worldwide mental health surveys that used a structured diagnostic interview with over 60,000 participants in 14 countries. Reported by Kessler et al. (2006) the prevalence of mood disorders (unspecified) ranged from 3.3% in Nigeria to 21.4% in the USA, while anxiety disorders ranged from 4.8% in China to 31% in the USA. The USA's National Institute of Mental Health (NIMH, 2012) used DSM-IV (American Psychiatric Association, 2013) criteria to examine the prevalence of Major Depressive Episodes amongst the country's population, and found that the overall incidence was 6.9%. Those of Asian origin had the lowest incidence at 3.2% and those of native origin the highest at 10%. The NIMH survey (2012) estimated the prevalence of major depression amongst adolescents at 9.1%.

In Australia, the 2007 National Survey of Mental Health and Wellbeing (Australian Bureau of Statistics 2008) reported on a sample group of 8,800 Australians across the nation, also using a variant of the

CIDI instrument. It found that 4.1% of the group had a major depressive episode during the previous 12 months. Overall, 6.2% had an affective disorder, and this group were the most likely to be categorised with a “severe” disorder type. Another Australian study (Boyd et al., 2000) measured 1299 adolescents at Melbourne schools and the prevalence of depression (using the Reynolds Adolescent Depression Scale) was 14.2%.

In the UK, the Mental Health Foundation’s survey “Fundamental Facts” (Halliwell, Main, & Richardson, 2007) reported that the nation’s depression incidence was between 8% and 12% of the population in any single year. In Sweden in 2013, Johansson, Carlbring, Heedman, Paxling, and Andersson administered a postal survey to 3001 adults; 17.2% of these were described as suffering from clinical levels of depression with the “point prevalence rate” for the disorder calculated at 5.2%. A Spanish study (Vazquez & Blanco, 2008) of 554 students estimated the prevalence of DSM MD as also at 8.7%.

### **Increase in Depression Incidence**

The WHO report on the Global Burden of Disease (2004) stated that the incidence of depression had been increasing since WWII. It predicted that by 2030 depression will account for the greatest overall disease burden worldwide. This echoed earlier studies such as Klerman and Weissman (1989) whose meta-analysis of epidemiological studies found a progressive lowering in the onset age for depression since WWII, increases in incidence in the generations following WWII, and an apparent narrowing in the gender gap in depression rates as young males showed increasing susceptibility to the condition. The effect sizes were too large to be accounted for by differences in diagnostic criteria. Twenge (2015) looked particularly at the psychosomatic symptoms evident in depression amongst data from 6.9 million USA teens and adults, and found that the increases in symptoms since the 1980’s were substantive – for example, teenagers in the later cohorts were reporting 38% greater memory problems and 74% more sleep difficulties. This study aimed to look at logical groupings of symptoms, rather than diagnostic labelling, in an attempt to parcel out the impact of a greater community acceptance of depression in the last 30 years.

Hidaka’s landmark review (2012) found that even in the 1960’s researchers were already reporting increases in depression incidence figures (Paykel et al., 1970; Rosenthal, 1966). Hidaka reported that although methodological strictness in a replication of the National Comorbidity Survey by Kessler et al. (2003) apparently showed a decrease in 12-month prevalence, the clear overall trend in the USA and world-wide, is a steady increase in incidence. Hidaka (2012) pointed out that many studies use retrospective data that are inherently inaccurate due to recall biases. Hence, another study by Twenge et al. (2010) is of interest since, using retained MMPI data in college students, it ascertained that in 2007 participants were 6-8 times more likely to show clinical depression profiles than those recording responses in 1938. Hagnell (1989) and Hagnell et al. (1994) reviewed Swedish prevalence data and found that young adults were showing an increasing risk of depression in the period 1947-1972, with the risk increasing tenfold between 1957 and 1972 as compared to the period 1947 to 1957.

What could be the contributors to this picture? Hidaka's review data found an association between higher Gross Domestic Product and depression rates and between depression rates and wage inequality. Hidaka (2012) notes that alongside depression other "diseases of modernity" are also increasing – specifically cardiovascular disease, diabetes, certain cancers, osteoporosis, and obesity. Clearly then, lifestyle factors are suspect. He cites obesity, an acceleration of the "Western Diet", lower rates of physical activity, problematic light and the watching of electronic materials on screens' influences upon sleep, and a cultural change which now emphasises external values such as status and financial wealth rather than common social and community benefit, as the main suspects. Hidaka (2012) cites the disparity of Japan being the only nation whose GDP, education and consumer levels have been comparable to other wealthy nations whilst retaining a low incidence of depression, as perhaps being linked to a low rate of wage inequality, very low obesity rates, a diet which has not changed since WWII and which is notable for a high content of long-chain fatty acids, and a continuing emphasis in its culture, of collective welfare values for its population.

### **Gender Differences in Depression**

It has been widely reported that women may be at a higher risk of MD than men. The 2012 USA NIMH study found that the incidence of the disorder amongst adult females was 8.4% and for males, 5.2%; in adolescents the rate for females was 13.7% and for males, 4.7%. The recent Australian Bureau of Statistics study (Australian Bureau of Statistics, 2008) study in Australia found that 7.1% of females experienced affective disorders compared to 5.3% of males, and the UK's 2007 prevalence study (Mental Health Foundation, 2007) estimated that 1 in 4 women had a lifetime risk of clinical depression, compared to 1 in 10 men. Johansson et al.'s (2013) study calculated that 12.9% of women and 8.3% of men experienced depression. The NIMH survey (2012) estimated the prevalence of major depression amongst adolescents at 13.7% in females, and 4.7% in males.

Briefly, the reasons for this disparity are probably complex. Luppá et al. (2012, using 24 studies) and an Australian study (Rich, Byrne, Curryer, Byles, & Loxton, 2013, surveying 111 articles) both performed a meta-analysis of studies on women affected by depression. The prevalence of depression varied from 2.6% to 43.9%. Whilst taking into account the differing diagnostic methods used across studies, the factors producing particularly high incidence were related to age, life events, childbirth, and previous mental health diagnoses. The perinatal period is known to be a period of specially elevated risk for women: an Italian study surveying 590 women (Giardinelli, Stefanini, & Afshar, 2011) used DSM-IV (American Psychiatric Association, 2013) criteria and both the Edinburgh Postnatal Depression Scale (Cox, Holden, & Sagovsky, 1987) and the Structured Clinical Interview for DSM-IV – finding that 21.9 % of the women met criteria for depression in the antenatal period, and 13.2% in the postnatal period. The American, Australian, English, and Swedish studies noted above, also noted that anxiety disorders are more common in women, whilst suicidality and alcohol/substance abuse disorders are more common in men. Nolen-Hoeksema (2001) proposed that women experience more frequent stressful events (in particular, chronic strain) and are more

frequently prone to victimisation than men. In many instances, they experience fewer opportunities and choices and do appear to be more reactive to stress when it occurs. Womens' coping styles are more likely to feature rumination while men's coping styles tend to feature action or externalisation, and women express and describe their symptoms more readily, also appearing to be more willing to seek help and therefore name a disorder.

### **Comorbidity in Depression**

There is increasing interest in the issue of co-morbidity to ascertain what resources are needed, and which aetiological factors may cause co-occurring disorders. To this end, the US National Comorbidity Survey (NCS, 1992) looked at the prevalence, causative factors and needs associated with comorbidity (Kessler, 1994). Comorbidity can be either homotypic (i.e., where two disorders from the same group occur together) or heterotypic (where disorders from different diagnostic categories occur together). The NCS (1992) found that major depression has a 51% co-occurrence rate with anxiety, and significant comorbidity has more recently been found with substance abuse, ADHD, PTSD, pain disorders, migraine, and cardiovascular disease (Bair, Robinson, Katon, & Kroenke, 2003; Dagher & Green, 2015; Grant & Harford, 1995; Halaris, 2013; Kessler, 1996; Schulman & Shapiro, 2008; Dowlati et al., 2011). A German study on comorbidity using 1301 participants (German Health Interview and Examination Survey, Jacobi et al., 2004) also used the CIDI and found similar patterns of comorbidity with depression. Disorders with the highest comorbidities were substance use disorders, mood disorders, and anxiety disorders. Depression showed a 20.8% incidence with one other disorder, 15.8% with two, and a 24.1% incidence with three or more additional disorders. The Australian Bureau of Statistics study (2008) found that affective and anxiety disorders showed the highest comorbidity with 3% of the overall population experiencing this pattern. The UK study Fundamental Facts (Halliwell, Main, & Richardson, 2007) found almost the reverse – that only 2% of those experiencing depression did not have comorbid anxiety. Johansson et al.'s (2013) Swedish study also estimated that 50% of those suffering from depression, experienced comorbid anxiety. Whatever the genetic, environmental, or personality risk factors active in the causative chain, it is clear that depression is a disorder which carries significant risks of a proliferation of distress and disability.

### **Age of Onset and Course in Depression**

The DSM-5 (American Psychiatric Association, 2013) in its review of the course of depression, notes that its main feature is variability. Some people once depressed, hardly experience any remission, while others only encounter one episode or have several years between symptoms. However, it estimates that only one in five sufferers will not experience recovery trends after 1 year. Spontaneous recoveries are not uncommon. However, an underlying or pre-existing condition exacerbates the risk of chronicity: anxiety disorders, borderline personality issues and substance problems make chronicity more likely. Neuroticism is a risk factor in response to negative life events. A first-degree relative with a depressive condition doubles or quadruples the incidence – that is up to 28%, and the trait of Neuroticism is thought to represent a large

part of this risk level. Medical illness (especially chronic conditions) increases the incidence and the lack of recovery in depression. Repeated experiences of stressful or adverse events in childhood form extra risk factors. The appearance of depression as specified by DSM-5 criteria tends to increase from puberty until the period until 30 years, while first episodes are frequently observed in later life (American Psychiatric Association, 2013). Both the USA's National Institute of Mental Health study (NIMH, 2012) and the Australian Boyd et al. (2000) study found that depression prevalence was higher amongst adolescents than amongst middle-adult populations. There appears to be another spike in incidence in much later life, with Lippa et al. (2012) finding in their meta-review that the pooled prevalence for depressive disorders amongst those aged 75 plus, was 17.1%.

### **Impairments to Functioning**

The NIMH (2012) report quoted the WHO (2010) as describing major depression as showing the heaviest burden of mental/behavioural disorders with 3.7 % of all disability-adjusted life years and 8.3% of all years lived with a disability. Using the criterion of disability-adjusted life years, major depression was calculated as causing the fourth-highest overall burden of disease in 1990 (Murray & Lopez, 1997) and this had increased to third place by 2004 (Demyttenaere et al., 2004). The DSM-5 (American Psychiatric Association, 2013) notes that impairment levels in depression can vary from the barely noticeable, to severe incapacity (p.167). Cognitive impairments are well-documented, with authors such as Golinkoff and Sweeney (1989) noting poor performance on memory tasks. A study using neuropsychological testing found that even when in remission, patients who have experienced major depression show residual deficits in working memory, psychomotor tasks and visual processing (Welland-Fiedler et al., 2004).

Given these difficulties it is not surprising that whether taking time off work or trying to remain at work, the costs of depression are high. Stephens and Joubert (2001) estimated that in Canada, annual costs for depression for medical and absence from work cost \$14.4 billion and when the costs are expanded to include lost productivity, this increases to \$33 billion. The Australian Bureau of Statistics 2007 review on mental health found a similar per capita level of economic impact in Australia (ABS, 2008).

Part of the reason for these huge costs is that the breadth of symptoms and impacts from depression are very broad – from the abovementioned cognitive and processing deficits to reduced energy and fatigue, lack of decision-making ability, interpersonal preoccupations, poor problem-solving and amotivation. Hence absenteeism is not the only issue in the workplace: the so-called “presenteeism” problem is now being analysed – where workers are at work, but are experiencing the set of obstacles described above, and hence productivity at work is affected. Kessler et al. (2006) assessed these issues in the National Comorbidity Study Replication using the CIDI. Among 3,378 US workers, 6.4% were assessed as suffering from MD. The impacts in this group were extrapolated to the greater US population; it was estimated that absenteeism was 8.7 days per (depressed) worker year and presenteeism, affected 18.2 days per year. The estimated cost

of this type of pattern to the US economy was calculated as 225 million lost work-days each year and \$136 billion (US) lost productivity per annum.

Judd et al. (2000) looked particularly at psychosocial problems in depressed populations, reporting on 371 patients with MDD. Psychosocial impairment appeared on a gradient which mirrored the level of depressive symptoms and it dissipated upon recovery as long as the person was asymptomatic. Individuals with subthreshold depression still showed impairment at lower levels. While psychosocial problems may fade away upon remission, Lepine and Briley (2011) noted that remission does not mean the cessation of all symptoms. Relapse is a significant problem, with a rate estimated at 85% during 15 years for those who had been in hospital, and 35% for those only treated elsewhere. Lepine and Briley (2011) noted that people who had had a diagnosis of MDD had over 20 times the lifetime risk of suicide of the general population. Depression increases the risk of death when present after a myocardial infarction (Lesperance, Frasura-Smith, & Bourassa, 2002). An Australian cohort study (Almeida, Alfonso, Hankey, & Flicker, 2010) found that the death rate amongst older men diagnosed with clinical depression was double that of their peers.

The burden for families of those suffering depression can be considerable. For example, depression is known to have a damaging effect upon relationships and it has been found to both increase the incidence of divorce and also be increased by it (Joint Canada/United States Survey of Health, 2004). Depression is common in pregnancy and during the perinatal period (Marcus & Heringhausen, 2009) and so exerts particular pressures upon the couple relationship and upon mechanisms of care for other children, at this time.

### **Categories versus Dimensions in Depression**

While the ICD-10 takes a slightly more dimensional approach to MD (see diagnostic criteria, above) The DSM-5 clearly takes a categorical approach with patients needing “five or more of the following” to qualify for a diagnosis. This implies that a numerical approach is adequate and that one type of symptom is essentially equivalent to another. While the categorical/numerical approach permits a rapid and clear diagnosis, this can be misleading. For example, Fried and Nesse (2014) have estimated that taking into account compound symptoms or subsymptoms listed, the possible number of profiles which could lead to a diagnosis of MD is 1,497. That implies a huge amount of variability in people’s experience of what we call “depression”. Hence, we should expect a high degree of variability between different patients (Baumeister & Parker, 2012; Lichtenberg & Belmaker, 2010). Additionally, the collection of symptoms experienced by an individual patient can vary across episodes (Oquendo et al., 2004; Sharpley, Bitsika, & Christie, 2016). Lux and Kendler (2010) questioned the equivalency of different depression symptoms and their supposed interchangeability and following on from this, Fried et al. (2014) found that individual symptoms within the DSM are linked to differing risk factors (i.e., personal and family history, early stressors, Neuroticism, number of working hours, and negative life events). There is consequently, an increasing level of debate about the relevance of differing types of symptom profiles and what these may mean (Hasler, Drevets,

Manji, & Charney, 2004); recent studies suggest that different symptoms under DSM criteria may even show different genetic links (Kendler, Aggen, & Neale, 2013).

### **Subthreshold Presentations in Depression**

Given the debate about variability in depression presentations, it follows that questions have been raised about subthreshold presentations also. These are when the constellation of depressive symptoms do not meet the criteria (e.g., of lasting at least 2 weeks) or do not significantly interfere with daily functioning. The first large-scale study into this phenomenon was by Judd, Akiskal, and Paulus (1997). In a review of over 10,000 people “subsyndromal depression” was more prevalent (at 3.9%) than major depressive disorder and minor depressive disorder combined (3.8%). Subsyndromal depression was found to not only be long-lasting with many patients reporting symptoms continuing 1 year later – but also to take part in the “morphing” of depression symptoms into other forms such as MD and also into other (diagnostic) categories such as anxiety. Hence, subsyndromal depression seems to be a part of the constellation of depression subtypes and to be a very significant risk factor for the development of diagnosable depressive disorders. The population of individuals experiencing subsyndromal depression is important as many deficits, problems and impairments still occur – and so in the modelling and understanding of depression – its development, treatment and prevention, it behoves researchers to not limit their study only to patient populations. This is now beginning to occur, with studies of the long –term course of bipolar disorder taking sub-threshold symptoms into account (e.g., Amsterdam et al., 2015) and complex computer modelling of depressive illnesses also incorporating this level of symptoms (Demic & Cheng, 2014).

A Canadian author (Patten, 2008) argued that true prevalence in the depressive disorders might not exactly match the estimated incidence of these disorders based upon constructed criteria. Furthermore, Patten contended that the disability experienced by those with a wide range of different variations of depression means that DSM criteria should not be the only indicator of need for clinical assistance. The American study of Pietrzak et al. study (2013) rated subsyndromal depression as being present when at least 5 symptoms of depression were described but the criteria for MD were not met. The consequent prevalence figure amongst the population measured, was 11.6%. Questions raised by this study include: concerns about the level of disability and distress amongst this group not being addressed; a probable increased risk for MD being poorly understood in this population; and, the markers for those most at risk of going on to develop MD, being as yet uncharted.

Sadek and Bona (2000) also found subsyndromal depression to be epidemiologically and demographically comparable to MD and dysthymia. Depression of the subsyndromal type was found to have a significant association with suicidality and psychosocial problems. Judd, Schettler, and Akiskal (2002) also found that subsyndromal depression was linked to significant psychosocial difficulties. These authors point out that impairments only really reduce when the person is symptom-free and that a lack of match to classic diagnostic criteria does not imply recovery or remission: only an absence of symptoms

should be taken to signify these. Pietrzak et al. (2013) found that personality difficulties and other psychological symptoms signalled an elevated risk of developing major depression amongst subsyndromal groups.

## **Causation Factors in Depression**

Although beyond the scope and focus of this thesis, it should be noted that theories as to the causes of depression vary widely across the disciplines of neuroscience, cognitive and social psychology. Brain biology seems to be widely disrupted in depression, leading to various theories. Monoamines are imbalanced and since antidepressant drugs not only improve this but also impact favourably upon depression symptoms, the so-called monoamine hypothesis has been coined. While monoamine oxidase may be too high in depressed patients (Meyer, Ginovart, & Boovariwala, 2006) this has not always been replicated across studies (Cicchetti, Rogosch, & Sturge-Apple, 2007). Interactional models are now gaining more currency than hypotheses that concentrate on abnormal levels of neurotransmitters or attendant chemicals alone. That is, since serotonin has a role in regulating the other monoamines, if it is too low then norepinephrine (noradrenaline) levels may also decline, and dopamine levels are also affected (El Mansari, Guiard, Chernoloz, Ghanbari, Katz, and Blier, (2010). Puzzlingly, an experimentally-induced decrease in monoamines does not appear to induce depression in healthy volunteers (Delgado & Moreno, 2000). Additionally, antidepressant medications typically take several weeks to show symptom reductions, even though neurotransmitter levels may be altered in less than a day. (Hirschfeld, 2000). Another disconnect between monoamine levels and depressive symptoms exists in patients with substance abuse problems, as depression as a secondary effect of substance abuse may take years to develop, despite monoamines being altered quite quickly (Ashton, 2002). While Tobe (2014) elegantly argues the reverse – that a well person depends upon their complex biological underpinnings and an enzyme system which is in balance, Schultz (2015) in a review of the literature, points to the very small effect size upon symptoms, of altered neurotransmitter profiles brought about by anti-depressant medications. This is exemplified by a study sponsored by the FDA (Khin, Chen, Yang, Yang, & Laughren, 2011). Tobe (2014) concludes that there are vested interest which tend to support an over-physiological view of depression, when its causation pathways are in fact more complex.

Since there seems to be a heritability factor in depression, attention has focussed upon specific genes. The gene linked to the serotonin transport mechanism (5-HTT gene) was postulated by Caspi et al. (2003) to be the differentiating factor in people exposed to stress who did or did not develop depression: but this study has not been consistently replicated. Several ensuing studies have yielded mixed results although Uher and McGuffin's (2010) meta-review of such studies found a majority of replications, some partial replications – and where studies did not yield confirmatory results, they tended to use self-report measure instead of standardised scales or structured clinical interviews.

Endocrine theories have also been raised in relation to depression. For example, women show reduced depression rates after menopause but increased rates after puberty and during the perinatal period (Cutter, Norbury, and Murphy, 2003). Where estrogen levels are poorly regulated, estrogen supplementation has been shown to be linked to lowered depression levels (Lasiuk & Hegadoren 2007). The level of female sex hormones has been found to show predictive power over affective symptoms in depressed women who have epilepsy (Zheleznova, Medvedev, & Kalinin, 2013); a lowered cortisol awakening response is associated with major perinatal depression, and lower blood cortisol levels overall, appear to be linked to chronic post partum depression (Seth, Lewis, & Galbally, 2016). There is little comparable data for men, but these studies may be reflective of Tobe's (2014) theory that the human mechanism needs to be in balance to function properly. There are theories linked to the HPA (hypothalamic-pituitary-adrenal) axis where increased activation in this area (and high levels of cortisol) can produce stress-type symptoms (Monteleone, 2001). Cytokines (pro-inflammatory chemicals which increase upon exposure to stress or infection) can be elevated in depressed people – and these can impact upon neurotransmitter functioning (Dowlatti et al., 2010).

Abnormalities in various structures within the brain have been postulated due to their use of monoamines such as dopamine, serotonin and noradrenaline and some imaging or metabolic studies have found anomalies (Mayberg et al., 2000; Underwood et al., 1999). More recent imaging techniques such as magnetising transfer have apparently revealed impaired biophysical integrity in the caudate nucleus in people with major depression (Kumar, Yang, Ajilore, et al. 2014). More advanced chemical analysis has shown brain-derived neurotrophic factor (essential to neuron health) to be decreased in depressed patients in people with late life depression; and functional MRI imaging (i.e., imaging during the process of a task) indicated volume reductions in the subgenual anterior cingulate cortex in major depression. However, theoretical modelling has more recently led to the notion that abnormal neuroplasticity or the dysregulation of areas which function together, may be at issue (Menon, 2011; Muller & Knight, 2006). Nevertheless, these latter dysfunctions in neuroplasticity and large-scale brain networks are likely to be just as true for a variety of other conditions and illnesses (Woodward et al., 2012) and so are not specific in explaining depression.

Depression seems in part to be a heritable condition. Twin studies on the prevalence of depression indicate a 40-50% heritability, and the presence of a first degree relative with diagnosed clinical depression increases the risk to between double and triple that of controls (Fullerton, Cubin, & Tiwari, 2003; Lohoff, 2010). Lohoff (2010) sums up the difficulties of tracking the genetic risks for depression by pointing out that no one gene has been found which alone accounts for depression vulnerability but rather, the most likely genes each carry a very small amount of prediction towards risk. Taken together with the fact that genetic studies for bipolar disorder and schizophrenia take precedence at present, progress in this area appears to be slow (Fullerton, Blair, Mitchell, & Schofield, 2009; Lohoff, 2010).

Cognitive theories of depression on the other hand, have flourished and are highly influential. Aaron Beck's seminal work developing cognitive theories of depression (Beck, 1967; Beck et al., 1979) provided an elegant summary of some of the difficulties wrought by depressive episodes; namely the negative views of self, negative views of the world, and negative predictions for the future, along with negative schemas (i.e., networks of related beliefs and attitudes which are activated during relevant life events). These tendencies have been observed widely (Matthews & MacLeod, 2005) and are given greater substance by the fact that cognitive or cognitive behavioural treatments for depression are currently the most effective intervention accepted worldwide, with and without accompanying antidepressant medication (Gotlib & Joormann, 2010).

Temperamental factors are thought to be highly relevant here, with the first causation factor mentioned by the DSM-5 (American Psychiatric Association, 2013, p 166) being Neuroticism. This setting factor contributes to negative affect and the lack of ability to maintain emotional stability. (The Black Dog Institute cites temperamental vulnerability as the underlying cause in non-melancholic and non-psychotic depression, terming it the "psychological osteoporosis" underlying these "fractures" in affective stability (Black Dog Institute, 2012). Costa & McCrae (1992a, 1992b) launched major studies introducing empiricism into the understanding of Neuroticism, finding that not only did it appear traitlike and stable, but that it had a key part to play in personality theory. This has been echoed by other authors such as Goldberg (1993) and Zuckerman, Kuhlman, Teta, Joireman, & Kraft (1993). These authors commonly understand Neuroticism as a tendency to respond to stimuli with negative and distressing responses such as emotional volatility, worry, lowered mood, flight, hostility and self-criticism, and items on the operationalised scales produced by these authors reflect these elements. McCrae and Costa (2003) report a key issue as being the frequency and lack of proportion in these responses; there is a notable correlation with scale items that describe both depression and anxiety (Jylha & Isometsa, 2006). Lahey (2009) describes that "The personality trait of neuroticism refers to relatively stable tendencies to respond with negative emotions to threat, frustration, or loss. Individuals in the population vary markedly on this trait,..... Neuroticism is a robust correlate and predictor of many different mental and physical disorders, comorbidity among them, and the frequency of mental and general health service use."

Despite cognitive theories of depression being increasingly complex and sophisticated, these alone may be an insufficient explanation as depression also involves behavioural and physical problems however (American Psychiatric Association, 2013). Evolutionary theories of depression posit that depression is an adaptive response. For example, it may occur when a threat occurs and escape or evasion is not possible (Gilbert & Allan, 1998). Gilbert and Allan (1998) take this notion further, extrapolating that depression can be a mechanism for accepting subordination and not putting oneself at risk by fight or competition. Nesse (2000) theorised that depression may be an adaptive signal that a goal is not actually possible and should be abandoned. Yet, Nettle (2004) points out that evolutionary adaptations should be consistent across a population (which the depressive response is not); that they need to evidence good design; and ability is reduced where they are not found. Apparently, depression fits none of Nettle's (2004) criteria.

## **Prevention of Depression**

Given the high rates of depression prevalence in the population and the extent of its impacts, any form of effective prevention is much needed. The WHO (2012) reports that empirically-designed prevention programs can reduce the incidence of depression. The most promising areas for preventive intervention are the problem of neuroticism undermining positive affect and emotional stability; the rumination and poor coping associated with anxiety disorders; vulnerability during chronic illness; and, the extreme life challenges and psychological instability associated with substance abuse. Each of these requires a different approach to support, strengthen coping and assist in resilience and so research needs to focus upon clear empirical strategies for each of these types of vulnerability before the onset of depression symptoms. Empirically targeted methods in prevention however, may be key. While risk factors are being carefully examined in prevention programs (Blanco, Rohde, Vazquez, & Otero, 2014; Hunter, Nazareth, Morris, & King, 2014) the methodology of the actual intervention is seemingly poorly defined and so outcomes (such as 15% in Hunter et al., 2014) are not outstanding.

If the mental processes and strategies (broadly described as positive illusions) can play a protective role in stabilising emotions during periods of stress, this should constitute a type of resilience to depression. This chapter examines why positive illusions may have particular utility in protecting against depressive states due to their high degree of relevance to a range of well-established factors that have been modelled as contributing to depressive vulnerability. For example, positive illusions are thought to show characteristics of emotion regulation (as in Fredrickson, 2011) that, like Surgency, may be protective against negative affect. Positive illusions are predicted to allay self-critical cognitions (Barnett & Gotlib, 1988) which are a key component of depression; they appear likely to have links to higher and more stable self-esteem (Kernis et al., 1993), factors which are protective against depression (Seligman, 1991); and they are thought to orient the person towards the future (Taylor & Brown, 1988) thus forestalling rumination.

## **Focus of this Study**

The modelling of depression is an enormous theoretical area, and extensive reviews and critiques of cognitive theories of depression have been undertaken elsewhere (Abramson & Alloy, 1992; Clark & Beck, 2010; Costello, 1992; Coyne & Gotlib, 1983; Disner, Beevers, & Beck, 2011; Gotlib & Joormann, 2010) and these are not duplicated here. Instead, this chapter concentrates on areas where depressive vulnerability factors are most closely linked to the concept of positive illusions. It briefly reviews known contributors to self-related processing in depressive vulnerability including: attentional bias, negative self-focus, stressful life events, self-esteem problems, neuroticism, attributional style, and dependency and self-criticism. This sets the scene for experimental questions to be posed with regards to the converse of vulnerability – positive cognitions and resilience.

## **The Historical Modelling of Depressive Vulnerability**

Cognitive models of depression have emphasised faulty mechanisms in peoples' processing, retrieval and attention which produce vulnerability and which seem to directly link to specific features of depression (for example, amotivation). Counteracting these phenomena certainly forms the basic platform of cognitive therapy for depression, which has resulted from Beck and Seligman's cognitive theories that were developed during the 1960's and 70's (Abramson, Seligman, & Teasdale, 1978; Beck 1967, 1976; Seligman, 1975). Beck's model (1967, 1976) emphasised faulty information processing (i.e., cognitive distortions) and underlying negative schemata in depression. Depressed people are characterised in this theory as interpreting themselves, their situation, and their future prospects, in a negative way. Where ambiguous stimuli exist, depressed individuals are thought to favour negative explanations. Expectations of life and the environment are negative, and external evidence becomes less important than the person's negative schemas which are construed as large, cohesive constellations of ideas and beliefs which bias the person's interpretations and expectations. Beck (1976) theorised that these schemata are stable enough to generate consistent types of errors in depressed subjects' thinking and information processing. In Beck's theory, external events may stimulate cognitive processes that "lead to" depression, but the environment is not given great emphasis in the aetiology of the syndrome. If cognitive therapy for depression is an effective treatment for an existing condition, it is now important to find out whether the opposite of these vulnerabilities produces robustness in mood – and hence, what may be effective in a preventive intervention.

Seligman, Abramson, Semmel, and von Baeyer (1979) proposed a system of attributions where depressed subjects perceive positive outcomes as due to external, specific, and temporary (unstable) causes, and negative outcomes to internal, global and stable factors. The formation of this system of attributions leads to a pattern of negative responses which themselves become stable over the course of time. Abramson et al. (1978) suggested that the level and persistence of depression would be directly linked to the level of distortions in a person's attributions. Like Beck (1976), Abramson et al. (1978) conceptualised cognitions as the primary mechanism in the depressive process, with poor motivation thought to be due to a lack of response initiation, and emotional symptoms as due to affect resulting from the self-conceptualisation. If a faulty system of attribution puts a person at risk, will a robust set of attributions be found in people exhibiting a positive illusions-type protective mechanism?

Beck's model of depression (1967, 1976) predicted that depressed people would show biases in their perception, recall and interpretation of external information due to the negative schemata through which information is filtered. Therefore, a person's context may provide situational triggers to negative thinking in people who are vulnerable. There is a need to investigate the trait X situation condition here. That is, negative schemata predispose people towards depression where lowered mood may be triggered by challenging events. Those people who are protected by the positive illusions bias may experience much less

disruption during the course of such events. Hence in situations where negative mechanisms would be triggered (or self-protective strategies found to be absent) the vulnerable individuals would be more prone to depressotypic phenomena. Typical situations might include failing a test, not getting a desired job, or relationship problems.

### **Attentional Bias and Negative Self-focused Attention**

There has long been a de facto assumption that depressed individuals have some kind of unusual attentional bias, prompting many studies (Edison & Adams, 1992; Ingram, 1990; Ingram et al., 1992). While most researchers agree that depressed people evidence failures to a) properly sort a mix of negative self-relevant information and positive or neutral information or b) shed negative information, laboratory-based tasks have been poor at finding how this bias may work, either using dichotic listening tasks (Ingram et al., 1994) or the reading of facial expressions (Ridout et al., 2003). It seems even, that negative biases in perceptual processing do not appear to be specific to the diagnosis of depression (Bradley, Mogg, Millar, & White, 1995; Bradley, Mogg, & Lee, 1997; Yu et al., 2015). For example, Bradley et al. (1997) found no link between depressed mood and a pre-conscious bias for negative words, but such a pre-conscious bias was linked to high trait anxiety. What may be of more importance in depressive processing is not incidental negative information - but the ability to disengage from negative stimuli that are self-relevant. Once engaged with self-referent negative information, depressed people may be less able to disengage (Caseras et al., 2007; Vrijzen, van Oostrom, Isaac, & Speckens, 2014). Some neural correlates have been observed in even subclinically depressed people who show differences during attentional tasks (Dedovic, Giebl, Duchesne, Lue, & Andres, 2016).

As well as self-relevant attention, self-focused attention (i.e., attention focussed internally upon mental or physical processes), which is negative, is another possible feature of depression. It has been well described as a feature in anxiety, mostly in relation to physical symptoms). That is, people who have experienced anxiety or panic symptoms tend to enact vigilant self-scanning, looking for the onset of another possible episode. They tend to notice physical symptoms that others do not (Deffenbacher, 1978; Mandler & Watson, 1966). Several studies seem to indicate that negative self-focus is also evident in both subclinical and clinical levels of depression (Ingram & Smith, 1984; Ingram, 1999; Smith & Greenberg, 1981) in a form that is more evaluative of a person's worth, rather than physical symptoms such as those evident in anxiety. A study measuring initial ruminative self-focus and the impact of manipulating this focus, found that "decentering" moderated negative thinking in depression (Lo, Ho, Yu, & Siu, 2014).

People who are prone to negative self-focus, selectively scan for and then ruminate over aspects of themselves or their performance that appear to be unfavourable. This contrasts with the broad attentional focus that is considered normal; a pathological focus overemphasises the internal world as well as scanning for negative cues in the outside world, while a normal focus concentrates more on the outside environment, and lacks the prime towards negative cues. Self-focused attention that is negative, may impact upon affect,

attributions and the level of accuracy in interpretations (Smith & Greenberg, 1981). McCabe, Gotlib, and Martin (2000) on the other hand, propose that people in neutral mood states have access to automatic attentional biases that are self-protective in nature. These align as similar to positive illusion processes.

Material from Ingram's (1990) review of the area does suggest some mechanisms for the distortions evident in depressed groups. In these populations, the regulation of self-focus appears to be disturbed, and so negative content becomes more salient. Alternatively, prior experiences of aversive states (either depression or anxiety) primes sufferers to experience vulnerability in trigger situations where negative self-focused attention is prompted. Ingram (1988) found that subjects who showed higher levels of negative self-focus across different situations, evidenced more negative cognitions and affect following negative personal experiences. Rude, Maestas, and Neff (2007) found indications that attention to one's own distress per se may not be as harmful as the negative affect or the judgement connected to it. Davis and Nolen-Hoeksema (2000) found that people subject to rumination showed greater cognitive inflexibility. This latter finding links with the propositions that depressed people experience differences in their executive functioning (Joorman, 2005), that they have reduced ability to inhibit negative materials (Goeleven et al., 2006; Joorman, 2006), and that such deficits in cognitive functioning may impair ability to re-interpret potentially distressing material or to disengage attention, hence disrupting emotion regulation (Joorman et al., 2009).

If positive illusions act as Taylor and Brown (1988) have described, they would have the potential to disrupt the "stuck" negative self-focus process by distraction, so assisting in emotion regulation and the avoidance of negative stimuli and provide "decentering as in the Lo et al. study (2014). For example, if someone is not picked (as they had wished) for a leadership team, they can "un-stick" themselves from negative self-focus and attendant rumination, by instead focussing on the unexpected spare time that they will have, and the fact that they don't much like some members of the team who were picked. They are inhibiting negative self-judgements and potential unease about the teachers' possible judgements about them, and freeing themselves from an entire focus upon wistfulness and loss (cognitively rigid) and instead, be free to entertain pleasant thoughts about an afternoon out with friends, and extra time for their next assignment. As Gotlib and Joormann point out (2010), few explorations have been made of these phenomena outside of symptomatic states, or using negative life events to test the diathesis-stress model. Hence, it is overdue to be examining these protective mechanisms.

### **Diathesis-Stress: The Contribution of Negative Life Experiences to Depression**

Diathesis-stress constitutes a state-trait model for depression. Trait measurements for depression (such as the Depression facet of the NEO-PI –R; Costa & McCrae, 1995) assume that in certain individuals, combinations of personality characteristics can produce long-term and relatively stable depressive symptoms. State measurements of depression (such as the Beck Depression Inventory; Beck, Steer, & Brown, 1996) measure depression which has been present for potentially a matter of weeks, and which may have multiple possible causes, some external.

The notion of diathesis-stress was a key component of Beck's original (1967) cognitive theory of depression. Several research studies have noted the higher than normal incidence of negative life events in the histories of people suffering from depression (Billings, Cronkite, & Moos, 1983; Brown & Harris, 1978; Lloyd, 1980; Spinhoven et al., 2011). Chahraoui, Benony, Bungener, and Jebrane (1999) found that cumulative negative events predicted a higher risk for depression. Brown and Rosellini (2011) noted that chronic stress has a different impact upon disorders than episodic stress. That is, chronic (but not episodic) stress moderated (i.e., worsened) the impact of neuroticism upon depression. Chronic (as contrasted to episodic) stress was also predictive of poorer outcomes for depression over time. The examination of a proposed protective (as opposed to vulnerability) factor should be tested in a design that takes into account the role of negative life events. For experimental purposes, episodic stress will be easier to measure than chronic stressors. For example, exam stress, driving tests, University entrance and GAMSAT test effects can more easily be measured, and upon a more available and homogeneous population, than chronic financial stress, or the strain of someone working two jobs to maintain their family. The former types of stress are much more suitable for a thesis-based experimental study, whilst the latter would need a large population more easily accessed by a funded research group or government organisation.

A great deal of research energy has been devoted to exploring what kinds of vulnerability are important in the diathesis, and what types of stress can become triggers. Abramson et al.'s (1978) reformulation of the learned helplessness model for example, introduced the idea that vulnerability to depression can be produced by habitual negative attributions, where the attributions are activated by external events. For example, where someone tends to make internal, global and stable attributions for failures, a minor fail (such as an assignment returned with a low mark) is predicted to trigger these "here I go again, it's always me, I always mess it up." But in some early studies neither this model (Johnson & Miller, 1990) nor Beck's model (Persons & Rao, 1985) were able to predict the onset of depression with any reliability. Later studies have focused somewhat more precisely upon empirically-validated links to depression in the generative process: Brown and Rossellini (2011) used an interaction model to look at vulnerability factors and trigger circumstances for depression. Specifically, these were neuroticism (the vulnerability factor) and certain life events (the triggers). This study for example, indicated that while neuroticism alone did not have an impact on the unfolding course of developing depressive symptoms, interactions between this factor and life stress did show predictive power. This was endorsed by the Mohamadi et al. study in 2013, which indicated that for individuals under stress, Neuroticism was not only predictive of perceived stress, but also of depression outcomes. Ciesla, Felton, and Roberts (2011) found a three-way interaction where rumination and a negative cognitive set (two vulnerability factors) combined with stressors to worsen depression. This provides endorsement for cognitive therapies that target negative automatic thoughts and rumination as risk factors in depression; similarly, these processes may be helpful to disrupt in a preventive or protective framework. Self-esteem structures appear to play a role in the mechanisms of coping with stress with structural equation modelling indicating that *perceived* stress (see above) along with self-esteem levels,

mediated the relationship between stress and depression - with perceived stress also negatively related to self-esteem (Lee, Joo, & Choi, 2013). As indicated by Ciesla, Felton, and Roberts (2011) subjective stress (i.e., stress which is felt but not related to actual stressors occurring) is related to dysfunctional attitudes - and this combination goes on to provide risk for further depressive episodes (Kuroda, 2016).

Another target for the cognitive therapies – negative schemas – have been found to interact with stressful life events to prompt higher levels of recurrent depression, with more dense negative-schema content linked to greater symptom levels in subsequent episodes (Seeds & Dozois, 2010). This is as Beck (1967, 1976) would have predicted - that negative biases in the processing of event information (due to negative schemata) tends to produce lower coping and higher depression levels in response to challenging events. One recent study combined the examination of negative schemas and attentional bias upon the course of depressive illness (Disner, Shumake, & Beevers, 2016). This study found that while people with profoundly negative schemas showed higher depressive symptoms at baseline, those who showed the most marked attentional bias had symptoms which worsened over time. Some other studies have looked at positive schemas to see if these have a protective effect: Keyfitz, Lumley, Hennig, and Dozois (2013) produced a five-factor model for positive self-protective schemata and found that worthiness was most negatively related to depression and self-efficacy by contrast, most inversely related to anxiety. A recent study (Ruizq, 2016) used schema analysis along with the related concept of psychological inflexibility and found that this construct mediated the relationship between depressive schemata and resultant symptoms of depression.

As seen above with the vulnerability factor of neuroticism, an individual's temperamental characteristics appear important in the depression process. An 'individual psychology' model for the generation of depression was proposed by Slavik and Croake (2006) that located personality characteristics as mediating the relationship between stress and symptoms via a person's response set to the stressor. Personality characteristics may need to be mapped out in the formulation of an individual's vulnerability to depression, and the Black Dog Institute's theory structure (2014) would also advocate for this. Some theorists take this approach further – proposing that certain characteristics can predispose people to their own generation of stress – and that this phenomenon is also linked to neuroticism. For example, Eberhart, Auerbach, Bigda-Peyton, and Abela (2011) found indications that certain types of long-term schemas were predictive of "stress-generation", which was in turn linked to the exacerbation of depression. Eberhart and Hammen (2010) found that certain types of (over-reactive) interpersonal style tended to generate relationship stress and worsened subsequent depression symptoms. Overall, Patten (2013) has argued that the modelling of diathesis-stress in depression needs to become much more complex and individualised and ideally, other factors such as social support, need to be taken into account (Brown et al., 2012; Tse, Rochelle, & Cheung, 2011).

## **Self-Esteem Maintenance and Homeostatic Mechanisms**

Leading on from the state, trait and state-trait models for depression (that essentially model vulnerability) as discussed in the section above, is the concept of homeostasis. Here, the proposal is that active psychological mechanisms are necessary to maintain a 'good enough' platform to the individual's state of mind, and so reduce the likelihood of depression.

For example, low self-esteem can be seen as a failure in the homeostatic (and maintenance) mechanisms around a person's self-concept. Low self-esteem has long been thought to show links with negative affect (Bradley, 1978; Snyder, Stephan, & Rosenfield, 1978; Zuckerman, 1979). Poor self-esteem has been linked to depression (Brown & Harris, 1978) as well as anxiety. That scores for depression would correlate negatively with scores for self-esteem, has been widely observed in the depression literature (e.g., Brown & Harris, 1978; Eisenbarth, 2012), and of recent times it has almost taken it as read that depression and self-esteem (especially when depression is at a symptomatic stage) will be inversely related (Roberts, 2006).

Sowislo and Orth (2012) found indications that while self-esteem predicts depression and depression is not predictive of self-esteem, self-esteem and anxiety seem to influence each other mutually. Simpson et al. (2010) examined other variables and found that alongside self-esteem, self-disgust was a second mediating factor. While early experiences, especially parental divorce and physical, emotional, or sexual abuse seem to be a risk factor for low self-esteem (Al-Fayez, Ohaeri, & Gado, 2012; Walsh & Walsh, 1987), it has often been unclear whether self-esteem is only a predisposing factor, or whether peoples' self-concepts change for the worse during episodes of mental illness. Lewinsohn, Steinmetz, Larson, and Franklin (1981) for example, found that self-esteem levels did not predict the onset of depression.

Ingham, Kreitman, Miller, Sashidharan, and Surtees (1986) found that the lack of a personal confidant, separation from a mother prior to age 11, and three or more children under 14 in the household, were linked to damaged self-esteem and hence, that this effect was long-term. The onset of depression in those involved in the survey, was linked to a lowering of self-regard - poor self-esteem correlated equally with depression and anxiety.

There has been some argument about whether self-esteem is a vulnerability factor in depression, or whether depression produces a "scar" which lowers self-esteem. Orth, Robins, and Meier (2009) modelled the former using data from three prospective studies to look at how self-esteem and depression develop, and the vulnerability model was a better fit. This result was replicated by Sowislo and Orth (2012) in a prospective design. Orth, Robins, Meier, and Conger (2016) further tested the vulnerability model and found the effect to be free of variability related to narcissistic processes. Although self-esteem seems to show

strong relationships with depression, its relationship with depression may not be simple. Eisenbarth (2012) for example, looked at two new elements: perceived stress, and resultant coping style. The results indicated that self-esteem interacted with perceived stress in predicting depression – and that high self-esteem was positively related to active coping styles such as help-seeking and analysis of problems, and negatively related to avoidant styles of coping. There is a great deal more detail to be understood then, about how self-esteem-related processes merge with depressive processes, and along what time lines.

Roberts and Monroe (1994) proposed a model where multiple self-esteem deficits cluster together and form a core vulnerability to depression. If a person has few, externally-dependent, or rigidly-maintained sources of self-worth, significant self-ideal discrepancies, and/or sources of poor self regard – these were termed structural inadequacies. This theorised set of vulnerability factors would be evidenced externally as lability in self-esteem, and a lack of robust response to negative primes. This produces a lack of homeostasis. However, the exact makeup of the constellation of factors would vary across individuals, according to their life history and temperament.

Roberts and Monroe (1994) suggested these vulnerabilities would lead to other phenomena frequently seen in depression such as poor coping, self-contributions to stress, poor regulation of affect, and poor relationships. The authors proposed that negative life events would result in a sudden decline in self-esteem in vulnerable individuals due to the inherent fragility, and that once present, low self-worth would play a role in the maintenance of depression. The potentially fluctuating nature of self-esteem would explain why the self-esteem level alone, does not adequately predict depression onset. A longitudinal picture revealing the profile of an individual's self-esteem lability will be a better indicator of proneness to depressive episodes.

Roberts and Gotlib (1997) went on to explore the predictive power of labile self-esteem in relation to life events and depression. They had developed the notion of dysregulation in relation to the vulnerability model, proposing that normal (or less vulnerable) people possess active mechanisms that buffer them from threatening experiences (and that this could be termed a 'homeostatic process'). Butler, Hokanson, and Flynn (1994) had found that labile self-esteem affected the impact of life events upon depression, using a prospective design. Roberts and Gotlib (1997) utilised a 6-week prospective design to examine the interaction between life events and self-esteem lability in predicting depression. The interaction was significant, and independent of overall self-esteem levels, and of the 'setting' personality factor of neuroticism. Later studies have pursued these questions and Simpson, Hillman, Crawford, and Overton (2010) found self-esteem to mediate the relationship between dysfunctional cognitions and depression. Eisenbarth (2012) also found interactions between self-esteem, stress, and coping while Orth, Robins, and Meier (2009) found no interactions but independent predictions of depression by both low self-esteem and stressful events (so that both operated as independent risk factors). Vickery and colleagues (2008) have replicated the impact of self-esteem stability as a predictor, finding that it moderated overall self-esteem in predicting depression scores. Meanwhile, Sowislo and Orth (2012) have confirmed that self-esteem is a risk

factor for depression rather than depression causing poor self-esteem – via meta-analysis. This supports the vulnerability – rather than depression ‘scar’ model.

Positive illusions might contribute to the lowering of core vulnerability in this model, by reducing self-ideal discrepancies, and providing swift, confident self-esteem protection. This would lead to more stable self-esteem over time, and a greater resilience to negative ‘primes’. Individuals with high levels of positive illusions therefore, would also be expected to demonstrate more stable self-esteem and less reactivity (with low self-esteem, negative affect or depression) to negative life events.

### **Neuroticism/Stability**

While positive illusions might contribute to stability by mounting moment-by-moment adjustments to a person’s conceptualisation of situations, Neuroticism is thought to act as a trait-like factor influencing stability, acting as a setting factor for both depression itself – and other factors that have an influence upon the depressive process. Jorm and colleagues (2000) found that high levels of neuroticism had a synergistic effect on both anxiety and depression, in tandem with low extraversion. This raises an important point. Neuroticism is a factor predictive of relapse in depression (Angst, 1999; Berlanga, Gerardo, Torres, Apiquian, & Caballero, 1999; Hardeveld et al., 2013; Steunenbergh et al., 2009) and is also associated with vulnerability towards depression (McLennan, Buchanan, & Bates, 1994; Roberts & Kendler, 1999). It has been implicated in the stress-generation process in anxiety and depressive disorders (Moller-Leimkuhler & Madger, 2011; Uliaszek et al., 2012). But as Uliaszek et al. (2012) outlined, it is presently unclear whether neuroticism has an impact upon general psychological distress (for example, unhappiness, low self-esteem, anxiety, depression) or has specific predictive power regarding vulnerability to depression. Paulus, Vanwoerden, Norton, and Sharp (2016) began to explore this, and found that important aspects which neuroticism mediates in relation to depression, are emotional dysregulation and psychological inflexibility-mentioned above in relation to negative schemata.

Teasdale (1988) proposed that neuroticism is a significant factor in a person’s wider functioning and that it may affect their functioning under stress. Such aspects of functioning may include information processing, attributions, affect, and the accessibility of self-related constructs. Hence, this over-arching factor may affect the severity and duration of a depressive episode as well as the threshold of risk for the development of an episode. Its strength in influencing lower levels of depression may lie in its emotion-regulating role (Goeleven et al., 2006). Spinhoven et al. (2011) found a positive relationship between neuroticism and depressive severity; however, this was also related to independent onset and duration factors. Ormel, Oldehinkel, and Vollebergh (2004) examined the impact and stability of characteristics - including neuroticism, self-esteem, and coping skills - in relation to depression. These researchers found that the three characteristics were trait-like and moreover, that the severity of these was linked to the level of depression symptoms. Takahashi, Shirayama, Muneoka, Suzuki, and Sato (2013) also found that patients with treatment-resistant depression showed higher neuroticism scores. However, using analysis of variance

it is hard to interpret the independence of each construct, which would be better achieved using hierarchical multiple regression and path analysis.

There needs to be some clarification of definition for the construct of neuroticism itself. Hettema et al. (2006) designed a study using 9,000 twins and found indications that genetic factors relating to neuroticism predicted over one half of the risk for internalising disorders. Neuroticism is known to be a very large “setting factor” in many disorders (Jacobs et al., 2011). However, its influence may be moderated by stressors (Brown & Rosellini, 2011), and can be mediated by the baseline severity of disorders (Spinhoven et al., 2011); its mechanisms in daily life circumstances warrant a great deal more explanation (Jacobs et al., 2011).

Neuroticism was the largest single factor predictive of adult depressive, anxiety, and substance use disorders out of the cluster of neuroticism, extraversion, disinhibition, conscientiousness, agreeableness, and openness in a study by Kotov et al. (2010) and so it may not show specificity in its impact upon depression. Neiss et al. (2009) found that self-esteem, depression, and neuroticism were genetically influenced (using the Minnesota Twin Family Study) and seemed to reflect aspects of a common “temperamental core”. Self-esteem, optimism and Neuroticism are also highly inter-correlated and it is speculated they may reflect one large personality factor (Judge, Erez, Bono, & Thoresen, 2002). Therefore, the opposite of Neuroticism (i.e., Surgency) looks like a generalised protective personality factor. Neuroticism is clearly of importance in the vulnerability and course of depression. However, its specificity in regard to depression, and the delineation of the construct of neuroticism in contrast to other related factors, appears less than clear at present.

## **Attributional Style**

Neuroticism has been found to correlate positively with a negative attributional style (Corr & Gray, 1996; Heene, Buysse, and Van Oost, 2003). Attributional style is a construct which sits close to the notion of positive illusions and it, self-esteem and depression may be logically linked but few studies have spelt out the relationships clearly. Tennen and Herzberger (1987) reviewed the literature on attributional style and depression, and concluded that attributional style was as likely to be a function of poor self-esteem as a specific feature of depression. Their study used multiple regression analyses to plot the determinants of attributional style, and found self-esteem to be the main predictive variable, with neither depression nor anxiety adding significantly to the variance in attributional style.

Yet this particular area has been rife with inconsistent results. Prieto, Goncalves, Buela-Casal, and Machado (2003) found that depressed patients did make more external attributions for positive events than non-symptomatic participants. Mezulis, Abramson, Hyde, and Hankin (2004) conducted a massive meta-analytic study (using 266 studies) and found that positive attributional bias was least evident in depressed populations, while the level of attributions in different types of psychological illness varied widely. Hasler et al. (2004) used a longitudinal design and found that baseline attributional style predicted later symptoms of

depression. The authors cautioned however, that the study could only be considered a quasi-experimental design. Barnett and Gotlib (1988) had also used a prospective design and looked at interactions between dysfunctional attitudes, life events and social support in predicting psychological distress. An interaction between dysfunctional attitudes, life events and social support did not predict general psychological distress, and the one-way interaction between attitudes and life events did not predict the level of depressive symptoms.

Forsterling and Buhner (2003) found that while depressed subjects' attributional styles were fairly distinctive, there were subjects with a so-called depressogenic attributional style who were not depressed. These authors pointed out that, whatever the complexities of the data, there appear to be very few depressed people who do not show a depressotypic attributional style. A longitudinal design using structural equation modelling indicated that depressive attributional style (stable and global attributions for negative events) was a predictor for depression symptoms over a period of 2.5 years in adolescent girls (Kim, Ollendick, & Seligman, 2012). In adults, the same style in an adult population was predictive of hopelessness symptoms in depression (Sturman, Mongrain, & Kohn, 2006). Another prospective study on attributional style and depression found that while attributional style was a predictor for depression over time in adolescents, moderating factors were also important and should be taken into account (Rueger & Malecki, 2011). Some studies have used the opposite – a positive attributional style, in a prospective way, to examine whether this could be a protective factor. Vines and Nixon (2009) studied children in this way, and found that a positive attributional style had a moderating effect on the impact of stressful life events upon depression. Hence, attributional style seems worth examining in the context of depression and protective cognitive styles, and should be used in a prospective design using structural equation modelling and one which takes into account multiple possible mediating factors.

## **Dependency and Self-Criticism**

Self-critical cognitions (SCCs) are also related to attributions and explanatory style: they are a phenomenon which has been described both as a proximal factor in depressive symptomatology as part of both the symptom set - and as part of a personality characteristic active in the possible formation of depressive cognitions. Some studies suggest that SCC's remain present in remission and so are not just a mood or state component (Barnett & Gotlib, 1988; Segal & Ingram, 1995), while others found them directly related to mood states (Coyne & Gotlib, 1983; Coyne & Wiffen, 1995). Negative representations of the self are an accepted component of depression and as such, are represented in such well-known scales as the Beck Depression Inventory (Beck, Ward, Medelson, Mock, & Erbaugh, 1962; Beck, Rush, Shaw, & Emery, 1979). An inability to act and a feeling of helplessness is explained by the theory of learned helplessness. Seligman and Maier (1967) found that dogs placed in a position where they could not avoid electrical shocks, later did not act to avoid shocks when this time they were in fact, avoidable. A theory was constructed to explain and extrapolate how this was linked to inaction and defeated behaviours – and later reformulated (Abramson & Seligman, 1978). Abramson and Seligman (1978) explained that such a theory

needed to predict why some individuals succumbed more than others, and why helplessness could become either widely generalised or specific. But the notion of helplessness and inaction has become linked to the pessimism and amotivation in the conceptualisation of depression.

Several theorists have linked self-criticism specifically to dependency, believing that there may be a common link. But Hammen, Marks, Mayol, and deMayo (1985) divided subjects into those with dependent and self-critical schemas. The self-critical subjects evidenced depression in relation to both negative interpersonal and achievement-type events, while the dependent subjects showed higher rates of depression in relation to negative interpersonal events only.

Robins and Block (1988) also divided subjects into the dependent and self-critical groupings, following Beck's proposal that only events salient to each group, would be likely to activate depression. Similarly, to Hammen et al.'s (1985) study, the groups appeared not to discriminate, but to overlap. Whilst interactions did occur, autonomy was not a reliable predictor, and sociotropic subjects were vulnerable to depression following both negative social events and negative autonomous experiences. Robins and Block (1988) commented that the experimenters' grouping of event types might not be subtle enough. Additionally, the groupings might not match the subjects' own classification of the most dangerous event types, which would be likely to show the most predictive power.

Coyne and Wiffen (1995) discussed critical personality issues as risk factors in depression, again pairing the issues of dependency and self-criticism as an entity in depression – which is now widely accepted and used in research protocols (Mazure, Raghavan, Maciejewski, Jacobs, & Bruce, 2000; Santor, 2003; Santor & Patterson, 2004). One problem associated with this approach however, is that self-criticism as a possible single entity has been left behind and a strong strand of research is only attending to SCC as a paired concept to dependency. Murphy and Bates (1997) analysed self-criticism as a separate issue and found that it was not only related to fearful and preoccupied attachment styles, but that it emerged in its own right as a vulnerability factor in depression. Some later studies have separated the two constructs and used SEM to look at mediating variables in depression outcomes. Cox, Clara, and Enns (2009) proposed that self-criticism was likely to be more closely related to perfectionism. In a longitudinal design, the impact of self-critical cognitions upon depression at Time 2 was not mediated by negative life events. Campos, Besser, and Blatt (2013) found that while self-criticism was influenced by early parental rejection, it was predictive of depression, which in turn mediated the relationship between self-criticism and suicidality. If positive illusions are active in robust individuals, these may act to forestall SCC's, either prior to the onset of depression or in the symptomatic stage. Positive illusions' role in mediating the impact of negative life events upon self-critical cognition and depression, also needs to be studied using a similar design to the recent studies cited above.

## Positive Cognitions

While there has been much examination of negative cognitions in depression (and bearing in mind the cautions described above), it appears that their opposite - positive cognitions - appear to be impaired in both depression and anxiety, and so an accurate understanding of their role in depression is important given the increasing attention given to this area in the literature. The tripartite model of anxiety and depression (Clark & Watson, 1991) for example, modelled depression and anxiety as sharing a factor of affective distress, but differentiating with anxiety featuring hyperarousal and fearful anticipation, and depression featuring anhedonia and related cognitions. Later factor analysis (Clark, Steer, & Beck, 1994) appeared to support this structure, with a large general distress factor in second-order analysis underlying the relationship between these first-order factors. Ingram (1989) conceptualised negative automatic thinking as specifically related to depression.

Kendall, Howard, and Hays (1989) investigated the differential roles of positive and negative cognitions in differing psychopathologies. Kendall et al. (1989) reviewed the models of positive and negative affect structures from Watson and Clark (1984), Watson and Tellegen (1985) and Schwartz and Garamoni (1986). Watson and Tellegen (1985) had suggested that depression in particular, was related to elevation of negative affectivity as well as low positive affectivity. Schwartz and Garamoni had theorised that healthy mood states would be related to a particular balance of positive and negative self-talk. Schwartz (1986) proposed an optimal positive-to-total cognitions ratio of .618, as distinct from an all-negative or all-positive “monologue”. Kendall et al.’s study supported the concept of a positive-to-negative self-talk ratio of .62:.38. For this study, Kendall et al. expanded the Automatic Thoughts Questionnaire of Hollon and Kendall (1980) to incorporate new positive self-talk items.

Following Clark and Beck (1989) and moving forward from the studies focussing upon negative vs positive cognitions, Kendall et al. suggested that depressed mood also interferes with the processing of positive self-relevant information. Depressed subjects evidenced significantly more negative self-talk and lower levels of positive self-talk when compared to either controls, or patients with other psychiatric diagnoses. Depressed individuals show a reduced level of anticipating future positive events (Bjarehed, Sarkohi, & Andersson, 2010) – while their level of anticipating future negative events is similar to controls. Macleod and Moore (2000) wrote a largely conceptual paper proposing that positive and negative inner experiences are actually dealt with by separate psychological mechanisms – and so in depressive states, both these mechanisms and the level of positive cognitions, go awry. Mak, Ng, and Wong (2011) termed positive views about the self, the world, and the future, the “positive cognitive triad”. This team used structural equation modelling to test whether this “triad” of views acted as a mediator between resilience and overall psychological wellbeing. Their results indicated that this group of positive cognitions were related to resilience: resilient individuals had more of these cognitions and showed lower levels of depression. It was

proposed that these positive cognitions were one mechanism which operationalised resilience to adverse events and challenges.

Layous, Chancellor, Lyubomirsky, Wan, and Doraiswamy (2011) are some of the researchers who have directly started to use findings on positive cognitions and known vulnerabilities in order to propose new styles of intervention for depression: they emphasised the teaching of positive thinking, affect, and behaviours in order to challenge the imbalances noted above, and hence to reduce the potential for depression symptoms, and increase people's resilience. Sin and Lyubomirsky (2009) had enacted a meta-analysis of targeted positive psychology interventions (now sometimes being termed positive activity interventions or PAI's) and found that these types of interventions tend to decrease depression symptoms, though this is somewhat dependent upon the level of depression severity, participant age, and the individual's level of motivation.

## **Summary and Conclusions**

This chapter has briefly covered some of the basic "facts" about depression, including a basic description of the disorder, the prevalence of depression, age of onset and course of illness, impairments in functioning, and so forth. It has noted that depression has been examined sub-syndromally and as a dimensional construct, thus opening up the study of depression in non-clinical populations. Although causal theories of depression are noted, albeit very briefly, the focus of the chapter is on cognitive factors in vulnerability to depression and even more specifically on cognitive resilience factors. Indeed, there is a large cognitive psychology literature on depression that has focused on vulnerability to depression. In particular, it has researched proximal factors such as negative self-focused attention, memory and attention biases, and cognitive constructs related to mood. Studies including the role of life events indicate that interactions between dysfunctional attitudes and the occurrence of life events are important, as are the person's perception of the life event in question. It has been clear that both negative cognitions, and the balance between positive and negative cognitions, are significantly disturbed in depressive states. More recent studies such as those briefly described above, explore the notion that an ideal state includes the utilisation of positive cognitions, affect generation and behaviours – which form a part of personal resilience. Hence, positive activity interventions that support and strengthen these responses, are being employed in vulnerable populations in order to treat depressive symptoms and increase robustness for the next period of vulnerability. However, these research activities are recent. The exact types and categories of protective cognitions and responses have not yet been mapped out. It is this study's contention that notions arising from Taylor and Brown's (1988) original concept of positive illusions will be fertile ground to explore in this context.

## CHAPTER 3 Positive Illusions

This chapter examines the concept of positive illusions. The first section entitled “The Origins of the Positive Illusions Concept” outlines the sources of the concept in social psychological studies of breast cancer patients who used strategies of self-enhancement and perceived control in their attempts to adjust to their situation. It then charts Taylor and Brown’s (1988) development of this concept in their seminal article that proposed that positive illusions are regularly used by people to protect their mood, self-concept and motivation. The following section entitled “Critiques of Taylor and Brown’s (1988) Formulations” reviews the work that emerged immediately after 1988. The section “Further Studies on Positive Illusions: Diverse Applications but Lack of Empirical Confirmation” then looks at later studies by diverse authors. This highlights the striking lack of empirical confirmation for the positive illusions construct, despite its having achieved accepted status in the literature, especially within social psychology. One of the strongest predictions for positive illusions has been that they should avert negative cognitions and support improved functioning in diverse ways. However, the outcomes of studies that use illusions as a predictor have to date proved unreliable - there has been a common tendency to use the term in a loosely or poorly defined way and without developing or utilising any empirically validated measure. The Summary and Research Directions section concludes the chapter by suggesting that a positive illusions measure needs to be developed and tested for its reliability and validity.

### **The Origins of the Positive Illusions Concept**

**Illusions in breast cancer patients.** Taylor (1983) and Taylor, Lichtman, and Wood (1984) studied breast cancer patients’ strategies in adjusting to a major negative event. The diagnosis of breast cancer involves the substantial task of adjustment, but it is also known to pose particular risks for depression, anxiety, hostility and lowered self-esteem (Anstice, 1970; Brown, 1978; Meyerowitz, 1980; Ray, 1977; Renneker & Cutler, 1952). Taylor (1983) has pointed out that the majority of individuals suffering from cancer tackle the task of adjustment without ever seeking mental health support, and indeed they usually report positive outcomes in their adjustment (Gurin, Veroff, & Feld, 1960; Wills, 1982).

Taylor and colleagues (1984) thought that in order to achieve this adjustment, breast cancer patients were probably using a set of attributions that specifically related to their circumstances in order to manage the magnitude of threat that they were facing. The authors speculated that their patients’ degree of success in adjusting might be related to the type of attributions made regarding their disease. They found that 41% of patients blamed some kind of stress; 32% carcinogens, 17% diet, 26% heredity, and 10% a blow to the breast. It was found that the specific event to which blame was attributed, made no difference to coping as assessed by the Global Adjustment to Illness Scale (Derogatis, 1975). When asked to attribute responsibility to four named dimensions, 41% of patients blamed themselves, 28% the environment, 10% another person, and 49% to chance (the percentages exceed 100% as some respondents chose more than one dimension). Of

these four dimensions, only blaming another person was associated with poorer coping - although it may be that different kinds of blame are optimal at different stages of adjustment.

Attributions were obviously important to the patients; however, they made a higher rate of causal attributions for their disease (95% of respondents) than their partners did (63%). The patients in Taylor et al.'s (1984) study seemed to show a high level of need to accord external blame for the development of their illness, although the benefits of their different specific attributions are still unclear. It may be that no one specific attribution helps everyone: instead, the person's personality/family/cultural factors are used in forming the attributions that most successfully lower the degree of threat to the person concerned.

Taylor's 1983 article examined in detail the types of self-enhancement that breast cancer patients attempted, and which of these might be indicative of the formation of a specific structure of beliefs around the illness. The group showed a clear tendency towards using downward comparison (i.e., finding themselves better off than someone else). Taylor described the patients as comparing themselves to 'real' women who had 'worse' disease profiles, and also to hypothetical people ('some women') who were not coping. Taylor also documented peoples' attempts to find meaning and benefit in their situation. An astonishing 53% of the patients said that the changes in their lives since the diagnosis of their disease had been positive. Although the transcription of patients' comments was illuminating, Taylor undertook little empirical analysis of this portion of the study. There was no examination, for example, of differences in adjustment between those using downward comparison strategies, and those using any other strategies. There was no quantified description of differing approaches or any attempt at categorising the strategies. Taylor did not mount any study of the individuals who did not use these types of explanations. There was no test for comparative outcomes using clinical measures of depression, anxiety or self-esteem. These kinds of analyses may have offered more information as to which particular components of patients' newly-formed belief structures, produced positive outcomes on actual mental health measures.

There was however, a clear link between a belief of perceived control over the disease and an observation of improved adjustment in the Taylor studies (Taylor, 1983; Taylor et al., 1984). Believing that either oneself or important others (e.g., treating physicians) had control over the course of the disease significantly improved the level of adjustment, as far as it was measured. Perhaps surprisingly, cognitive control (rather than behavioural forms of control such as dieting or exercise, or those attempted through information-seeking) was most strongly associated with improved psychological outcomes. Taylor concluded that finding meaning, feeling a sense of control, and supporting self-esteem by feeling better off than others, were important to patients in their struggle to achieve feelings of safety and stability once more. She proposed that peoples' ability to tackle the three tasks of finding meaning, achieving a sense of control, and supporting self-esteem, rested on their ability to generate sets of illusory beliefs.

**Illusions in the normal population.** In 1988, Taylor and Brown extended the investigation of these cognitive adaptations by publishing a review of the literature on the use of self-serving biases amongst the normal population. Taylor and Brown disagreed with early authors such as Jahoda (1958) and Maslow (1950), as well as subsequent theorists such as Jourard and Landsman (1980) - all of whom have described 'mental health' as incorporating complete contact with reality. Instead, Taylor and Brown (1988) identified the need to support positive mood states by biasing information to make it fit positive aspects of one's self-image. People seem to need to maintain a feeling of security by believing that the future will not contain negative events and that even if their performance is average, their real worth is superior. Threatening information needs to be isolated, and failures and setbacks minimised to retain motivating cognitions. Taylor and Brown's wide-ranging review drew the conclusion that amongst 'normal' people, there are widespread and probably beneficial biases towards emphasising positive information in many aspects of behaviour and cognitive processing. Taylor and Brown termed these errors and biases, *positive illusions*. They followed Stein's (1982) definition of illusion as:

A perception that represents what is perceived in a way different from the way it is in reality. An illusion is a false mental image or conception which may be a misinterpretation of a real appearance or may be something imagined. It may be pleasing, harmless, or even useful (p. 662).

Taylor and Brown (1988) cast their net very widely in their article, citing studies from the domains of cognition, memory, personality, social psychology, information processing, and depression. They cited 32 different types of positive biasing tendencies in 70 different studies before concluding that "illusions" are widespread in the normal population, and likely to be supportive of wellbeing. Following on from the themes from the earlier Taylor (1983) and Taylor, Lichtman, and Wood (1984) studies, they categorised illusions as featuring either unrealistically positive views of the self, an over-estimation of personal control, or unrealistic optimism for the future.

**Positive self-views.** Taylor and Brown's (1988) review seems to indicate that people use strategies to maintain an unbalanced view of themselves where positive characteristics are given more weight and credence than negative ones. For instance, people apparently find positive information about their personalities easier to recall than negative information (Kuiper & Derry, 1982; Kuiper & MacDonald, 1982; Kuiper, Olinger, MacDonald, & Shaw, 1985) and positive qualities are judged as more typical self-descriptors (Alicke, 1985; Brown, 1986). Past performance tends to be recalled as better than it was in fact (Crary, 1966) and failings are perceived as common or inconsequential, whereas talents are viewed as rare, and more important (Campbell, 1986; Harackiewicz, Sansone, & Manderlink, 1985; Lewicki, 1983; Marks, 1984; Rosenberg, 1979). People judge that positive traits are more characteristic of themselves than others, and negative traits, less so (Alicke, 1985; Brown, 1986). Taylor and Brown (1988) reflected that these biases are observable on a statistical basis in that if most people see themselves as more special or above average, ipso facto these beliefs cannot always be correct. The flaw here is that this is averaged over a population -

some people may indeed be above average or more able, and these people may be correct in their assessment of their abilities.

**Illusions of control.** Taylor and Brown (1988) cited studies on gambling beliefs and chance, in order to illustrate biases related to personal control. Fewer studies were mentioned here, but Langer (1975) and Langer and Roth (1975) used gambling situations to examine beliefs about personal agency, and found that control is inferred even in purely chance-governed situations. Superstitions also operate similarly by endowing objects with ‘luck charm’ significance; subjects tend to believe that they have greater control if they throw dice, than when a substitute does it on their behalf (Fleming & Darley, 1986; Langer, 1975).

**Unrealistic optimism.** In western culture, people are often more future- than present- oriented. That is, they concentrate on what is going to happen, rather than what is happening now. Also, they believe that the present is an improvement on the past, and that the future will be even better (Brickman, Coates, & Janoff-Bulman, 1978; Gonzales & Zimbardo, 1985). Taylor and Brown (1988) cite Markus and Nurius’ (1986) finding that people believed that many more positive than negative events would occur for them in the future. Similarly, other groups’ estimations of future events were more closely related to their preferences or social desirability factors than to the likely pattern of events (Pruitt & Hoge, 1965; Sherman, 1980). This picture is likely to have cultural support; our society promulgates the view that people are always learning and therefore perhaps, constantly increasing the amount of control they have over their environment, and that they can always improve themselves and their situation. Martin Seligman with Railton, Baumeister, and Sripada (2013) are working on a new model to map how people plan and view the future. “Prospection” unlike many phenomena in psychology, has no immediate links to past experience – instead it uses the present to set a guide for the future while evaluating possible outcomes. This is a very distinctly human phenomenon, achieving a type of planning that would not be found in other species.

## **The Benefits of Illusions**

Taylor and Brown (1988) predicted that the use of illusions would have many benefits. These included support for happiness or contentment, and for motivation and persistence. Particular comparison was drawn with the profiles associated with depressed individuals, who appear to lack the use of any type of illusion-style strategies. The authors grouped these benefits under the general heading of ‘mental health’.

**Happiness.** Taylor and Brown (1988) cited several studies that drew comparison between the perceptions and attributions of happy people, and those who are not happy. However, the authors asserted that 70-80% of people usually report that they are ‘moderately to very happy’ in mood surveys, yet these surveys were not referenced. In the studies that are mentioned as linking happiness to illusion-like phenomena, most of the studies did not set out to define happy people, so much as compare depressed and non-depressed populations. It should be noted that happy and nondepressed, cannot be taken to mean the same thing. Taylor and Brown (1988) reported that “positive illusions have been tied to reports on

happiness” and “the association between illusions and positive mood appears to be a consistent one” (p. 198) but no mention is made as to where this has been illustrated. However likely this is, no validated scale yet exists to test for positive illusions, and so links between the outcome of happiness and the use of illusions cannot confidently be drawn.

**Motivation and persistence.** The prospect of links between motivation and the use of illusions is a realistic one, given what we already know about goal-setting and performance. The broadest task of positive illusions seems to be the maintenance of the self-concept and thus self-esteem. According to Weiner et al. (1971), people with high self-esteem find the idea of achieving goals credible, and tend to attribute failures along the way, to inconsequential factors. Seligman and Schulman (1986) attributed the greater persistence of optimistic salesmen to the support that positive attributions provide to persistence. Taylor and Brown (1988) concentrated on describing the apparent relationship between factors in motivation and illusion-type features. These included the study by Felson (1984) that showed that positive self-views are linked to greater task persistence, and Burger’s (1985) work, which found links between the desire for control and active and persistent responses to tasks. Positive illusions may also be linked to positive mood states, which are supportive of action and persistence. If they are, then it follows that they are likely to be incompatible with negative mood states such as depression.

**Illusions and Depression.** A key feature of the Taylor and Brown (1988) review was the frequent comparisons that the authors made between the “normal” populations and those that are depressed. In line with the Kendall, Howard, and Hays’ study (1989), the authors cited several studies showing that people who are depressed or suffering from low self-esteem harbour self-images which incorporate a greater proportion of negatives (Coyne & Gotlieb, 1983; Ruchman, West, & Pasahow, 1985; Watson & Clark, 1984). The depressed group showed more equal recall for positive and negative information related to the self (Kuiper & Derry, 1982; Kuiper & MacDonald, 1982). The reformulated learned helplessness theory predicts that depressed individuals will ascribe less agency to themselves. Taylor and Brown (1988) cited studies by Abramson and Alloy (1981), Golin, Terrell, and Johnson, (1977), and Golin, Terrell, Weitz, and Drost (1979) which illustrated that such subjects do not show the illusions of control which tends to be maintained by nondepressed groups. Taylor and Brown (1988) also indicated that depressed people failed to show positive biases in their predictions for their futures (Alloy & Ahrens, 1987; Brown, 1985; Pietromonaco & Markus, 1985; Pyszczynski, Holt, & Greenberg, 1987; Ruchman et al., 1985).

Taylor and Brown (1988) concluded that people suffering from depression or low self-esteem showed a marked lack of positive illusions. What seems striking about this group is their apparent lack of access to positively-biasing strategies of any kind. Taylor and Brown cited 19 studies that included depressed subjects and that spanned a wide range of experimental tasks. Thus, it appears that depression is either highly incompatible with positive, self-elevating strategies, or that it is the outcome of a failure to implement these same strategies. Theories describing pessimism (Seligman, 1991), attributional style and learned

helplessness (Abramson, Seligman, & Teasdale, 1978), and cognitive features of depression (Beck, 1976) are supportive of either, or both, of these possibilities.

The areas discussed in Taylor and Brown's (1988) review, ranged over social strategies, social cognitions, schema-related cognitions and motivation. However, it remains unclear whether the authors were proposing cognitive mechanisms, social tendencies, personality variables, or a combination of all three. No model was proposed for how and when illusions may be used, what variables internal or external to the person might facilitate them, or what the predicted effect of positive illusions on precise outcome measures would be. For example, no explicit consideration was given as to how the use of positive illusions might affect self-esteem levels, although the premise for their use would seem to be based on support for the general area of self-esteem. Taylor and Brown (1988) surmised that positive illusions characterised "the mentally healthy person" (p. 204). This position however, has confused a sample from the normal population (i.e., of those who are not currently showing depression) with people who have no adverse psychological symptoms of any kind - and the two are not the same. Taylor and Brown (1988) did not indicate precisely under what conditions illusions might be used, or how they might be acquired.

### **Critiques of Taylor and Brown's (1988) Formulations**

Colvin and Block (1994) were comprehensively critical about the means by which Taylor and Brown (1988) reached their conclusions about positive illusions. In particular, they criticised the basis of the logical structure used by the authors. They suggested that Taylor and Brown's (1988) article used a three-step process. This: (a) highlighted tendencies found in normal participants; (b) argued that this implies that these constitute illusions that are evident in most people; and then (c) pointed to studies where the opposite of positive biases operate in dysfunctional population samples. They criticised the representativeness of phenomena described in the first step, and in the move to step (b) argued that there is little evidence that illusions exist as described by Taylor and Brown, or that they will be features of 'most' people.

They were particularly critical of the way in which Taylor and Brown (1988) drew conclusions from studies relating to the so-called step c), where depressed populations were said to show tendencies opposite to those characterising positive illusions (i.e., either non-illusory, or negative by nature). Colvin and Block (1994) noted that several of these studies had shown results that were more complex or equivocal than was represented in the summaries by Taylor and Brown (1988). To a certain extent, Colvin and Block's (1994) criticisms of the conclusions drawn from these studies were philosophical ones. For example, while not disputing that depressed people are more even-handed in describing their positive and negative qualities, they attributed the differences to self-esteem levels, and then failed to speculate about the links between self-esteem, depression and self-protective illusions. The Lewinsohn, Mischel, Chaplin, and Barton (1980) study exploring self-perceptions and depression, does seem to have methodological flaws. The study's observers were undergraduates who were informed about the diagnostic category of the depressed group; the inter-rater agreement concerning negative attributes was low; and the effect size regarding the degree of difference in

realism, was also low, accounting for only 4% of the variance. Reviews and studies subsequent to 1988 have generated much evidence that depressed people show more realism in their self-appraisals (Haaga & Beck, 1995), and have produced other evidence that is variable or contradictory (Dobson & Pusch, 1995; Dykman, Abramson, Alloy, & Hartlage, 1989).

Colvin and Block (1994) noted that peoples' self-descriptions appear to show elements related to actual competency (Colvin, 1993a, 1993b), and speculated that illusions may not always be involved. This though, fails to take into account the possibility that positive illusions may exist as supportive structures to motivation and wellbeing, and therefore can be related to competency in the subsequent sphere of action. If illusions are an important factor in an individual's motivational structure, they may even be prerequisites for continued effective coping.

Colvin and Block (1994) criticised Taylor and Brown's (1988) evidence regarding the illusion of control, as failing to demonstrate that illusions of control are related to better mental health profiles. I would also question the conclusions relating to the gambling-type studies put forward by Taylor and Brown (1988), and the lack of specific prediction regarding psychological outcomes. But dismissing the whole area as Colvin and Block (1994) have done, fails to take into account the thematically-related area of attributional style. The wealth of evidence surrounding the issue of attributional style in low self-esteem and/or depressed groups (see Chapter 2 for a discussion) indicates that a perceived internal locus of control for positive events forms part of a healthy personal profile (Alloy & Clements, 1992; Alloy, Lipman, & Abramson, 1992; Houston, 1995). This provides support for the general area of positive biasing in cognitive processing.

Colvin and Block (1994) do not speculate about the importance of timing for positive illusions. So, for example, the illusions of control may indeed be "limited, transient and haphazard" (p. 10) but timing and context may be crucial in processes supporting self-esteem in ambiguous circumstances. In a situation where many interpretations of events are possible, interpreting personal control for an outcome may serve its purpose by acting briefly but at the right time for the person to maintain their goals, and their activities in pursuit of those goals.

Colvin and Block (1994) cite evidence that believing in personal control in the face of irrefutable evidence to the contrary, is damaging (Affleck, Tennen, Pfeiffer, & Fifield, 1987). But an 'either-or' position fails to take account of the possibility of optimal levels of illusions, or their timing or adaptability in usage. Like most psychological mechanisms, illusions may be most helpful when applied appropriately and with flexibility, rather than operated rigidly. Credibility is also an important consideration. Credibility and adaptability come together when: a) evidence is judged to be irrefutable; b) this provides motivation for a new set of goals; and c) optimism and a positive self-image are used to support the maintenance of the new goals.

As well as considering the optimum level for the use of sustaining illusions, serious consideration of the area needs to address the kinds of circumstances that might activate these illusions. It is most likely that they would be of benefit during the many minor challenges which people experience each day (e.g., “why did he glare at me when I said that?”). Dealing effectively with these constant challenges has the potential to avert distress and keep a person’s motivation on track. An absence of such strategies could leave people open to entry into depressotypic thinking and lowered self-esteem (e.g., “well he’s seen through me now - he doesn’t like me anymore.”). Positive illusion-style strategies would have the potential to forestall rumination or the negative self-appraisal. On the other hand, serious illness or devastating economic problems might call for a differing set of sustaining illusions. These might take the form of favourably comparing one’s circumstances to those of other people with disadvantages (Taylor, 1983), and retaining in the foreground, awareness of aspects of one’s self and one’s circumstances which are found to be positive.

Colvin and Block (1994) were deeply critical of the lack of empirical basis to Taylor and Brown’s (1988) arguments. However, they also failed to explore the possible connections between positive illusions and related areas of operations. They too then, were unable to consider where positive biases may fit into cognitive mechanisms that are already fairly well known. For instance, their analysis failed to consider what mechanisms may be necessary to maintain self-esteem (as indicated by Tennen & Herzberger, 1987), and paid no regard to the extensive work carried out by Seligman and associates on the related area of optimism (Seligman, 1991; Seligman & Schulman, 1986; Shulman, Seligman, & Oran, 1986). Optimism shows several features in common with positive illusions regarding the positive biasing of information, and its use has demonstrated benefits in achievement, motivation and persistence, and not only to mental, but to physical, health outcomes (Seligman, 1991).

Colvin and Block (1994) did not accept that distortions of reality might result in improved functioning in the long term, remarking that “If individuals distort reality.... such individuals must necessarily emit suboptimal, if not maladaptive, behavioural patterns over the long run of a life” (p. 17). This perspective again fails to take into account Seligman’s (1991) evidence that the habitual distortions of the optimist seem to result in substantial benefits in terms both internal and external to the person. In this sense, Colvin and Block seem to be throwing the baby out with the bathwater. Though Taylor and Brown’s 1988 and Taylor’s 1989 papers are open to criticism on a variety of fronts, this does not alter the fact that several major areas of research show trends that suggest that a positive bias (used where self-relevant information is ambiguous) might provide a buffer against threats to the self-concept.

Taylor and Brown have replied (1994) that Colvin and Block’s (1994) criticisms were applied to a small section of their original paper, and that the three-step structure was not an accurate representation of their writing. Taylor and Brown (1994) also engage in a point-by-point refutation of the detail of Colvin and Block’s critique. The majority of their argument centres on the point that Colvin and Block have misunderstood several details. But in their response, Taylor and Brown (1994) make the same mistakes as in

their original paper (Taylor & Brown, 1988). Both the 1994 and 1988 papers cite many examples of studies showing that average adults distort perceptions and beliefs for their own benefit. However, this observation does not mean that positive illusions exist as a construct. Never having tested this, it is not possible to conclude whether positive illusions promote psychological adjustment. The validity of the three proposed categories of illusions is never questioned. Studies which are cited as providing support for the validity of positive illusions are in fact, further work on the illusion of control (Donovan, Leavitt, & Walsh, 1990; Spacapan & Thompson, 1991) and other related aspects which do not, in fact, test for either the existence or veracity of positive illusions *per se*. Taylor and Brown (1994) do not appear to appreciate (p.25) that mental health is very hard to confirm; nor that they failed to use clinically-verified measures of psychopathology. Taylor and Brown (1994) again make reference to unpublished references (Weinstein, 1993). Hence, at this stage, illusions remain a proposed construct rather than the proven entity Taylor and Brown seem to believe has been established.

In a further article, Taylor, Collins, Skokan, and Aspinwall (1989) again argued that positive illusions are used by most people as strategies that are supportive of mental health. However, this argument was mounted without empirical testing of the construct. The authors asserted that positive illusions are distinct from defence mechanisms and that in the face of significant or longstanding negative feedback, illusions give way to realistic interpretations of information, so that the individual can adjust the form of their actions when it becomes necessary.

Taylor et al. (1989) while proposing many interesting strands for investigation, were very assertive about their “findings”, which are again based upon research findings drawn from diverse areas. In the abstract of their article, the authors say that peoples’ normal functioning features the three categories of positive illusions proposed in their 1988 review. The rest of the text assumed that positive illusions existed, that they operate as had been predicted, and that they were formed out of the three components already described – that is, unrealistically positive views of the self, illusions of control and unrealistic optimism for the future. On page 115, Taylor et al. (1989) mentioned the preceding 1988 review, and asserted that:

The perception of the self that most people hold is heavily weighted towards the positive. Most people believe that they are more socially competent than others think they are, and in general self-conceptions appear to be more favourable than how the self is perceived by others (p. 115).

In fact, these authors had no basis at this stage to conclude what the greater proportion of the normal population believes: this had, and has not, been directly tested.

Taylor went on to conduct a very interesting study on positive illusions and psychological resources amongst men infected with the HIV virus (Taylor, Kemeny, Reed, Bower, & Gruenwald, 2000). This study took a more firmly empirical position. It used a somewhat homogeneous population with respect to age and asymptomatic status at the outset, observable factors such as such as CD4 T cell counts and mortality rates,

and a prospective design. Although this paper again assumes that “psychological beliefs such as optimism, personal control, and a sense of meaning are known to be protective of mental health” (p.99), the study’s outcomes are more credible than those of the previously-criticised group (see above) due to the more rigorous design. The study found that subjects who scored low on realistic acceptance of their own mortality, lived an average of 9 months longer than the individuals who showed high scores for realism. People who reported finding positive meaning in their own experience of an AIDS-related bereavement, showed a lower rate of AIDS-related mortality, and a higher level of CD4 T cells.

### **Further Studies on Positive Illusions: Diverse Applications but Lack of Empirical Confirmation**

Positive psychology is short on measures and empirically-based findings that relate directly to its tenets (Held, 2004; Ingram & Snyder, 2006) and long on theory-building. For example, more than 300 citations of Taylor and Brown’s 1988 review have been made from 1988 to date. Few of the authors writing on illusions following Taylor and Brown’s (1988) original article have questioned the basis or operation of positive illusions (e.g., Nicholson, 2011) and so the concept has been absorbed into the (mainly social) psychology literature almost unquestioned, even though aspects remain untested. These very concerns were raised by Young (2014) in a review article, which concluded that at the present level of research few conclusions can be drawn about positive illusions and their possible utility. In the years since the first seminal study proposing illusions as a construct, several studies have been published that examine positive illusions and their efficacy in relation to many different aspects of life. Most of the studies appear to support the notion of positive illusions/self-enhancement/self-protection/task protection. However, two main problems arise. The first is that the term positive illusions is used loosely. Illusions used in relation to golfing strategies for example (Kirschenbaum, O’Connor, & Owens, 1999) and adjustment to divorce (Mazur, Wolchik, Viridin, Sandler, & West, 1999) may not form part of the same construct. The second problem is that there seems to be an assumption that this loosely-grouped collection of habits and strategies should not be subjected to empirical testing. This means that “illusions” may not even exist as a viable construct.

The following section reflects on some of the studies published between 1989 and 2014 and the indications and limitations implied for the positive illusions construct. The review was conducted using PsycInfo and medical data bases entering the term positive illusions as a keyword. For the dates 1988-1995, this generated 134 references. For the period 1996-1999, 260 references were brought up and for 2000-2015, 1,646 were obtained. Additionally, the reference sections of certain key articles in the area of positive illusions and defence mechanisms were examined (Asendorpf & Ostendorf, 1998; Boyd-Wilson, Mclure, & Walkey, 2004; Colvin & Block, 1994; Norem, 1998; Paulhus, Harms, Bruce, & Lysy, 2003; Taylor & Armor, 1996; Taylor & Brown, 1988).

## **Illusions and Positive Affect**

Wolfe and Grosch (1990) designed a study to test whether positive illusions are indeed associated with positive affect, social skills, and improved intellectual functioning, as Taylor and Brown (1988) had predicted. The outcomes for the study were a little unclear, apart from finding that the illusory tendencies were traitlike and loaded onto two different factors (1 Affective and 2 Cognitive/Social). This study suffered from many of the drawbacks mentioned above in the positive psychology literature and its results are therefore harder to understand: it draws conclusions without testing the validity of the constructs at hand, and uses terms interchangeably and in a poorly-defined way. The study for example, used the terms positive illusion and 'self-confidence' interchangeably. (Self confidence though, is likely to involve several sub-factors such as experience of one's known competence in related areas, and affective aspects of self-concept.) Self-confidence should have been distinguished from positive illusions -which Taylor and Brown (1988) proposed as (also interchangeably) either beliefs or strategies that exist to distort reality in order to bolster the self-concept.

Wolfe and Grosch's (1990) study also used an eclectic collection of measures to rate positive affect. These included Scheier and Carver's (1985) Optimism Scale, Hoyle's Multifaceted Evaluation of Self Inventory (Hoyle, 1987), and 20 out of 37 narcissism items from Emmons (1987). Mixing up items from different scales to arrive at a measure of a single construct is psychometrically very flawed, and few conclusions should be drawn from the results. In this particular study the theoretical underpinnings (such as the role narcissism has in positive affect) are not explained by the authors – though psychoanalytic and later studies seem to agree for example, that narcissism features do intensify a person's efforts to elevate self-esteem (Jordan et al., 2003; Winnicott, 1965). Four different measures were used in the study to rate social skills, and negative affect was measured using Buss's (1986) inventory and some items from Levin and Stokes' Negative Affectivity Scale (1988). The problems of mixing up scales are compounded by selecting certain items from other measures whilst leaving others out: without thorough testing of the items selected, severe undermining of validity should be expected. Therefore, results on the outcome variables should be treated with caution.

In any event, the study's factor analysis yielded an unclear structure in terms of interpretable constructs. Factor 2 for example, was termed 'the cognitive/social factor' whereas cognitive and social factors in self-esteem protection should be treated distinctively. The term 'personality variables' (ie traitlike features) was used to cover such factors as self-esteem and self-monitoring. Whether these variables are indeed personality variables, is open to question. Self-esteem is much debated in the literature, and can be viewed as both a predictor and an outcome variable. 'Self-monitoring', could be argued to be a cognitive phenomenon and there is no apparent empirical justification for the inclusion in this study as described. The authors assert that : "optimism turns out here to be primarily affective" (p.531), with very little of the careful and complex testing which would be required to support such a sweeping statement. Wolfe and Grosch (1990) also draw a "long bow" in forming other conclusions, rating 'hopeful' and 'optimistic' as

synonymous with 'optimism', 'sensitive' and 'tactful' as meaning 'self-monitoring', and 'efficient' and 'self-reliant' as meaning self-efficacy. These kinds of issues undermine the conclusions that may be drawn from Wolfe and Grosch's (1990) study as well as others in this group, as do correlational designs with no longitudinal aspect. While they may signpost the way, what is most exemplified is the need for a careful empirical approach to the area of positive illusions and their possible contribution to wellbeing.

## **Positive Illusions and Self-Esteem**

Taylor and Brown (1988) proposed that positive illusions formed an essential buffer between the self and potentially negative or demoralising feedback. Hence, illusions should be strongly linked to self-esteem. Their theory, based in part upon preceding research, was that people who operate self-enhancement strategies would also be high in self-esteem. Colvin, Block, and Funder (1995) were suspicious of this conclusion. They pointed out that historically there has been poor operationalisation of self-enhancement, relying mainly upon self-report measures for both this concept and the accompanying measure of self-esteem. There is likely to be an inherent bias in this; people who are inflating their personal characteristics are also likely to inflate their definition of how they are doing with self-esteem. Colvin and Block (1994) further observed that Taylor and Brown's (1988) review lacked description of potential processes and meanings for self-enhancement, and so the concept has gone largely unexplained. Colvin et al. (1995) tested 18 year-olds for self-enhancement (via a self-description using a standardised adjective set), and then returned to these participants at age 23. At this time, the same participants were examined and rated for personality characteristics by graduate students or qualified psychologists. The same protocol had been used when the participants were aged 18, and using the same instrument (CAQ) to obtain definitions of those who were considered to be self-enhancers. At age 23, the self-enhancing men and women obtained less favourable descriptions by the assessing psychologists. A further analysis of the CAQ items typed the self-enhancing groups as having brittle ego defence systems. A further study found self-enhancing men and women performed more poorly on interpersonal skills. From this set of studies, the conclusion would appear to be that certain types of self-enhancement tend to lead to an artificial, shallow inflation of self-esteem which masks negative personality characteristics and poor social skills from the person.

Asendorpf and Ostendorf (1998) re-examined Colvin et al.'s (1995) finding that self-enhancement strategies (ie attributions and comparisons made to support the positive view of self) are used in relation to negative traits and negative social behaviours. They proposed that self-enhancement would be related to how unfavourable a particular trait is judged to be, and that individuals would show consistency in their self-enhancement across traits that are highly judged. The effect size for the former proposition was small, but a tendency to self-enhance across highly evaluated traits was seen to be the case. Both Colvin et al. (1995) and Asendorpf and Ostendorf (1998) investigated how self-enhancement is related to characteristics of positive adjustment. Taylor and Brown (1988), while proposing that positive illusions are positively related to mental health, were (a) unclear whether they were talking mainly about mood protection, and (b) it was emphasised

that positive illusions were related to protection of the person's own self-image – not that held by others, necessarily.

There may also be a distinction to be made between 'bloated' ego characteristics and a person adjusting as best as they can, to their inherent set of qualities. For example, Taylor and Brown (1988) cited studies showing that positive qualities are judged as more typical self-descriptors (Alicke, 1985; Brown, 1986) and that past performance tends to be recalled as better than it was in fact (Crary, 1966). In the long-term protection of self-esteem, it may be more important that the individual make their own judgements about which skills and talents they find more important in themselves (which may vary from how the wider culture values such traits). This allows the person to feel satisfied because they are consistently good at making cakes and gardening for example, even though their skills in the usually more highly valued Mathematics, English, and playing the violin, are poor.

A study by Paulhus, Harms, Bruce, and Lysy (2003) examined links between the self-enhancement aspect of positive illusions and adjustment including self-esteem. This study used a measure of over-claiming as a scale for self-enhancing strategies. These authors found that over-claiming was related to self-reports of psychological adjustment, but that this relationship disappeared when the level of an individual's adjustment was rated by another person and not the participant. Narcissism played a part in the level of self-reported adjustment; however, there remained a relationship between over-claiming and self-esteem as measured by the Rosenberg Self-Esteem Scale even when this was taken into account. Paulhus et al. (2003) wondered whether this may reflect differences between genuine and defensive styles of self-esteem. This relates to the manic defence - a concept originated by Sigmund Freud (1917). In *Mourning and Melancholia*, Freud described that when we experience a loss, we feel distress as a result of our attachment to the lost "object". To recover, we need to work through this experience of losing something important. The manic or ego-driven individual frees themselves from their distress by denying the importance of the object and focussing upon ego-based activities. Melanie Klein (1940) elaborated upon this a great deal in her work with depression. She proposed several variants of this type of defence and linked these to narcissism, while noting that we are likely to use such defensive styles frequently in minor ways, during the course of everyday life. Donald Winnicott (1945) further studied the manic defence. He emphasised the important role of fantasy in this type of defence structure – especially the attempt at omnipotence as a flight from the disturbance and distress of one's inner reality, which may feature loss, grief, and fear. He proposed that we may tend to fixate upon a new external object to distract ourselves. In a healthy situation, our ability to tolerate the feared inner reality increases until we can contemplate it properly and abandon the superficial external object. In an unhealthy one the external object(s) are never abandoned. The manic defence is now an established concept that is still researched: from 2000-2014 a database search yielded 335 citations.

Paulhus et al. (2003) in their work relating to the manic defence took for granted that positive illusions are an operating entity – and that over-claiming (i.e., claiming knowledge that could not possibly be true) is

representative of self-enhancement, which in turn, is itself representative of positive illusions. Well-recognised scales were used to measure self-esteem (the Rosenberg Self-Esteem Scale; Rosenberg, 1965), adaptation (the revised Ego-Resiliency Scale; Funder & Block, 1989), and narcissism (the Narcissistic Personality Inventory; Raskin & Hall, 1988). Their own Over-Claiming Questionnaire used items from the book *Cultural Literacy* (Hirsch, 1988) in addition to false items. The scale was trialled on 44 college students for test-retest stability, bias, and accuracy and showed reasonable coefficient values of between .76 and .80. With such a small-scale trial, it is not easy to tell whether the OCQ is a generalisable measure and it would certainly be a brave claim to state that over-claiming thus measured, reflects self-enhancement or positive illusions as Taylor and Brown (1988) conceptualised them. However, this study parcelled out some interesting aspects of the positive illusions debate; narcissism appears to play a role in self-enhancement mechanisms, self-reported adjustment may reflect this, and resulting boosts to self-esteem may be defensive or insubstantial in nature. If another person rates a person's level of adjustment though, there appears to be little relationship to any use of self-enhancement strategies.

### **Are there Optimal Levels for the Use of Illusions?**

There does seem to be some risk involved in the use of illusions. Taylor et al. (1989) dismiss as unusual, examples of disastrous overconfidence such as the abortive invasions of Russia by both Napoleon and Hitler. But Baumeister (1989) describes illusions as having the potential for both positive and negative outcomes. He sees overreaching the optimal margin of illusion as leading to self-defeating behaviours based on grandiosity. He cites historical examples as leading to catastrophes as diverse as the Wall Street Crash and the excesses of Cambodia's Khmer Rouge. Military leaders and others whose organisational structures do not facilitate honest feedback, are felt to be especially vulnerable to the sequence of a high confidence level followed by initial success, leading to increasingly over-optimistic views of the self's capacities, which go unchallenged and then pave the way for significant errors of judgement and eventual downfall. He proposes that illusions work best where their use is kept to within an optimal margin - below this, they are ineffective, but above this level, the risk of judgement errors increase, and highly inflated views of the self become more difficult to maintain.

Baumeister (1989) described the margin of an illusion as being the extent to which it departs from objective reality. Like Taylor and Brown (1988), he speculated that illusions carry potential liability - if their level of use is such that it interferes with interpreting important feedback from the environment the person may persist at fruitless tasks or fail to take account risks. Setting goals too high means an increased risk of failure, which entails further threats to self-esteem. On the other hand, Baumeister (1989) saw undiluted realism as depressing for most people. For example, it would mean that adversity is seen as an entirely negative experience, tending to lead to withdrawal. Withdrawal is not a useful response to difficulties: what is usually needed is initiation and action, which implies a belief in the possibility of a positive outcome. An optimal level of illusions would help people create a closer match between their internal standards and expectations, and their actual experiences, by biasing the perception of those experiences. From this

perspective, it looks as though optimistic expectations need the support of positive illusion operations to retain their credibility.

Compton (1992) did not reject Jahoda's (1958) theory that a full acceptance of reality (and hence, little use of illusions) is a concomitant of mental health. Compton (1992) estimated that since the criteria for optimal mental health are so complex and difficult to achieve, the proportion of the population with 'optimal' mental health would probably be less than 20% of any sample. This subgroup would be those less likely to need illusions, since they would be more able to cope with facing negative self-relevant information. Compton (1992) proposed that in this subgroup, 'optimal' mental health and low use of illusions would be linked to a high level of self-esteem.

Compton aimed to measure self-esteem, positive illusions, depression levels, personal hardiness, preference for self-relevant feedback, and general mental health. The study tested 114 college students using a self-report test battery and the sample largely consisted of males (74%).

Compton (1992) used a mean-split system for partitioning participants and their scores into four groups: High self-esteem and High illusions (HiHi), High self-esteem and Low illusions (HiLo), Low self-esteem and High illusions (LoHi), and Low self-esteem and Low illusions (LoLo). About 10% of the subjects formed the high self-esteem/low illusions group. When compared to both of the low self-esteem groups, the HiLo group showed fewer deviant signs, were better adjusted, and less neurotic, personality disordered or psychotic. Comparison between this HiLo group and the HiHi group, found that the second group had a significantly lower mean self-esteem level. The two groups did not differ on measures of depression, hardiness or attribution. They showed mixed results on the other scales. It is unclear, exactly what "mixed" results means here, as Compton did not report the score comparisons. Presumably, there is no clear advantage of one of these two groups over the other.

Compton (1992) used the Trent Attribution Profile (Wong & Sproule, 1984) that has not been very widely used. Alloy (1982) for instance, has criticised the use of unvalidated attribution measures. Such measures do not permit direct comparison with other studies measuring attributional style.

Compton used the Beck Depression Inventory short-form (Beck & Beck, 1972) as a measure of depression. A highly reliable scale, this has 13 items in the revised form and has shown test-retest reliability coefficients of from .60 (Hatzenbuehler, Parpal, & Matthews, 1983) to .90 (Lightfoot & Oliver, 1985). The measure of Hardiness used by Compton was based upon an unpublished test reported via a personal communication. Using a measure whose reliability is not known, severely limits the conclusions that can be drawn from a study using such a scale.

The apparent differences highlighted by Kernis et al. (1993) as to the ways that people with high, low, stable and unstable self-esteem react to positive and negative feedback may reflect the quadrants that Compton (1992) used to partition self-esteem and illusions scores. For further clarification of the links between self-esteem and positive illusions amongst the high- and low-use populations though, several strategies would be useful. The use of a large sample would facilitate the group splitting which needs to take place around the scores. If possible, an externally validated, dedicated positive illusions measure with demonstrated reliability and generalisability, should be used to measure the illusions construct. No confidence in illusions scores can be obtained until there is satisfaction that the construct itself is a valid one, reliably measured. Reliable measures of self-esteem and if necessary, attributions, should be used, in order to enable clear-cut conclusions to be drawn from the scores. Stability of self-esteem could be measured by several retests over a period of time - say, 1 month - to ascertain not just the score differences between the groups partitioned about self-esteem and illusions score levels, but to enable some links to be made indicating the mechanisms behind the differences in score patterns. In Compton's study, further confusion was added due to the DP and Total Esteem subscales sharing items in common, thus muddying the discriminatory power of the two instruments.

Boyd-Wilson, McClure, and Walkey (2004) also investigated the notion that positive illusions may operate differently at differing levels of wellbeing. They cited Maslow's (1968, 1987) concept that a broad cross-section of the "normal" population is actually experiencing a "psychopathology of the average" (Maslow, 1968, p. 16). So whilst people in this group may need illusions to sustain them, those few who function at a higher level need fewer illusions as they can afford to perceive life with greater clarity, as Jahoda (1958) had proposed. Boyd-Wilson et al. (2004) divided 205 participants by partitioning at the 33<sup>rd</sup> and 66<sup>th</sup> percentiles of a happiness score. Positive illusions scores (in the form of a self-enhancing bias) were compared for the three groups: these were termed the low, moderate, and high-happiness groups. The study found no difference in levels for positive illusions in the moderate and high-happiness groups, but a lower level for the low-happiness group. A second study (using the same 205 participants) looked at the level of positive illusions used at differing levels of life satisfaction. Results were similar to those of the first study in that positive illusions levels remained high for the moderately and very satisfied groups, and were lower for the less satisfied group. Hence, this study's results do not support the theories of Maslow (1968, 1987) or Jahoda (1958) that the healthiest group do not need illusions. This study though, suffers from the general group of problems mentioned above: (1) it takes the validity of the positive illusions construct for granted; (2) it is hazy in its measurement of the construct, using a non-standardised measure for self-enhancing bias, itself only one aspect of the illusions construct proposed by Taylor and Brown (1988); and (3) it used the Affectometer of Kamman and Flett (1983) to measure happiness, and the Satisfaction with Life measure of Diener, Emmons, Larsen, and Griffin (1985). Neither of these scales however, has been standardised or validated on large populations as a measure of affect or mental health, and so the conclusions which can be drawn are quite limited.

**Illusions, coping, and the academic setting.** Wright (2000) examined some of the complexities that were emerging in the study of positive illusions. Whilst recognising that unrealistically positive self-views can be negative in that they tend to mask shortcomings which are noticeable to others (Colvin, Block, & Funder, 1995) she proposed that they may be adaptive in discrete areas. Wright (2000) took care to use objective criteria in rating the unreality of the self-view, by comparing grade point averages with the students' self-ratings of their ability. Results showed that both actual and perceived ability were related to the students' academic performance levels. The author suggested that the adaptive function of unrealistically positive self-views in this case, might be related to the crucial level of the illusions held. However, it is also possible that some types of illusion processes are generally adaptive, and others are less so.

Gramzow, Elliot, Asher, and McGregor (2003) observed that sometimes unrealistic self-views may serve to assist avoidance, and at other times they may support motivation. Gramzow et al. (2003) proposed that it might not be the level of the illusion that promotes adaptation, but the purpose for which it is used. Gramzow et al. (2003) noted that studies relating positive self-views with performance have so far shown mixed results (Blanton, Bunk, Gibbons, & Kuyper, 1999; Robins & Beer, 2001). They set out to test whether a positively skewed view of academic ability would be associated with poorer performance where it was related to actual low grades, and be related to enhanced performance where it could be shown that the illusions were being used to enhance motivation or approach-type tasks. Overall, the findings were that over-positive self-views were associated with poorer later academic performance. However, when past poor performance was parcelled out and the impact of high motivation for achievement factored in, the results appeared to indicate that self-enhancement showed a positive association with the grades achieved.

The Robins and Beer (2001) study looked at the relationship between self-enhancement, academic achievement, self-esteem, narcissism, and possible aspects of motivation. Similar to the above study, self-enhancement was calculated by comparing students' own reports against objective scores, in this case, SATs. Self-esteem was measured using the Rosenberg (1965) scale, and narcissism, with the Narcissistic Personality Inventory (Raskin & Hall, 1988). This study found that self-enhancers did not evidence better academic results and were not more likely to graduate from college than others. Narcissism was associated with self-enhancement, as was lower self-esteem. The authors speculated that while illusions may buffer individuals on their way to a task, they may not make a difference to the task's outcome, and costs may be incurred as part of the illusion process, which ergo, distorts reality. Positive illusions were thought to be related to complex and varying circumstances and needs for people. The notion of benefits in the short term but costs in the longer term was echoed by Heath and Jourden (1997) whose study found that while participants demonstrated positive illusions in the lead-up to a task, they became disillusioned during the actual performance of the task. Further, disillusionment became more marked when there was a large gap between the level of achievement hoped for, and that actually achieved. Hence, persistence is likely to have benefitted but accuracy, efficiency, and ultimate appraisal may all suffer in this dynamic.

Chung, Schriber and Robins (2016) claimed to study positive illusions in college students over time—but their definition of self-enhancement strategies within the academic context only, hardly fits the structure proposed by Taylor and Brown (1988). Hence, the illusions concept here is not only taken as an existing construct when it essentially remains untested; but is used in very loosely based terms and without a validated measure while the term positive illusions is a key part of the article’s title. Similar approaches are still being taken in other recent studies with Neckar (2013) using a measure combining narcissism and over-claiming to look at “the costs and benefits of positive illusions”. Makridakis and Moleskis (2015) mounted review-based concerns as to when positive illusions change from being beneficial to harmful, when the construct itself has not ever really been validated as a psychological entity.

### **Are Positive Illusions Learnt or Innate?**

Snyder (1989) outlined a developmental process for positive illusions. She proposed that people learn to forge close perceived links between themselves and positive outcomes, and to put distance between themselves and negative outcomes in order to maintain a positive self-view. These self-views are first built up, and then continually refined and renovated. If positive illusions are a part of the ‘guiding fiction’, how do they get built up? Snyder conceptualised appraisal as analysing the positivity or negativity of an event, and calculating the degree of our perceived linkage to it. During childhood, we are shown the differences between good and bad actions and outcomes, many hundreds of times. Along the way, the child soon learns to claim connection to good events to gain praise and fit in, and to deny responsibility for bad events in order to avoid punishment and disapproval. If a child is taught in comprehensive ways to see themselves as consistently connected to good events and most frequently blameless in relation to bad events, she or he will be host to a wide-ranging set of positive illusion-style beliefs.

Life events will play a crucial part (McWilliams, 1994). If a child experiences more disruptive or threatening life events than the combination of his personality, environment, learning and carers can contain and isolate, the credibility of the positive illusion structure will be permanently undermined. Temperamental variation means that some children will accept positive linkages easily, whilst others feel dubious about the connections making sense. Neuroticism and hostility are especially likely to be major ‘setting’ factors to this integration (Bolger & Zuckerman, 1995, Watson & Hubbard, 1996) and will affect the thresholds of ‘good enough’, ‘long enough’ and ‘consistent enough’ modelling by the caregiving adults. In other words, a child who has a placid, interested outlook will find it easier to accept people’s suggestions of links between themselves and a range of positive outcomes. Credibility will be a vital part of appraisal of an event in relation to the self. What has been modelled, taught and found acceptable by the child, forms the basis to what seems believable later on.

### **Constructs Related to Positive Illusions**

Empirical studies have already demonstrated that there are some areas of psychological function that seem similar to positive illusions. These include those opposite to positive illusions – such as depressive realism (Haaga & Beck, 1995), learned helplessness (Abramson et al., 1978), automatic thought patterns in depression (Hollon & Kendall, 1980), self-esteem instability and maintenance (Morris & Reilly, 1987), and attribution patterns in depression (Tennen Herzberger, 1987). Similar to positive illusions and also known at the time were the impact of denial and defensiveness in patients experiencing illness (Hackett & Cassem, 1974), sealing over (McGlashan, Levy, & Carpenter, 1975), the study of very robust individuals and optimism (Seligman, 1991). However, Taylor and Brown (1988) neglected to review and compare all of the above areas. For example, although the authors indicated that at least part of the positive illusions concept operates via cognitive mechanisms, there was no detailed comparison to the existent literature on schema-related cognitions, the structure of self-esteem, or the use of self-talk. The constructs related to depression were reviewed in the previous chapter, and these latter constructs are reviewed and discussed in the section below.

## **Denial**

**Conceptualising Denial.** Denial is a widely-used term, especially in psychodynamic practice and literature, but its use carries different meanings across the various fields of medicine and psychology. Anna Freud (1948) first conceptualised denial as a primitive defence mechanism, which has similarities to positive illusions, in her seminal work “The Ego and the Mechanisms of Defense”. Denial was explained as an outcome when any combination of a variety of defences are mobilised in order to nullify threatening information by distorting one’s perceptions. Once the threatening information has been ‘obliterated’ or ‘discredited’, the person feels less stressed and is better able to function - as long as they can continue to keep the dangerous information under control. However, denial has often been viewed as a sign of serious pathology. For example, Lewin (1950) examined its possible role in manic-depressive illness, and it is also seen by some theorists as a defence in psychosis (Waelder, 1960). The terms “defensiveness” and “denial” are sometimes used interchangeably. However, in psychological (as opposed to criminological) studies, denial is usually operationalised as a defence that the person uses for themselves, whilst defensiveness, is one that is externalised to other people.

**The Measurement of Denial.** Denial has been operationalised by some well-established scales that measure denial and other closely-related constructs. Little and Fisher (1958) performed a cluster analysis on the MMPI Hysteria (Hy) scale. Two groups of clusters emerged. The resultant Ad (Admission) scale was made up of items describing physical symptoms that subjects can acknowledge. However, what is of more interest to this study is the emergent Denial subscale that comprised items describing a denial of feelings of hostility, poor interpersonal relationships, and feelings of suspicion. High scores on the Denial (Dn) scale were analysed as related to “the unsightful, the anti-intrceptive, the morally virtuous individual” (p. 306). This scale is now used as a standard tool in the analysis of MMPI profiles (Greene, 1991).

Haan (1965) derived a Denial scale from structured interviews. Items from the California Personality Inventory (CPI) and the MMPI that reflected specific mechanisms (derived by factor analysis) were formed into putative scales. Denial responses were seen as rejecting the existence of psychological distress or difficulties in tackling life problems. Haan's Denial scale correlated .44 with the Lie scale of the MMPI, and .52 with Social Desirability.

These two scales along with another four scales representing repression and/or denial subscales of the MMPI, were analysed for validity by Watson et al. (1987). Their analysis showed the strongest support for the Little and Fisher (1958) and Haan (1965) Denial subscales of the MMPI, and the R-S scale by Byrne et al. (1963). These three scales showed the best loading on factor 1 in the factor analysis (between .89 and .90) and the highest correlations with each other (between .69 and .77,  $p < .01$ ). The mean  $r^2$  describing the proportion of variance shared with other measures of denial, were highest in this group with  $r^2$  values of between .25 and .28 (Little and Fisher Denial scale).

Hackett and Cassem (1974) constructed a denial scale which rated denial related to physical illness. Scores on the scale showed overlap across the three categories, showing that the instrument alone could not parcel out the qualitative categories that the authors had described. Hackett and Cassem believed that the tendency towards denial remained stable over time, thus functioning like a personality trait. Levine et al. (1987) by contrast, conceptualised denial in illness as a coping strategy. These authors devised a 24-item instrument for use with medical patients. Total inter-rater reliability was  $r = .78$ , and the alpha for internal consistency was reported at .76. However, the Levine scale did not correlate with the Little and Fisher Denial scale or with objective measures of illness severity. Therefore, Levine et al. concluded that denial in (severe) illness is a coping response to situations of extreme threat where no physical action can be taken by the patient. Eller et al. (2010) and Gould, Brown, and Bramwell (2010) in studies of illness coping, characterised denial as a form of avoidant coping. Deimling et al. (2006), in an oncology study, found denial to be associated with higher levels of anxiety and depression in patients. Being a rather crude strategy, denial may best be used temporarily, to avert potentially damaging rumination and over-examination of threatening information. If used persistently or over a long period, denial is a rigid strategy which is not optimally adaptable and which does not produce favourable outcomes for the person (Alberquerque et al., 2011). Cramer (2007) found that the use of denial decreased during the years from age 11 to 18 in participants, implying that denial is indeed an immature defence mechanism.

### **The Concept of Defensiveness**

Soloff (1980) drew from Weisman and Hackett (1961) in defining denial as "the conscious or unconscious repudiation of part or all of the total available meaning of an event to allay fear, anxiety or other unpleasant effects." (p.134). It is not surprising that denial that is directed towards others (described as defensiveness) is often related to the kind of denial described above, which is an internal repudiation of threat. Defensiveness is a term that is used broadly. It may be used to describe the propensity to "fake

good”, i.e., to outwardly present as though personal faults and difficulties do not exist; or inwardly, to protect the self from distressing negative information or fears. According to Freudian theory (Freud, 1948) defence mechanisms exist to protect the person from persistent underlying fears and to maintain the self-image that they have created (Hentschel, Smith, Draguns, & Ehlers, 2004). Defensiveness has been found effective in some circumstances for self-esteem protection (Buetow, Goodyear-Smith, & Coster (2001); defence mechanisms in general, have been described as manifesting in cognitive, emotional and behavioural signs (Hentschel, Smith, Draguns, & Ehlers, 2004) and therefore being measurable.

The K scale of the MMPI was devised as a measure of defensiveness (Meehl & Hathaway, 1946). McGrath and O’Malley (1986) in assessing the validity of subscales and signs in the MMPI, found the Denial scale of the MMPI to correlate with K at .75 in pain patients, .80 in medical patients, and .81 in psychiatric patients (all at the  $p > .01$  level of significance). Denial and defensiveness then may form elements of a greater strategy set. The K scale of the MMPI was devised as a measure of defensiveness (Meehl & Hathaway, 1946). Sometimes termed the “defensiveness scale,” this scale is a more subtle measure than the L (“Lie”) scale in detecting attempts at positive self-presentation. Designed to detect more subtle variants of psychopathology in people who otherwise function in the normal range, it mentions self-control, family and interpersonal relationships in an innocuous way. Thus, people who score highly on this scale are seen as being unnecessarily defensive and overly positive in their self-presentation.

## **Sealing Over**

Allied to the concept of denial as a primitive defence, is the phenomenon of ‘sealing over’ where a patient attempts to distance himself/herself from unpleasant symptoms or behaviours, dismissing them as non-existent, irrelevant or nothing to do with him or her. Often used in psychotherapeutic circles, the term has not been widely discussed, as McGlashan, Levy, and Carpenter (1975) pointed out. These authors attempted to chart the difference between ‘sealing over’ patients, and those termed ‘integrators’ i.e., those who were able to acknowledge their difficulties and integrate them into their life picture. Subjects were people diagnosed with schizophrenia and resident in an inpatient unit. After briefly describing the two categories, psychotherapists, chart psychiatrists and a research psychiatrist assigned patients to these two groups. It should be noted that inter-rater agreement between the psychotherapists and psychiatrists was only 63%, and the subject numbers were extremely low with only 14 patients completing the study. The authors described sealing over subjects as seeing their illness as “visited on them” (p. 1270); and as relatively unimportant. These appear to be cognitive distortions that act to minimise the perceived connection between the person and the illness. Similarly, the sealing over group did not make connections between their illness and preceding life events, and appeared dismissive of the entire topic. Explanations of the origins of their illness were externally located (e.g., lack of sleep). In contrast, ‘integrators’ were able to discuss both negative aspects of their illness (e.g., their level of fear) and positive aspects (e.g., the elation of manic symptoms).

The authors of this study did not quantify or list the responses of the subjects, using phrases such as 'tended to' or 'experienced'. Therefore, we cannot know how these common themes were arrived at or just how many of the subjects expressed them clearly. The numbers involved mean that these categorisations would almost certainly not reach statistical significance if examined by *t*-tests, and no psychometric tests were used.

This study's methodology is so highly flawed that its outcomes should be viewed as being virtually anecdotal. Nevertheless, in the 1970's, data were slowly accumulating that denial is a commonly-used defence which may be successful at least in allaying some forms of distress. This aligns with the longstanding psychoanalytic view of denial as a primitive support mechanism. As interest focused on denial as a protective mechanism in the 1970s, medical and psychiatric teams noticed different profiles of defence mechanisms in medical patients (Lerman, 1979; Miller & Rosenfeild, 1975; Plananasky & Johnston, 1976). Some of these profiles appeared to show links with health outcomes for the patients. The current perspective however, might be that people recovering from schizophrenia for instance, would be better off as integrators in the longer term. This is because acceptance of symptoms and understanding of factors that increase the risk of recurrence, is necessary for people to minimise the prospect of illness recurrence. An extreme version of this was described by Carson (2004) where a woman with a breast cancer diagnosis denied her illness, kept on working and stayed downstairs in a basement. She had no treatment of any kind and was found dead from a haemorrhaged carcinomic ulcer.

### **Very Robust Individuals**

Janis (1983) noted that a certain amount of denial appeared to reduce stress levels in patients and hence, moderate adverse types of physical arousal. Druss and Douglas (1988) took the indications of these findings further. Instead of viewing patients' defence mechanisms in a pathological way, they theorised that certain patients found resources to support their adjustment to their situations. Druss and Douglas (1988) focused on case histories where three such patients faced their severe medical conditions with a number of motivating strategies. These included denial of certain aspects of illness. The authors were interested in the way that these patients showed marked optimism and consistent levels of high motivation despite severe circumstances. No psychological measures were used - rather, the study recorded behaviours and verbal accounts by the people concerned.

Druss and Douglas (1988) noticed that those robust individuals did not deny physical facts about their conditions. Instead, the patients tended to ignore or reject negative aspects of their diagnoses. Instead, they found positive aspects to dwell on. Obstacles were viewed as challenges rather than crises, and these individuals adopted a practical, problem-solving approach rather than perceiving themselves as having received narcissistic injuries. In a prior study, Druss and O'Connor (1969) had described this as an important part of adjustment in the face of threat: colostomy patients evidencing adjustment problems felt betrayed and wounded, while those with fewer psychological problems adopted a problem-solving approach.

Druss and Douglas (1988) termed the robust patients “resilient”. They did not seem to show the same profile of attitudes and behaviours as Hackett and Cassem’s (1974) “major deniers”, however. The resilient group were more sophisticated in choosing which information to reject. Cognitively, they showed the ability to pay selective attention to the available information, viewing positive aspects as primary and using dismissive strategies to downgrade the level of perceived threat or unpleasantness. In differentiating helpful from pathological forms of denial, the context of use and the elements selected for exclusion, could be differentiating factors. Learning, rather than temperament or “setting” factors, may be important in the formation of these self-supporting patterns. In line with the learning and developmental tasks for the establishment of self-esteem described by Snyder (1989), Druss and Douglas’ (1988) “resilient” patients all cited a parent who modelled optimism and a positive approach in the formation of their attitudes. Kortte and Wegener (2004) offered a taxonomy of denial in illness to recognise possible complexities; denying patients were divided into those evidencing major or partial denial, and avoidance and re-interpreting strategies. Avoidance-type strategies were thought to disadvantage patients whereas those re-interpreting do not deny facts about their illness but instead, filter and mobilise cognitive distortions and illusions to increase their feelings of comfort and security. Where effective, this latter group of strategies is selective and does not compromise health management, yet masks enough of the threat-carrying illness aspects to reduce anxiety. This is supported by findings from a study by de Ridder, Fournier, and Bensing (2004) where functional optimism was not related to a lack of symptom report in diabetes patients, but was positively associated with self-care and physical functioning. Buetow, Goodyear-Smith, and Coster (2001) in their study of heart failure patients, noted that “disavowal emerges as a coping strategy that many... patients use every day to palliate the emotional strain of their condition and find hope” (p.121). While Hentschel, Smith, Draguns, & Ehlers, (2004) charted defence mechanisms in relation to physical health as an intrinsic part of human coping, which need to be applied to issues such as daily life difficulties, loss of independence, self-image challenges, body image issues, and the fear of death. Although a certain amount of denial of difficulty is cited as culturally normal in America (Miller & Slocombe, 2012), studies later than those listed above appear to show that denial as a coping mechanism may have a very short-term benefit but does not show positive outcomes in the long term. Hyphantis et al. (2011) for example, found that denial was amongst six styles of defence mechanism that reliably differentiated psychiatric patients from healthy controls. Perry, Presniak, and Olson (2013) explored the structure of defence mechanisms in patients diagnosed with personality disorder and found that denial was prominent amongst narcissistic individuals. Two recent studies have found that denial is a very common self-protection mechanism under certain conditions: amongst adult children of alcoholics for example (Klostermann et al., 2011), and patients with chronic obstructive pulmonary disease (Albuquerque et al., 2011). Both of these studies found that whilst denial was widespread amongst the participant groups, at higher levels it was associated with poorer mood in both studies.

As Anna Freud (1948) proposed, denial seems to be a primitive form of defence - an immature and ineffective style of coping in the longer term. Amongst older adult-surviving cancer patients, denial was

correlated with elevated anxiety and depression levels (Deimling et al., 2006). Amongst bereaved people, denial was found to accompany rumination and suppression as strategies. Conceptualised as an avoidant process, this cluster is associated with poorer grief outcomes (Stroebe et al., 2007). Denial was also found to accompany avoidant coping in a study that spanned five countries, studying peoples' attempts to avoid depression after diagnosis with HIV-related illness (Eller et al., 2010). An avoidant style of coping was also found to incorporate denial in patients diagnosed with gynaecological cancers. The authors (Gould, Brown, & Bramwell, 2010) conceptualised this denial/avoidance as an individual's attempt at self-regulation. Amongst a group of people diagnosed with brain tumours, denial did not mediate depression levels (Keeling, Bambrough, & Simpson, 2013). Eller et al. (2010) and Gould, Brown, and Bramwell (2010) in studies of illness coping, characterised denial as a form of avoidant coping. Deimling et al. (2006), in an oncology study, found denial to be associated with higher levels of anxiety and depression on patients. Cramer (2007) found that the use of denial decreased during the years from age 11 to 18 in participants, implying that denial is indeed an immature defence mechanism.

Denial may function at least temporarily in propping up self-esteem and distancing oneself from trouble and responsibility, with people who refused to apologise after harming someone evidencing higher self-esteem and greater feelings of power and control than those who did offer an apology (Okimoto, Wenzel, & Hedrick, 2013). This finding resonates with societally-held beliefs about human nature – that people deny to protect themselves from potential shame and guilt; but the received view in literature, newspaper articles and religious texts is that people should admit to their failings and not take them (i.e., denying) to the grave.

Overall then, denial appears to be an overwhelmingly common attempt at self-protection that people may use in differing situations and in the context of differing personality variables. Though primitive and perhaps clumsy it seems to be readily available to people and in the short term or in everyday situations it may be perceived as helpful by its protagonists. While Taylor and Brown (1994) were at pains to point to some of the distinctions they perceived between positive illusions and denial, this differentiation is still within the realm of theory and has never been objectively tested to see whether the two phenomena are the same, whether they overlap, or are influential upon each other. In a study of self-protective and buffering strategies against distress, the notion of denial will be an important inclusion.

### **Positive Illusions and Positive Psychology Constructs**

Positive psychology overall seeks to maximise the individual's positive emotions, and experiences, elevate motivation, and increase the skills that can promote strong structures in the person's life. It does not specifically seek to address vulnerability to depression per se, though the "broaden and build theory" (Fredrickson, 2001) speculates that un-regulated negative emotions have a strong tendency to lead to poverty of planning, pro-action and efficacy, so giving rise to a stunting of the person's skill set and a negative cycle of experiences. Mindfulness (i.e., acceptance of what one is experiencing at the moment, including

emotional pain and distress) is not seen as harmful in this school of thought: rather, that it is important to be skilled in knowing when to assist oneself by using these techniques, and when to divert the negative downward spiral described by Fredrickson, with strengthening tactics. Neither does positive psychology advocate an expectation of happiness all of the time – which would rather be deemed a false and unhelpful philosophy (Seligman, 2002). While positive psychology has been critical of over-active levels of guilt or perfectionism (Rath & Clifton, 2004), neither does it favour a focus upon material gain or narcissistic pursuits, rather advocating for the pursuit of excellence and engagement, and generosity to others (Seligman & Csikszentmihalyi, 2000). Seligman proposed three categories – that of the ‘pleasant life’, the ‘good life’ and the ‘meaningful life’. Of these three, he emphasised the last as ultimately the most important. The meaningful life is described as having its roots in fulfilling one’s abilities, achieving a sense of purpose, feeling belonging, and being able to be part of, and contribute to, something larger than oneself.

Martin Seligman has also been identified strongly with the notion of optimism as a resource for people. Optimism – the interpreting of situations as likely to turn out well or be for the best – implies a process of optimising by the individual. Its opposites are not only pessimism – but also realism, as it interprets or distorts reality. Optimism is a general lay term derived from the Latin “optimum” (best) but psychologists have sought to define it more closely. For Seligman, this is based upon a construct of explanatory style (e.g. Peterson, 2000) where the individual locates the reasons for negative events as outside of the self, temporary, and specific to the situation. Whilst optimism has been often thought of as a dispositional trait (Judge, Erez, Bono, & Thoresen, 2002; Schulman, Keith, & Seligman, 1993), Seligman has constructed a whole area of positive psychology from his book ‘Learned Optimism’ (1988, 1991). Since he views the outcomes of an optimistic style as helpful, techniques have been developed to teach its explanatory style. The technique basically involves disputing negative thoughts and beliefs. Buchanan and Seligman (1995) studied the outcomes of a learned optimism course for highly pessimistic college students and found that 16 hours of training produced lowered rates of anxiety and depression as compared to controls, 18 months later. Whilst “correcting” pessimism is likely to yield benefits, its enthusiastic application may be better suited to some environments (business, sales – Sujana, 1999) and not to others (Simmons, 2010). Optimism for the future may be a component of the positive illusions construct, but the notion as a whole, does not map onto the complex set of operations described by Taylor and Brown (1988).

The ‘problem’ of negative emotion is a recurrent idea within this theoretical area. Following on from Seligman, Barbara Fredrickson also vigorously took up the issue of dealing with negative emotions. According to Fredrickson (2011) “positive emotions signal flourishing... positive emotions also produce flourishing”. Fredrickson (2011) takes the theoretical perspective that healthy individuals have an emotional ‘set-point’, which tends towards the mildly positive, even when situations are neutral. She posits that without this bias, people would engage less with their environments and would be less inclined to try and broach new situations. Her broaden-and-build theory essentially proposes that a bias towards positive emotions supports the broadening of peoples’ abilities to choose from a variety of actions and plans – which

negative emotional states do not. Negative emotions are seen as necessary in threatening situations, but maladaptive in the resting state. As discussed in the preceding chapter, a pervasively negative emotional, attentional, or processing bias tends to be hard to exit from, and is associated with highly depressogenic phenomena. There are interesting implications here for the sequelae of trauma, abuse, and negative life events, which are likely to critically disrupt the positive set-point for a person, lead to a failure of the broaden-and-build upward spiral of engagement, skills-building and achievement, and lead to a severe disruption to the accumulation of skills and emotional experiences necessary for resilience.

According to Fredrickson (2011), positive emotions have the potential to ‘undo’ negative emotional states and the risks associated with these, and that healthy individuals make this connection and practice the cultivation of positive states and perspectives. Resilient people are described as recovering faster from adversity and hence, that the ability to progress faster towards positive emotions contributes strongly towards the resilience constellation, which is also then empowered to engage and take action. Resilience is likely to be a complex construct and to feature marked individual and cultural differences.

Fredrickson and Joiner (2002) designed a prospective study where participants were tracked through a short time period where people encountered several normal-type life events. They concluded that resilient people (who experienced a dominance of positive emotions) demonstrated an upward spiral featuring what the researchers termed ‘broad-minded coping’. Fredrickson (2011) points to data on negative emotions as carrying risks for cardiovascular disease, and proposes that continuous default to more positive emotions may hence, form protective factors in this area of physical pathology. Kalisch, Muller, and Tuscher (2015) have posited a model of resilience where the individual shows flexible, adaptive and positive coping using a process of positive appraisal, positive re-appraisal and interference inhibition to evaluate situations and stabilise the emotions. This is essentially the opposite of stress-generation. We have already briefly reviewed the concept of stress-generation (see preceding chapter) where individuals contribute not only to their experience of, but a genesis of stressful situations via maladaptive actions, responses and coping attempts.

Neuroticism was found to be a key predictor of stress generation (Uliaszek et al., 2012) and we would propose that positive illusions, with their almost automatic suppression of over-reactivity and voyages into the territory of negative interpretations and predictions, act as a construct that is in direct opposition to neuroticism. Taylor and Brown’s (1988) original concepts also relate to the literature on emotion regulation. Gross and Thompson (2013) for example, proposed a model where a situation is identified, then attention is applied to salient aspects of the situation, and finally appraisal is applied in the checking and regulating of a subsequent emotional response. If positive illusions are protective and would tend to avert negative affect, they should theoretically also be related to low neuroticism, as optimism, self-esteem, and mastery are all highly correlated (Judge et al., 2002).

Because positive illusions have not yet been properly operationalised and tested empirically, there is variability and a lack of coherence about how they are construed. Nicholson for example (2011), repeatedly confused optimism with positive illusions in her review article and appeared to use the terms interchangeably. This is a disservice to both constructs, whose processes have been quite distinctly described. Schneider (2001) for example, published an article entitled “In search of realistic optimism: meaning, knowledge, and warm fuzziness”. While Radcliffe and Klein (2002) amongst others, have contributed to a collection edited by Kaniell, Massey and Robinson (2008) entitled “Optimism without illusion: the impact of experience on expectations”. Nicholson also could not appear to discern whether optimism could cause illusions – or vice versa - and described illusions as a result of mood changes – perhaps not considering that positive illusions may have a causative role in mood protection. Positive illusions were described by her as being experienced rather than generated by the person. These confusions arising in an authored article suggest that it is high time for the existence or otherwise of positive illusions to be empiricised, and some light cast upon whether they are only dependent upon mood state or whether they can positively influence moods, and whether they are a passive or active process.

Simmons (2010) partners positive illusions with the “triad” of self-evaluations, perceptions of control, and optimism – on perhaps an intuitive basis. However, she points out that positive illusions have been dramatically under-researched in contrast to these other constructs, and wonders whether, in the absence of empirical study, illusions do have any utility over and above the other constructs. She is also cautious about the beneficial level of positive illusions use and cites Carr’s (2004) view that positive illusions do not block individuals from acknowledging negative information but rather, put a slant on it that places the information in the most favourable way: this however, is not well distinguished from optimism, either. Simmons (2010) cites positive illusions and Taylor’s overall body of work, as having helped the notion of optimism gain acceptance as a positive element for people, in the field of psychology – and so paving the way for interest in self-protection and enhancement processes and indeed, the whole field of positive psychology. There is still a concern about the distortion aspects of illusions, however. As discussed above, Colvin and Block (1994) raised such concerns and these were in part addressed by Taylor and Brown (1994). Whilst Carr’s (2004) reassurances and Taylor et al. (2000) assert that on the whole, the illusions used by people are “mild” (p.100) – this has not been empirically demonstrated. Taylor and Brown (1988) described that people should ideally have breaks from operating illusions in order to be able to see themselves realistically and in 1994 also described their notion that illusions are separate from denial, especially at the delusional level (Taylor & Brown (1994). But Robins and Beer (2001) examined inflated self-beliefs and whilst finding that more people showed these than not, the overall level was modest. Hence it may make most sense to view positive illusions use in the light proposed by Friedrickson (2011) whereby a slightly elevated emotional “set-point” is beneficial for resilience – and may have several mechanisms underpinning this, including positive illusions. If such semi-automatic processes that seek to divert potential negative self-focus and simplify ambiguous feedback are commonly and frequently active, they do not appear to be related to harmful or delusional phenomena to the extent which has been demonstrated so far. Beginning to empirically test some

of Fredrickson's (2011) proposals will also help to shed light upon the most appropriate emotional self-regulation systems for people.

## Summary

In summary, positive illusions are a concept that was theorised in the late 1980's but was never operationalised nor tested empirically, but gained widening acceptance. Young (2014) reviewing the credibility of Taylor and Brown's (1988) positive illusions concept so often cited in the literature, concluded that the empirical basis was poor and noted that the individual constructs described by Taylor and Brown (1988) had not yet been empirically linked to better outcomes for individuals. At face value, it seems to relate credibly to known entities and processes such as optimism, self-esteem maintenance, and denial /defensiveness. Especially in positive psychology and cognitive terms, it would seem to sit at the opposite end of the spectrum to depressive states and hence may act as a protective or preventive factor against depression. The present study takes the position that it is well overdue to thoroughly develop a measure for this construct and test it against related constructs to examine: whether it performs in the ways which have been predicted; to see whether it has independent predictive value; and whether it is a truly independent entity or a subset of larger phenomena.

As a footnote, we note that after the development of the Positive Illusion Scale in this thesis Collard, Cummins, and Fuller-Tyskiewicz (2016) devised a positive illusions measure and tested it against the concept of subjective wellbeing. Our analysis of their study concludes that the development of their measure was not exhaustive; and that it was not tested against other related psychological constructs to measure its validity, and was not tested as a predictive variable in outcomes for known mental health measures. A more detailed review of Collard, Cummins, and Fuller-Tyskiewicz (2016) appears in the Discussion below.

## CHAPTER 4: Background to the Group of Studies

### Examining the Positive Illusions Construct

Positive psychology indicates that since adversity and challenge are part of life, resilience factors become important. Seligman et al. (1999) found that building optimism could work in preventing depression. Taylor and Brown's (1988) theorised construct of positive illusions has become defacto accepted as an entity and somewhat subsumed into the positive psychology lexicon.

The first task of this set of studies was to establish whether the positive illusions construct could be operationalised. Given the lack of any appropriate measure developed thus far, a scale needed to be developed. A self-report format was thought to be preferable as it permits the sort of large-scale testing necessary to establish the properties of a novel construct, is easier to implement on test-retest, and allows other researchers to investigate its relevance with different population samples.

Although the positive illusions concept was discussed and expanded in later journal articles by authors such as Janoff-Bulman (1989), Snyder (1989) and Baumeister (1989), the originators of the concept were Taylor and Brown (1988). It was in their 1988 review that they explored the range and type of operations, and where comprehensive links were drawn with other authors, studies and theoretical areas. Therefore, in the present thesis, the starting point for scale development was the issue which dominated Taylor and Brown's (1988) article: the numerous types of illusion strategies described by Taylor and Brown (1988) in their seminal article.

Taylor and Brown (1988) identified that positive illusion-type operations occupied both social and cognitive domains. For example, people may choose their friends and their social activities in order to create favourable comparisons for themselves (Swann & Hill, 1982; Swann, 1984). However, the present exploration of the role of illusions was firmly anchored to the cognitive domain, in order to ascertain its role as a buffer against depression and as a predictor of mental health outcomes. Hence this investigation was confined to the cognitive aspects of illusions.

In investigating Taylor and Brown's (1988) descriptions of positive illusions, another choice was apparent. One approach would have been to adopt a category-driven approach using Taylor and Brown's three proposed categories for illusion operations. The other was to base the new scale on the many different individual strategies cited by the authors. For the purposes of this study it was decided to begin by including as many of the individual strategies as possible, to ascertain whether as claimed by Taylor and Brown that these did indeed make up an entity that could be called 'positive illusions', and to test the validity of their subsequent categorisation of the strategies.

## **Stability and Validity**

A positive illusion belief system should be trait-like, and therefore show stability over time. The use of strategies is likely to be governed by a Trait x Situation interaction. That is, under conditions where the buffering effect of positive illusions needs to be mobilised, individuals will utilise strategies that are in line with their positive illusion belief system. In this study, a test-retest design was conducted to assess the stability of the construct, and to allow for the role of life events in positive illusions usage, to be determined.

In assessing a new construct, it is important to take account of external validity. Although Taylor and Brown (1988) proposed that positive illusions have a very specific role, it is possible, for example, that illusions are a subset of hypermania, or ‘stability’ (as opposed to neuroticism). It was important to determine that PIS does not overlap completely with pre-existing constructs, and to rule this out, the measure was administered at the same time points as scales for validated psychological constructs such as denial, defensiveness, and self-esteem.

## **Positive Illusions and Mental Health**

A major aim of this study was to explore the extent to which positive illusions were related to positive mental health outcomes. To date, predictions in the literature have been somewhat vague, although the possibility that illusions may feature in ‘robustness’ towards depression, has been suggested as an important area for investigation. Denial and defensiveness appear to be related to positive illusions (see Chapter 3). This study provided an opportunity to explore their degree of overlap with PIS, and to measure their relatedness to mental health outcome measures. Tennen and Herzberger’s (1987) study indicated that active maintenance of the self-concept is important in protecting against the development of depression. This implies links between robustness towards depression, self-concept maintenance and self-esteem, and so the relationship of PIS to self-esteem should also be explored. Finally, if PIS marks the ‘opposite’ to depressive vulnerability, then the role of mania (often conceptualised as the ‘opposite’ of depression) in positive illusions needed to be investigated to examine issues of convergence and divergence.

## **Test Populations**

To establish a new construct as valid and representative, an adequate population sample is needed. To establish norms, an ‘average’ or healthy population, is the group of choice for a measure which does not seek to define a pathological process. College students are usually the most accessible group. This type of sample offers large numbers with relative stability of access, and the likelihood of scores for mental health measures which are within the normal distribution (that is, not skewed towards pathology as in a clinical population, and without pathology being excluded, as may be the case in some occupational settings).

Student participants though, are not fully representative of the adult population by virtue of their young age, their occupation of the higher end of the socioeconomic scale, and their higher than average IQs.

Ideally perhaps, new measures should be tested on population samples that allow greater generalisability for the findings. This means including participants who are older, who represent a wider range of intellectual and occupational functioning, and who come from more diverse socioeconomic backgrounds than the student group. But in developing tests for a novel construct, a student population does present immediate benefits, and this is the group that these studies have used. Once the features of positive illusions have been reliably demonstrated in this subject group, further testing using more representative populations can be considered. The study attempts to avoid the pitfalls mentioned in Chapter 2 (above) with the use of short measures of depression such as the BDI.

## **Test Stressors**

The question of when positive illusion strategies might be most useful has not yet been answered. Janoff-Bulman (1989) indicated that they are most important in relation to events that threaten a person's major beliefs and philosophies about life. But this is in contrast to Taylor and Brown's (1988) proposal that they are mobilised to deal with the many minor challenges of everyday life. It is not possible to incorporate major stressors prospectively into an experimental design unless the test population is about to experience a major life event (such as in industries where large-scale restructuring is taking place). However, the life-stage features of a college population means that they are quite likely to experience stressors. In a reasonably large sample of these young people, many of whom are away from home for the first time, important and stressful events can be expected to occur for a proportion. Including a measure of life events is the method of choice to determine the impact (or otherwise) of buffering strategies on these participants.

The introduction of a lower-level naturalistic stressor would provide some information about the utility of positive illusion strategies; if the whole group were to experience such a stressor, this would enable comparison of responses across the test populations. Undergraduate students experience such stressors naturally in the course of their yearly examinations. The periods most universally relevant to the students would be the end of first-year exams (where failure to achieve required benchmarks would mean inability to continue the course) and final-year exams, which have implications for employability and accessibility to further study. In the current set of studies and for the majority of the testing, first-year students were selected as the main target population, given (a) their greater accessibility and (b) the researcher's desire not to further disrupt students' final exams.

## **The Design for Testing**

This study was constructed order to answer the most basic questions about Positive Illusions (in Study 1) before moving on to a progressively more detailed examination of the construct's properties in Study 2 and Study 3. A prospective design was also favoured to minimise retrospective bias in participant sampling, and to enable genuine longitudinal study of the constructs at hand. Multiple regression, interactional, and path models were employed in the analysis, and other possible contributing factors influencing the stability

and maintenance of self-esteem (such as neuroticism and attributional style) compared as predictors. Negative life events were included in the methodology, due to their capacity for activating the sequences leading either to depression or self-protective mechanisms.

**Study 1.** Since no scale currently exists to operationalise the positive illusions construct, the proposed links between positive illusion use and mental health outcomes remain untested. Taylor and Brown (1988) predicted that positive illusion use would be particularly associated with positive mood, facilitation of intellectual functioning, and enhanced motivation, persistence, and performance. Study 1 conducted an initial test of the positive illusion concept by developing a self-report positive illusions measure and testing its internal properties, such as reliability, factorial integrity and construct validity. The study's focus was upon instrument development: items for the scale were developed, and a first draft of the measure tested for internal consistency and factor structure. Care was taken to try and include most of the buffering methods described by the positive illusions literature in item development.

Further, this introductory study sought to test the hypotheses that positive illusions as a construct would indeed relate positively to scores for self-esteem, denial, and defensiveness, and negatively to depression, and it ascertained the degree of relatedness (or overlap) with these concepts. Since long-held psychodynamic theory holds that aspects of mania may be an attempt to protect self-esteem (tested by Winters & Neale in 1985), manic and hypermanic symptoms were explored in the relationships between self-esteem, the self-support of positive illusions, and depression. Regression analysis was used to define the amount of variance in depression levels, accounted for by positive illusions scores.

**Study 2.** The first step of Study 2 was to refine the positive illusion scale under development: the first version (in Study 1) designed to reflect the strategies described by Taylor and Brown (1988) most closely, showed clear relationships with other constructs as had been predicted, but a poor internal structure. The re-developed PIS was analysed for factor structure and reliability. This refreshed version of the scale used items designed to reflect the three categories identified by Taylor and Brown in their 1988 article, and additionally, a fourth category - the 'Downgrading of the negative' category identified by Snyder in 1989 and found to be relevant in Study 1. Items were clearly framed into a self-talk format supporting an accurate reflection of the proposed cognitive processes of positive illusions.

Secondly, the refined scale underwent further comparisons with existing psychological constructs, to see whether the pattern of correlations found in Study 1 remained, and whether the association with depression, still held. The study also aimed to explore the relationships between positive illusions and life events and the links between positive illusions and denial and defensiveness were further explored. This study contained a section that concentrated on the relationship between illusions and self-esteem, with a test-retest design used to look at relationship of positive illusions to self-esteem scores over time; *t*-tests were used to examine the predictions that positive illusions would predict self-esteem stability, and that high

positive illusions scores would buffer against depression in the presence of negative life events. Regression analysis was used to define the amount of variance in depression levels, accounted for by positive illusions, denial, defensiveness, and self-esteem.

**Study 3.** Study 3 was broken into two sections – Parts A and B. Scores on the revised PIS scale had correlated broadly in the directions predicted, with denial, defensiveness and self-esteem, and with anxiety and depression. Positive illusion scores were also positively related to the stability of self-esteem. However, it was not yet known to what degree positive illusions might overlap or be subsumed by the concepts of neuroticism and attributional style (Robins & Hayes, 1995) and so this was explored in Study 3.

In Part A, the first aim was to check whether the factor analysis in Study 2 could be replicated in a further group of participants, thus further testing the integrity of the PIS. The second aim was to examine whether the PIS correlated negatively with a measure of neuroticism and continuous measures of both depression and anxiety, and whether it correlated positively with a positive attributional style. Study 3A examined issues at one time point – Time 1 – only.

In Part B scales were administered at a further two time points enabling investigations into the predictive power of positive illusions upon depression and anxiety scores over time. In particular, this study also looked at the effect of positive illusions on depression levels with the intervening occurrence of a naturalistic stressor. Multiple regressions were used to test the hypotheses that positive illusion scores at Time 1 would predict outcome scores at Time 2, and that those participants who had experienced negative life events at Time 1 and who showed higher positive illusion scores, would experience lower outcome symptoms. Outcomes included negative self-critical cognitions, anxiety, depression, and self-esteem.

Structural equation modelling (SEM) was used to plot the influences of the different constructs over time, upon the final outcome measures. Key predictions were that: positive illusion scores would mediate the effects of life event scores upon depression at Time 3; that positive illusion scores at Time 1 would predict scores of self-critical cognitions at Time 3; and, that positive illusion scores would show predictive value for depression scores over and above the contribution made by scores for the large “setting factor” of neuroticism.

## CHAPTER 5: Study 1. Operationalising Positive Illusions

Positive psychology holds that inherent positive characteristics in a person foster happiness. Moving on from this, it addresses a more realistic view of human experience than has been the case in earlier years of psychology research: that there may not be a fundamental difference between people who are experiencing psychological suffering and those that are not – rather, that adversity and challenge are part of life and hence, resilience factors become important. It explores many aspects of these factors, from the social to those relating to intellectual ability (Seligman & Csikszentmihalyi, 2000). In studying his own specialist area – optimism – Seligman found that building optimism could work in preventing depression (Seligman et al., 1999).

Taylor and Brown (1988) coined the term ‘positive illusions’ in referring specifically to biases in information processing that people tend to use to maintain their optimism and motivation. These positive biases seem to operate within a wide range of cognitive/affective operations. For example, Taylor and Brown included the downward comparison strategies noted by Wills (1982) as well as the over-optimistic predictions for the future described by Weinstein (1980). Taylor and Brown included both cognitive and social strategies within their frame of reference. However, this study only concerned itself with the cognitive aspect of positive illusions.

Taylor and Brown (1988) predicted that the use of positive illusions would promote certain aspects of mental health. **Yet no scale currently exists to operationalise the construct.** Therefore, the proposed links between positive illusion use and mental health outcomes remain untested. Taylor and Brown (1988) predicted that positive illusion use would be particularly associated with positive mood, facilitation of intellectual functioning, and enhanced motivation, persistence, and performance. This study conducted an initial test of the positive illusion construct by trialling a self-report positive illusions measure and testing its internal properties such as reliability, factorial integrity and construct validity. Secondly, the investigation sought to address Taylor and Brown’s (1988) comments that the theoretical links between positive illusions and other psychological constructs were not well-established and required further exploration. In this study this was explored through its correlation with other measures. Another issue has been that the positive illusions construct has been widely accepted and used in the literature since then, without empirical validation – and further, that it has often been used with a broad interpretation or indeed a vague one. In order to clarify the role of positive illusions, a broad representation of the range of operations described by the illusions literature was statistically examined first, with the aim of refining the construct if it appeared to demonstrate some validity.

As described in Chapter 3, the use of positive illusions may have a predictable relationship to specific mental health outcomes. For example, illusions are predicted to buffer the individual against the cognitive features of depression, protect the self-concept and therefore maintain high self-esteem, and show links with

the use of denial and defensiveness, as individuals attempt to protect the self from unwanted negative information. There have been conflicting predictions regarding links between manic symptoms and self-esteem levels. Conventional wisdom equates the manic symptom of grandiosity with inflated self-esteem, while Winters and Neale (1985) indicated that mania may in fact, be related to a form of low self-esteem. This has been followed up by Richard Bentall and his team (Bentall & Thompson, 1990) who have also gone on to discern that instability of self-esteem is present in remission for people with affective disorders, including those with bipolar disorder (Knowles et al., 2007). Manic symptoms therefore, were measured in the study to provide information on possible links between self-esteem buffering strategies and affective disturbance.

It was expected that the overall scale would evidence either a unitary factor structure (showing that it measures a single major concept) or alternatively, a factor structure that shows relevance to a collection of logically credible strategies, or representation of factors suggested by the literature. The study reports on the psychometric qualities of the positive illusions measure. Its reliability and internal consistency were examined. It was expected that redundant items would show up as having poor item-total correlations and low alpha coefficients (showing a poor representation of the overall construct). Secondly, the convergent and divergent validity of the positive illusions measure was tested with a correlational design that plotted the relationship between illusions scores and scores on related measures.

## **Aims and Hypotheses**

**Aims.** The major purpose of this study was to ascertain whether the many item types described in the literature would form a cohesive scale for positive illusions. Hence, the primary focus was on examining the structure and internal consistency of the measure formulated. A secondary focus was on the convergent and divergent validity of the measure. To this end, specific hypotheses were made regarding the relationship of the PIS to other measures.

### **Hypotheses.**

1. Scores for positive illusions will correlate negatively with scores for depression.
2. Scores for positive illusions will correlate positively with scores for self-esteem.
3. Scores for positive illusions will correlate positively with scores for denial.
4. Scores for positive illusions will correlate positively with scores for defensiveness.
5. Scores for self-esteem will correlate negatively with scores for depression.
6. Scores for self-esteem will correlate positively with scores for denial.
7. Scores for depression will correlate negatively with scores for denial.

## Method

### Instrument Development: The Positive Illusions Scale

*Categories.* Taylor and Brown (1988) proposed three categories for positive illusions: (1) unrealistically positive self-evaluation; (2) exaggerated perceptions of personal control; and (3) unrealistic optimism for the future. In fact, a multiplicity of illusion strategies have been described in the literature (Chapter 3) ranging from the downgrading of personal shortcomings, to the belief that the present is better than the past, and the future better than the present. The three proposed categories do not appear to represent the entire range of tendencies claimed for a normal population. For instance, the tendency to downgrade negative self-relevant information as described comprehensively by Snyder (1989) is not included.

In an attempt to represent the full range of (cognitive) illusions strategies described by Taylor and Brown (1988) the various strategies already described in the literature were grouped under logically-derived headings: **(1)** The tendencies to make downward social comparison to peers, and to see the self as better than others, were both judged as **(Making) Favourable comparison to others'**; **(2)** Strategies rating favoured abilities as rare and distinctive, judging shortcomings as common, minimising faults, upgrading talents, and rating friends more favourably than is reasonable, were all grouped together and termed **'Specialness'**; **(3)** Perceiving self-discrepant feedback as inaccurate and discounting it, and rejecting negative personal attributes, were termed **'Negating information that downgrades the self'**; **(4)** People acting as if in control when outcomes are determined by chance, inferring skill when a random outcome is operative, and biasing outcome estimates in a positive direction, were all grouped as **'Exaggerated perceptions of control'**; **(5)** Explaining self-discrepant behaviours by excuses and not accepting responsibility for failure, were both thought to evidence **'Underestimating the level of responsibility for negative events'**; **(6)** Taking more than reasonable credit for success was termed **'Overestimating the level of responsibility for favourable events'**; **(7)** Personal history being recalled in a favourable light and past performance being remembered as better than it was were both considered to form a **'Revision of personal history'**; **(8)** People showing a future-biased orientation, optimism being a pervasive feature of judgements, the present being believed better than the past, and the future better than the present; people believing that their futures will be better than those of their peers, and the possibility of future negative events being downgraded, were all considered to show **'Unrealistic optimism about the future'**.

**Items.** In selecting items to form a Positive Illusions Scale (PIS), the experimenter took into account the full breadth of strategies described in the literature that has proposed the positive illusions construct (see Chapter 3). Only strategies apparently incongruent with the bulk of operation types described, or considered untestable using a self-report measure, were excluded from the item generation process (See Background to the Group of Studies, Chapter 4; and Appendix A1). Forty-five items were designed to employ a conversational style in order to enhance understanding. This followed Schuman and Presser's (1977) finding that formally-balanced forms produced no difference in responses (See Appendix A2).

To examine the appropriateness of the categories developed, 20 first-and second-year clinical psychology and neuropsychology master's degree students completed an item-into-category allocation task. The randomly-ordered and numbered items were presented, with the eight categories named on flashcards in front of the participant. Each of the items was allocated to the category number felt to be most suitable by the judge. The cutoff point for item retention was determined at 75% rater agreement (See Appendix A3).

Twenty-seven of the 45 items achieved more than 80% allocation to a single category. Two items were discarded due to near-random category allocation. In 17 of the remaining items, there was a strong tendency for raters to spontaneously comment that two (or three) categories appeared equally suitable. The categories that this pertained to were Favourable comparison to others (1), Specialness (2), Negating information that downgrades the self (3), Underestimating the level of responsibility for negative events (5), and Revision of personal history (7). Following the raters' feedback, two clear groupings emerged; one, of categories 1 and 2, and the other of categories 3, 5, and 7. The two new and further collapsed categories, were 'Specialness' (formerly 1 and 2) and 'Downgrading negative information' (formerly 3, 5, and 7).

The 17 items relating to these groupings were further tested by 10 different raters from the same professional group, i.e., clinical psychology and neuropsychology master's degree students. Raters were provided with the items and the new set of five categories, which were: (1) 'Specialness', (2) 'Downgrading negative information', (3) 'Over-emphasising the level of responsibility for good events', (4) 'Optimistic focus on the future', and (5) 'Exaggerated perceptions of control'. The original 45 items, including the 27 satisfactorily-allocated items from the first round of allocation, were retested (See Appendix A4).

In this second round, all 45 items achieved above the 75% allocation cut-off to one of the five categories. Feedback was sought from eight senior clinicians in order to further cull items. These professionals were all senior research or clinical psychologists working in the public service in Melbourne, or attached to the University of Melbourne. As a result of their feedback, 11 additional items were dropped due to concerns about complexity of language. The stems of each of the remaining 34 items were slightly modified to align them with a 0-3 scale. The format of a 0-3 scale was designed to mimic that of successful self-report measures such as the BDI and BAI as in this case, the type of language in the stems appeared to flow best with the Guttman-type scale. The resultant Positive Illusions Scale (PIS) formed a self-report instrument of approximately similar length to measures of related concepts such as depression and anxiety (e.g., BDI, and BAI), which were then used in testing the experimental hypotheses. Although all 34 items were presented to the respondent as being scored in the same direction, 17 items were reverse anchored (denoted below with an asterisk) so that 3 = 0, 2 = 1, 1 = 2, and 0 = 3. The PIS (34 items) is shown below.

# The University of Melbourne

Please print:

Initials..... Age:.....years..... months

Occupation: .....

Sex: M.....F..... Date:.....

On this form you will find a list of questions about your opinions. **Please circle the number** which best reflects your opinions: 0 = 'not at all', and 3 = 'very great' or 'very much'. There are no right or wrong answers. Please mark all 34 items.

Example of scale use:

0.....	1.....	2.....	3.....
not at all	a little bit	quite a	very much

---

0..... 1..... 2..... 3

1. Compared to the average, how good are you as a driver?

0..... 1..... 2..... 3

2. In Tattsлото, how much skill is involved in choosing the numbers?

0..... 1..... 2..... 3

3. Compared to the average, how good are you as a friend?

0..... 1..... 2..... 3

4.\* How likely is it that you may encounter a significantly 'bad patch' in the future?

0..... 1..... 2..... 3

5.\* How often has your behaviour been nasty to people in the past?

0..... 1..... 2..... 3

6. How good will the future be for you, compared to the present?

0..... 1..... 2..... 3

7. When throwing dice for money, how important is it to throw them yourself?

0..... 1..... 2..... 3

8.\* Last time you were blamed for a mishap, how fair was this?

0..... 1..... 2..... 3

9.\* How likely is it that you might be retrenched in a job, in the future?

0..... 1..... 2..... 3

0..... 1..... 2..... 3

0..... 1..... 2..... 3

0..... 1..... 2..... 3

0..... 1..... 2..... 3

0..... 1..... 2..... 3

0..... 1..... 2..... 3

0..... 1..... 2..... 3

0..... 1..... 2..... 3

0..... 1..... 2..... 3

0..... 1..... 2..... 3

0..... 1..... 2..... 3

0..... 1..... 2..... 3

0..... 1..... 2..... 3

0..... 1..... 2..... 3

0..... 1..... 2..... 3

0..... 1..... 2..... 3

0..... 1..... 2..... 3

10.\* As a teenager, how often did you behave badly towards your parents

11.\*How good was the past (for you) compared to the present?

12.\*Think of your most valued abilities as a worker or student. How common are these?

13. How often do you find yourself making plans for the future?

14. You may have some shortcomings such as being late frequently, of being untidy. How common are these?

15. Compared to others you know, how good are your chances of having a windfall in the future?

16.\* There may have been a time you didn't get the job you wanted. How much was this your fault?

17. How often do you have hopeful daydreams about the future?

18.\* There may be some negative aspects to your personality. How important are these?

19.\* You may remember failing an exam or test. How much were you to blame?

20.\* How important are the mistakes that you make?

21.\* If someone made a negative remark about your personal qualities, how much notice would you take?

22.\* You may have made a relationship with someone you value highly. How much was this due to luck?

23. When entering a raffle, how good are your chances of winning a prize?

24.\* Think of the last time you were criticised by a stranger. How accurate were they?

25. Think of the qualities you value

most about yourself. How important are these?

0..... 1..... 2..... 3

26. How well do the personal qualities of your friends compare to those of most people?

0..... 1..... 2..... 3

27. You may have got a job or place on a training course that you wanted. How much was this due to you?

0..... 1..... 2..... 3

28. There may be some skills that you possess. How distinctive are they?

0..... 1..... 2..... 3

29.\*There may have been a time when you got the house or flat that you wanted. How much was this due to chance?

0..... 1..... 2..... 3

30. How important are your successes?

0..... 1..... 2..... 3

31.\*If gambling, how likely are you to fail, compared to others?

0..... 1..... 2..... 3

32.\*How frequent will unpleasant events be in your future?

0..... 1..... 2..... 3

33. There may be people whose lifestyle or circumstances you don't like. How good are your relationships compared to theirs?

0..... 1..... 2..... 3

34. How good are your morals compared to theirs?

---

**Participants.** Data for the preliminary study were collected from 150 undergraduate students (103 females and 47 males) with a mean age of 19.07 years (SD = 2.92 years) from the University of Melbourne. Participants were enrolled in the introductory psychology course, and obtained study credit by completing a varying mixture of subject pool participation and assignments. Informed, written consent was also obtained from all participants before participating in the study. The study used a cross-sectional design, i.e., there was no re-test session involved in this initial study.

**Clinical Measures.** For the purpose of this study, self-rating scales (as opposed to observer-or interviewer-rating scales) were deemed to be the most appropriate type of instrument, in order to enable short testing times and ease of completion in a non-clinical population. In addition to scales measuring the constructs of depression, mania, self-esteem and denial, the K and L scales of the MMPI were administered to the pilot group.

**The K and L Scales of the MMPI.** (Meehl & Hathaway, 1946). Both of these are used as validity indexes within the MMPI. However, in this study their frequent use to measure defensiveness was of utility. The Lie scale (L) uses 15 items to detect efforts at hiding normal tendencies of aggression, minor dishonesty and other shortcomings. In so doing, it indicates the tendency to 'fake good' on the information being requested, which would tend to distort scores. In conjunction with the MMPI, it is used to give an indication of a normal balance of admitting and denying faults or symptoms, attempts to exaggerate symptoms, or conversely, efforts to disguise phenomena seen as undesirable. Elevated scores are linked with dampened scores on other scales (Greene, 1991). Burish and Houston (1976) found L to correlate significantly with the Denial (Dn) scale of the MMPI and this has also been found in further studies (Nelson, Sweet, & Heilbronner, 2007).

Test-retest coefficients are lower than those generally found for other MMPI scales, with reliability coefficients over a week being from .70 to .85, and over a year from .35 to .60 (Dahlstrom, Welsh, & Dahlstrom, 1975). Like the K scale, L has been found to differentiate inpatient from outpatient score patterns, and borderline from non-borderline patients (Hunt, 1983; Lloyd, Overall, Kinsey, & Click, 1983).

K provides information on defensiveness. It comprises 30 items designed to differentiate individuals who display apparently normal-range score profiles, yet in reality, experience psychopathological symptoms. When using standard MMPI procedures, a K-corrected profile is plotted in order to increase the Inventory's discriminative power. Since K measures the propensity to describe psychological symptoms, in a normal population it can be interpreted as a measure of healthy integration or adjustment if the scores are at moderate and not inflated levels (Heilburn, 1961; Smith, 1953; Sweetland & Quay, 1953; Tellegen et al. 2003; Yonge, 1966). On the other hand, in maladjusted non-clinical populations the scale still functions as a measure of defensiveness when at higher levels (Heilbrun, 1963; Nakamura, 1960; Selibom, Ben-Porath, Graham, Arbisi, & Bagby, 2005; Siegel & Langford, 1998).

Upon test-retest, the K scale's reliability coefficients range from .78 to .92 over 2 weeks, and .52 to .67 over 8 months to 3 years (Dahlstrom, 1975). K has been found to differentiate between assaultive and non-contact sexual offenders (Moncrieff & Pearson, 1979) and added to the abbreviated version of the MMPI significantly improves validity (Moreland, 1984).

**The Beck Depression Inventory.** This inventory (Beck, Ward, Medelson, Mock, & Erbaugh, 1961; Beck, Rush, Shaw, & Emery, 1979) has 21 items in its revised (1971) form and is a very widely-used instrument for assessing both varying levels of depression in diagnosed patients, and in detecting the condition in normal population groups. The inventory's 21 items are rated 0-3 in intensity, and they measure mood, crying, pessimism, irritability, a sense of failure, social withdrawal, lack of satisfaction, indecisiveness, guilt feelings, disturbance of body image, sense of punishment, work inhibition, self-dislike, sleep disturbance, self-accusation, fatigability, suicidal wishes, loss of appetite, weight loss, somatic preoccupation and loss of libido. When self-administered, the scale takes 5-10 minutes to complete.

The BDI provides a total score. However, the BDI provides cut-off scores that indicate minimal, mild, moderate and severe levels of depression. Beck and Beamesderfer (1974) made a general recommendation that scores of 0-9 be considered normal; 10-18 indicate mild to moderate depression, 19-29 moderate to severe depression, and 30-63 extremely severe depression. Kendall, Hollon, Beck, Hammen, and Ingram (1987) suggested that scores of 10-17 indicate dysphoria, scores higher than 17 are likely to reflect depression, and those above 30 indicate severe depression.

A self-administered scale used across a variety of settings and populations, needs to demonstrate a high degree of reliability and item efficiency. Beck, Steer, and Garbin (1988) reviewed research on the psychometric properties of the BDI for the years between 1961 and 1986. Meta-analysis of the scale's internal consistency showed a mean alpha coefficient of .86 for psychiatric patients (who ranged from heroin users, to psychiatric inpatients with mixed diagnoses, to outpatients) and .81 for non-psychiatric individuals. Correlations of BDI samples with clinical ratings were .72 for the psychiatric group, and .60 for non-psychiatric patients.

Concurrent validity tests show the BDI to have coefficients ranging from .41 (Carroll, Fielding, & Blashki, 1973) to .86 (Steer, McElroy, & Beck, 1982) with the Hamilton Rating Scale for Depression (Hamilton, 1960). Coefficients with the Zung Self-Rating Depression Scale (Zung, 1965) have ranged from .70 (Schnurr, Hoaken, & Jarrett, 1976) to .81 (Blatt, Quinlan, Chevron, McDonald, & Zuroff, 1982) and from .41 (Seitz, 1970) to .75 (Turner & Romano, 1984) with the MMPI Depression scale.

Translations of the BDI measure – for example, into German and Icelandic versions – have been found to demonstrate good internal consistency ( $\alpha > 0.84$ ) and test-retest reliability ( $r > 0.75$ ) while as regards convergent and divergent validity the BDI performed well, as did discrimination between different levels of

depression (Arnason, Olason, Smari, & Sigurethsson, 2008; Kuhner, Burger, Keller, & Hautzinger, 2007). A meta-analysis of studies of the psychometric properties of the BDI showed high internal consistency, high content validity, good differentiation – but was criticised for its poor discriminant validity against anxiety (Richter, Werner, Heerlein, Kraus, & Sauer, 1998).

The BDI is designed to function as a state measure. Non-psychiatric populations (who are expected to show more stability in score patterns than those with psychopathology) have been used to ascertain the BDI's test-retest reliability, and demonstrate Pearson product-moment correlation coefficients ranging from .60 (Hatzenbuehler, Parpal, & Mathews, 1983) to .90 (Lightfoot & Oliver, 1985), revealing acceptable stability in measurement.

**The Self-Report Manic Inventory (SRMI).** A measure for mania was used to check that positive illusions are not merely a subset of the phenomenon of abnormally elevated mood. Shugar, Schertzer, Toner, and Gasbarro (1992) developed a 47-item self-report inventory for mania. Items were designed to reflect the major symptoms and behaviours defined by the DSM-III-R (American Psychiatric Association, 1987) and ICD-9 criteria (WHO, 1980), while tapping phenomena that do not require the presence of insight in order for correct reporting to take place (see Appendix A5). Nine subscales were developed as representing increased energy and activity, increased spending, increased sexual drive, increased verbosity, elation, irritability, racing thoughts and decreased concentration, grandiosity, and, paranoid/psychotic experiences. In the Shugar et al. (1992) survey, there was no significant difference between the number of items endorsed by patients with, and without, insight.

As with the BDI, a total score can be obtained for the SRMI. Moreover, a range of cut-offs [suggested by Shugar et al. (1992) to be at 14, 18 and 22] can be used according to the population type, or the degree of sensitivity required. Where the intention is to exclude those who are not manic, the lower cut-off is the best indicator, and if the emphasis is on identifying people with symptoms in the clinical range, use of the high cut-off is preferable.

In Shugar et al.'s (1992) study, mean scores for non-manics were 12.16 (Time 1) and 13.29 (Time 2). For the manic patients, mean scores were 23.67 (Time 1) and 24.27 (Time 2). Alpha for internal consistency was .94. A rotated factor analysis generated two factors, accounting for 53.4% of the variance. The factors were labelled as 'energised dysphoria', and 'hedonistic euphoria'. The scale demonstrated adequate clinical sensitivity, correctly allocating 71% of the participants to the clinical and non-clinical groups. Overall, a cut-off of 22 score points gave the highest specificity (76%) and positive predictive value (86%). In subsequent reviews of the SRMI, Braunig, Shugar, and Kruger (1996) found that it was a reliable instrument for diagnosing and differentiating manic symptoms, and it correlated well with the Young Mania-Rating Scale (Young, Biggs, Ziegler, & Meyer, 1978). Schottle, Rode, Kruger, and Braunig (2006) considered the SRMI to be the best-validated instrument amongst German populations; and Braunig, Shugar, and Kruger (1996)

found the SRMI to correlate well with both the Internal State Scale (Bauer, Crits-Christoph, Ball, et al., 1991) and the Young Mania Rating Scale, while the SRMI was observed to have better sensitivity to mood fluctuations in the non-clinical range.

**The Coopersmith Self-Esteem Inventory.** (SEI: Coopersmith, 1967). This scale provides self-descriptive statements with a 'like me-unlike me' scoring system. It enjoys extremely wide usage. Originally devised for schoolchildren, both school and adult versions are now available. Meanwhile, a study comparing score norms for Australia (in this case, using young people as participants) has suggested that the SEI is culturally valid in this country: Center and Ward (1986) measured self-esteem scores for children in grades 2-10, and found the mean of 63.5 (+/- 14.9) to closely approximate the U.S.A. values published by Donaldson in 1974 (63.8 +/- 14.8).

Coopersmith (1967) reported a test-retest reliability for the SEI of .88 over 5 weeks, and .70 over 3 years. This was later supported by Ryden (1978) who found .78 over 6 weeks, and .80 after 58 weeks. Taylor and Reitz (1968) found the 54-item version to have .90 split-half reliability.

Gestinger, Kunce, Miller, and Wenberg (1972) reported a correlation of .63 in measuring convergent validity with the Self-Perception Inventory (Soares & Soares, 1975). Demo (1985) found the SEI to correlate significantly with all other methods of measurement (except the observer checklist), indicating strong convergent and clinical validity. The SEI appears closer to a measure of general self-concept than some other scales: Ahmed et al. (1985) found a Cronbach's alpha value of .75.

A cross-cultural comparison of Australian and Vietnamese Australian adolescents found the reliability of the SEI to be sound: The alpha coefficients for the Total Self-Esteem scale was .88 and .79 for the Anglo-Australian and Vietnamese-Australian samples, respectively (Herz & Gullone, 1999). A Welsh translation also showed adequate scale reliability (Hills, Francis, & Thomas, 2007) while a US Navy study checking a very large and more heterogeneous group than Coopersmith's original 1981 group of participants, found reliability and validity indices very similar to those of Coopersmith (Lal, Jain, & Johnson, 1996).

**The MMPI Denial subscale (Dn).** Denial is widely viewed as an adaptive manoeuvre (conscious or unconscious) designed to forestall fear and anxiety (Soloff, 1980). Few scales exist to measure this construct. Little and Fisher (1958) analysed score clusters from the MMPI Hysteria scale, having observed that this scale was over-represented in both medical and psychiatric patients' scores. An important component of this phenomenon was found to be the Denial (Dn) subscale. This contains items about poor interpersonal relations, feelings of hostility, failure and suspicion. The Dn subscale has been used in many studies of defensive styles and their relationships to behaviour. For example, Watson et al. (1987) used the Dn subscale in examining the relationship between denial, irrational beliefs and anxiety, in depressed and schizophrenic patients at the Minnesota Veterans' Administration Center. The Dn scale was noted by

Watson et al. (1987) to consist of items denoting an unwillingness to acknowledge psychological discomfort. Elevated Hy can be associated with a variety of less subtle defensive style and has been found to be associated with alienating parents in Family Court cases (Gordon, Stoffey, & Bottinelli, 2008); individuals with multiple chemical sensitivity (Binder, Storzbach, & Salinsky, 2006); women with adult-onset eating disorders (Cumella & Kally, 2008); and fibromyalgia patients, as compared to seizure patients (Johnson, Storzbach et al. 2010). Cautions have been issued that account needs to be taken of possible physical ailments in the Dn/Hy presentation as, while the Admission of Physical Problems subscale of Hy (i.e., the physical concerns component of the scale) may be elevated in the psychologically mediated disorders noted above, they will also be in disorders of purely physical origin – for example, people with chronic back injuries showed elevations on this subscale but lower levels of Dn than controls (Ornduff, Brennan, & Barrett, 1988). The Dn component then is also important to differentiate as it is measuring a distinct phenomenon and, along with elevated K, is a strong indicator of psychological factors associated with physiological problems (McGrath & O'Malley, 1986). In some somatoform disorders, Dn was inversely correlated with Ad (Aragona, Tarsitani, De Nitto, & Inghilleri, 2008).

In the original study, the Kuder-Richardson reliability coefficient was measured at .75 (Watson et al., 1987). The authors compared six proposed repression measures structured as subscales from MMPI items. After looking at factor analysis and intercorrelation results, they suggested that the validity coefficient for the Little and Fisher subscale was higher than those for the Byrne (Byrne, Barry, & Nelson, 1963) and Haan (1965) denial scales (the other measures found to be psychometrically acceptable). Watson et al. (1987) proposed the Little and Fisher scale as the most reliable choice for measuring the concept of denial. Convergent validity with the Hann and Byrne scales was reported as .69 and .76, respectively. Subsequently, the Dn subscale has been used to measure denial in offenders (Walters 1988), with back pain sufferers (Ornduff, Brennan, & Barrett, 1988), conscripts (Frecska, Lukacs, Arato, & Mod, 1988), and head injury patients (Nockleby & Deaton, 1987) and is often used in studies of populations thought to be utilising primitive forms of defences or experiencing psychological components to physical illness, as noted above.

**The 34-item Positive Illusion Scale (PIS)** was used in this study. This was previously described.

## **Procedure**

Participants were recruited through advertisements placed on subject pool noticeboards. Groups of between 12 and 20 participants attended one of six scheduled test sessions where they were administered the pack of measures. The sets were accompanied by a consent form (see Appendix A6) and were presented in standardised order (SRMI, Dn, K, L, BDI, PIS, SEI) due to the high number of participants, the number of testing groups, and the varying numbers of people in each group, in order to assist accuracy in collation.

A paragraph of written instructions was provided (see Appendix A7) and the salient points of the instructions were verbally reinforced at the beginning of each testing session. Upon completion of the test

sets, all participants were provided with debriefing sheets which described the aims of the study in lay terms, and invited further enquiry of the person supervising the test session (see Appendix A8). The battery took from 20 to 50 minutes to complete in this sample, with an average completion time being around 35 minutes. The ethical issues raised in this study are addressed in Appendix A9.

## **Data Analyses**

Exploratory factor analysis was used to define the factor structure of the PIS. The reliability of the PIS was investigated by using Cronbach's alpha and item-total correlations to examine internal consistency. Correlational analyses were used for testing Hypotheses 1-7. Statistics relating most directly to item performance and scale scores and correlations are presented in the main text body: other analyses are presented in the Appendices.

## **Results Part 1: Analysing the Positive Illusion Scale – Factor Structure and Reliability**

**Frequency Distribution of Items.** Table 1 presents the descriptive statistics for the 34 PIS items. Several of the items show problems of skewness, such as items 2, 25, and 30. This skewness may cause problems for identifying factor-item relationships. Nonetheless, none of the items had single categories above 80%, suggesting that even in variables with skewness there was still some meaningful variation. For this reason, all items were retained for the initial factor analysis.

Table 1.

*Descriptive Statistics of PIS Items*

Item	0 Not at all	1 A little	2 Quite a bit	3 Very much	Mean	S.D.	Median
1	14.8	20.4	51.4	13.4	1.63	.90	2
2	72.0	20.3	3.5	4.2	0.40	.75	0
3	0.7	6.9	48.6	43.8	2.35	.64	2
4*	4.2	42.4	31.9	21.5	1.71	.85	2
5*	14.6	61.8	19.4	4.2	1.13	.70	1
6	1.4	22.9	46.5	29.2	2.03	.76	2
7	26.4	25.7	20.1	27.8	1.49	1.16	1
8*	19.6	35.7	30.8	14.0	1.39	.96	1
9*	45.5	36.4	10.5	7.7	0.80	.91	1
10*	9.7	58.3	21.5	10.4	1.33	.79	1
11*	13.9	35.4	33.3	17.4	1.54	.94	2
12*	3.5	33.3	49.3	13.9	1.74	.74	2
13	3.5	17.5	36.4	42.7	2.18	.84	2
14	10.4	31.3	36.8	21.5	1.69	.93	2
15	13.2	52.1	27.8	6.9	1.28	.78	1
16*	30.7	43.6	20.0	5.7	1.01	.86	1
17	2.1	11.3	41.1	45.4	2.30	.75	2
18*	7.8	50.4	35.5	6.4	1.40	.73	1
19*	5.0	6.4	32.9	55.7	2.39	.82	3
20*	2.1	26.2	49.6	22.0	1.91	.75	2
21*	6.4	39.0	30.5	24.1	1.72	.90	2
22*	21.4	45.7	20.0	12.9	1.24	.94	1
23	36.9	58.9	4.3	0.0	0.67	.55	1
24*	26.2	48.9	19.9	5.0	1.04	.81	1
25	0.7	4.2	25.0	70.1	2.65	.60	3
26	0.7	11.2	49.0	39.2	2.27	.68	2
27	2.8	16.8	43.4	37.1	2.15	.80	2
28	2.1	19.4	52.1	26.4	2.03	.74	2
29*	19.9	44.7	27.7	7.8	1.23	.86	1
30	0.7	3.5	27.8	68.1	2.63	.59	3
31*	14.6	50.0	21.5	13.9	1.35	.90	1
32*	10.5	62.9	22.4	4.2	1.20	.68	1
33	3.5	23.1	46.9	26.6	1.97	.80	2
34	3.5	9.7	49.3	37.5	2.21	.76	2

*Note.* \* Items have reverse anchors but the table above shows data prior to any reversal.

*Missing Data.* The range of missing data was from 0 to 4 for each item: see Appendix A10. To have the maximum number of analysable participants and a data file without missing data, the EM missing values replacement algorithm was applied (Little & Rubin, 1987; Roth, 1994). The EM algorithm was used to estimate missing data for all PIS items based on knowledge of all available PIS items. The data were then rounded to the nearest whole digit.

*Item Reversal.* Items were reversed prior to performing the factor analysis. The choice of which items to reverse was based on the theoretical meaning of each item. The list of items reversed is set out in the above Table 1.

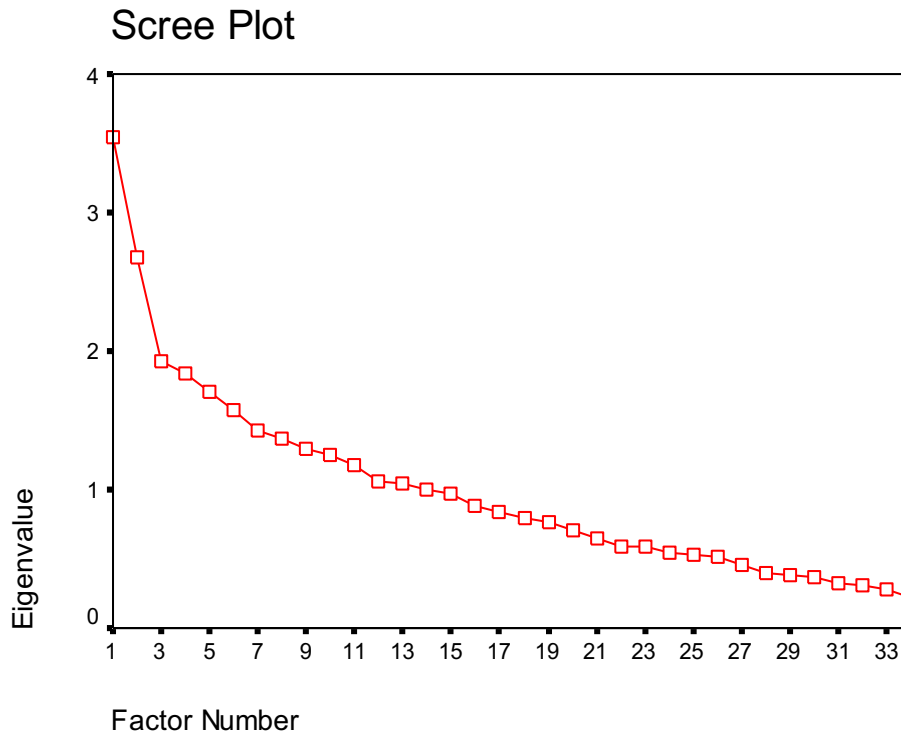
*Factor analyses.* An iterative approach was adopted to refining the scale using exploratory factor analysis. This approach involves progressively removing items based on statistical properties to develop a more refined internally consistent and construct valid scale (Cudeck, 2000). Three iterations were conducted. For all three iterations, the scree plots are displayed in the text of this thesis. In the interest of saving space, the factor loadings are shown in the Appendices as indicated, except for the third and final iteration.

**Factor analysis iteration 1.** All 34 items were used in this factor analysis. An examination of the Kaiser-Meyer-Olkin Measure of Sampling Adequacy showed a value of .566. Based on recommendations of Kaiser (1981), this represents a ‘miserable’ correlation matrix for employing factor analysis. This suggests that there is inadequate common variance in the items for performing factor analysis, which also manifests itself in generally low correlations between items. Part of this poor factorability is likely due to the lack of variability and skewness of the items. It is also likely to be due to a lack of underlying factors bringing about scores on observed items. As a result of this poor factorability, one option would be to end analyses at this point. However, considering this was a new scale and very exploratory, a factor analysis was still performed to see what, if any, scales emerged that might assist with future scale development. Also, it was assumed that removing items with poor communalities and individual Measure of Sampling Adequacy would improve the potential for factorability.

*Examining Item (and proposed Category) Performance.* The first question when performing a factor analysis is to determine an appropriate number of factors to extract. There are several bases on which to make this decision, some of which are generally acknowledged to be better than others.

The strategies described by Taylor and Brown (1988) suggested eight related factors. The Scree Plot shown as Figure 1, based on the rule of identifying the start of the scree and going up one, probably suggests two factors, although an argument could be made for six factors.

**Figure 1.** 34-Item Analysis



The Eigen values over 1Rule suggested 14 factors. This rule is well known as suggesting too many factors and should be ignored (Preacher & MacCallum, 2003). The Parallel test (shown in Table 2) suggests five factors based on the rule that the only factors that should be included have eigenvalues larger than the 95% confidence interval of the equivalent random data (O'Connor, 2000).

Table 2.

*Parallel Test of PIS factor structure – 34 item PIS*

Root	Mean	95 <sup>th</sup> Percentile	Actual Data
1	2.07	2.17	3.54
2	1.92	2.00	2.67
3	1.81	1.92	1.93
4	1.71	1.80	1.84
5	1.62	1.70	1.71
6	1.55	1.61	1.57
7	1.48	1.54	1.43
8	1.41	1.48	1.37
9	1.35	1.40	1.30
10	1.29	1.35	1.24
11	1.24	1.28	1.18

Integrating the different recommendations for the number of factors it would appear that something between two and five factors would be appropriate. The parallel test suggests five factors, and so this was the starting point for analysis. Promax with Kaiser Normalisation was used, as the scales appeared to be highly

inter-correlated. Four- and five-factor solutions both had Heywood cases suggesting that too many factors were extracted (Heywood, 1931) (See Appendix A11 and A12).

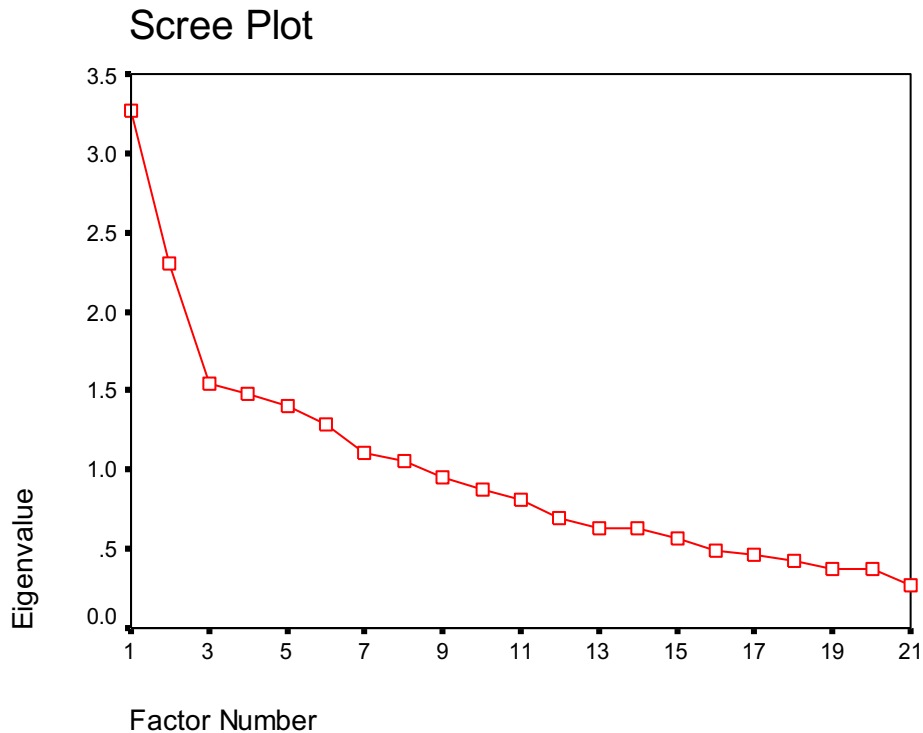
From the examination of the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (MSA), it was evident that there was a lack of common variance in the items to justify the creation of underlying scales. One option for reducing this issue was to remove items that were amplifying the problem. Some ways of doing this include deleting items with: (a) low communalities; (b) low item-level measures of sampling adequacy; (c) skewed distribution; (d) kurtotic distributions; (e) loadings on multiple factors; (f) loadings on no factor (Kaiser, 1981). Frequently, these indicators of problematic items will converge. As options e and f depend on the particular number of factors, only options a, b, c, and d were considered. To make the process of integrating these indices more reliable, a composite “badness” score was created that attempted to give equal weight to communalities, MSA and distributional properties: Composite badness:  $(.3 - \text{communality}) + (.5 - \text{MSA}) + (\text{absolute skewness} / 15) + (\text{absolute kurtosis} / 15)$ . Items with composite badness higher than .06 (positive signs) were used in the subsequent analyses (see Appendix A13). Item numbers 2, 7, 8, 9, 10, 11, 16, 19, 22, 23, 25, 26, and 29 were removed. So, 13 items were deleted, leaving 21 items for analysis.

**Overview.** Based on the recommendations for item deletion obtained from factor analysis iteration 1, a subsequent factor analysis was performed on the remaining 21 items.

**Factor Analysis Iteration 2.** The Kaiser-Meyer-Olkin Measure of Sampling Adequacy on the reduced set of 21 items was .620. While this suggests a ‘mediocre’ covariance matrix for factor analysis, it is still an improvement on iteration 1.

In order to assess the underlying factors that might explain the relationship between items on the PIS, factor analysis was used. The maximum likelihood extraction method was employed as this is well established and is more appropriate than principal components analysis for extracting the underlying constructs that are sought (Olsson, Troye, & Howell, 1999). As the number of items had been substantially reduced, it was unlikely that theory could inform the number of factors to be expected. The Scree plot suggested two factors. This is shown in Figure 2.

**Figure 2.** 21-Item Analysis of PIS



The *Eigenvalues over 1Rule* suggested eight factors, but as previously mentioned should not be given much regard (Preacher & MacCallum, 2003). The *Parallel test* suggested two factors (O'Connor, 2000) although the third factor was only marginally below the equivalent 95<sup>th</sup> percentile of random data (See Appendix A14). Integrating the different recommendations suggested that two factors was the appropriate number for extraction.

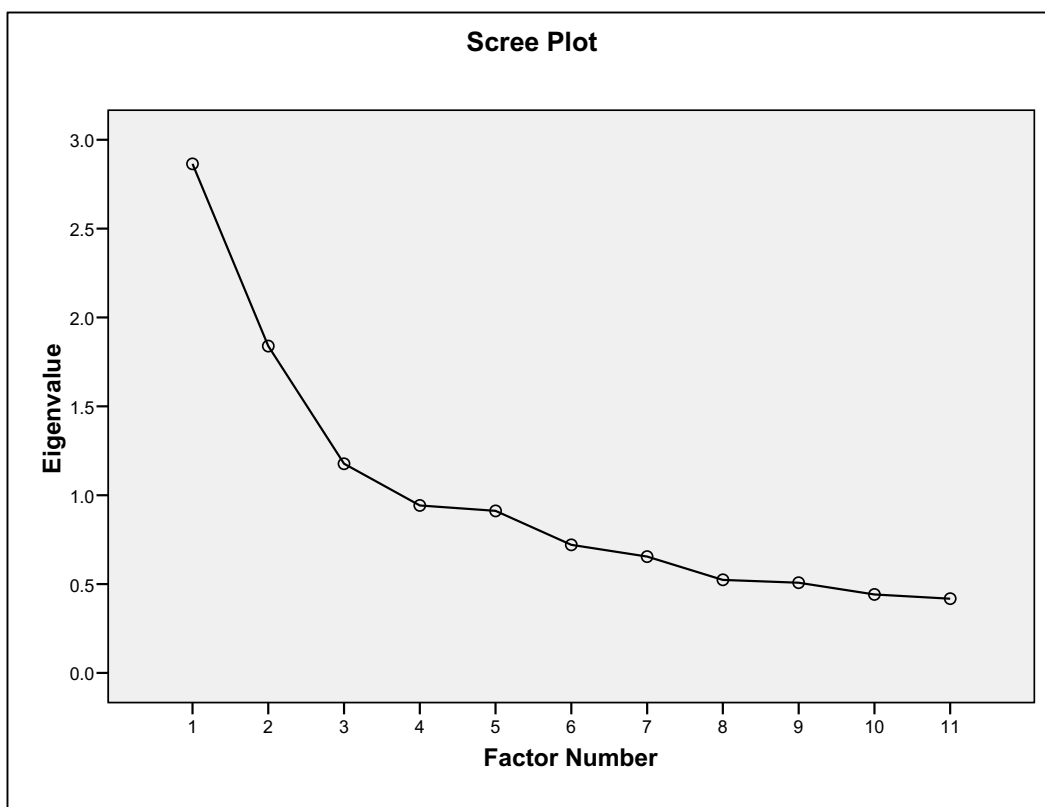
The factor analysis was initially run with an oblique rotation (promax with kappa = .4) (Hendrickson & White, 1964). As the observed correlations between the two factors was small ( $r = .11$ ), analyses were re-run with an orthogonal rotation (varimax) as this allowed for clearer interpretation of factor loadings without distortion of factor relationships (Hakstian & Boyd, 1972). From the rotated factor matrix, there were still several items that were not loading highly on either factor (see Appendix A15).

In order to refine the set of 21 items further, all items without a factor loading above .25 in the above analysis were excluded. Also, items 17 and 24 were excluded because they had the combination of both relatively low loadings ( $>.25$  but  $<$  than .40) and loadings on both factors. Iteration 2 suggested that the borderline variable from the previous analysis (Item 34) should be excluded to improve the reliability of the second factor. The deletion of Item 32 was also considered given that it cross-loaded on the second factor at the .31 level. Nonetheless, because of its relatively good loading on factor 1 (loading = .61), Item 32 was maintained. Hence item numbers 3, 12, 14, 17, 24, 27, 28, 33, 34 were deleted, leaving 12 items. These 12 items were reviewed for semantic and conceptual consistency. It was notable that in the main, the elimination of several items had left those that were clear and simple to read. Item number 31 however,

while showing a satisfactory loading, had a poor semantic construction with a broken format as well as a negative anchor, which was potentially confusing. Specifically, it read “if gambling, how likely are you to fail, compared to others?” This appeared especially unwieldy in comparison to the remaining items. Seven of the remaining 11 began “how important”, “how frequent” or “how often” and were simple to read. The remaining four items were also straightforward. Hence item number 31 was deleted, leaving 11 items.

**Factor Analysis Iteration 3:** For the third and remaining set of 11 items, The Scree plot suggested two factors (see Figure 3).

**Figure 3.** 11-Item Analysis of PIS



The Kaiser-Meyer-Olkin Measure of sampling adequacy was .70 suggesting a “middling” covariance matrix, while the Parallel test suggested two factors (see Appendix A16). Hence, two factors were extracted. The overall extraction was performed using maximum likelihood extraction. In terms of initial eigenvalues, this accounted for 39.8% of variance and in terms of extracted sums of squared loadings two factors accounted for 28.9% of variance.

**Overview.** The results of the exploratory factor analysis suggested two uncorrelated factors. Considering six of the seven items loading on Factor 1 had previously been reversed, it appeared better to not reverse them, but rather to reverse Item 15 only. This made the relationship between the items and the overall factor

score clearer, except for Item 32, which loaded onto both factors. The resulting varimax-rotated factor loading matrix for 11 items is shown in Table 3.

Table 3.

*Rotated Factor Matrix 11-item PIS*

Factor	1	2
PIS 18	.67	-.17
PIS 4	.67	-.06
PIS 32	.61	-.31
PIS 20	.57	.19
PIS 21	.46	-.04
PIS 5	.40	-.04
PIS 15*	.38	.03
PIS 30	.02	.76
PIS 13	.09	.51
PIS 1	-.05	.36
PIS 6	-.12	.32

*Note.* \* = reversed item

## Reliability Statistics

**Reliability of the 11-item PIS.** The two PIS factors are uncorrelated ( $r = 0.15, p < .05$ ). Thus, it makes no sense to report the item-total correlations of the full scale or to combine the two scales together to form an overall total score. Instead, the item total statistics for the two sub-scales are presented separately in Tables 4 and 5 below. Reliability analysis shown in Table 4 suggests that the Factor 1 scale had good internal reliability, whereas the Factor 2 scale shown in Table 5 had relatively poor internal reliability. An examination of ‘reliability if item deleted’ statistics indicated that no item could be removed from either of the scales in a way that would improve the reliability. For Factor 1, Cronbach’s alpha = .74. For Factor 2, Cronbach’s alpha = .55.

Table 4: Factor 1:

*Indices of Internal Reliability.*

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach’s Alpha if Item Deleted
PIS 18	8.97	8.35	.57	.68
PIS 4	8.66	7.97	.53	.68
PIS 32	9.16	8.78	.50	.69
PIS 20	8.45	8.68	.46	.70
PIS 21	8.64	8.38	.40	.72
PIS 5	9.23	9.17	.37	.72
PIS 15	9.08	9.08	.33	.73

Table 5:

*Factor 2: Indices of Internal Reliability.*

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
PIS 30	5.85	2.97	.41	.45
PIS 13	6.30	2.42	.39	.44
PIS 1	6.84	2.45	.33	.50
PIS 6	6.45	2.87	.27	.54

**Scale Interpretation.** Factor 1 included items examining the denial of negative personal traits (18), denial of future adverse events (4, 32), attachment to past mistakes (20), attachment to others' negative judgements (21), acceptance/denial of past nasty behaviour (5), un/likeliness of future windfalls (15). Positive scores on this scale appear to involve a propensity to distance oneself from the negative.

Factor 2 included items examining importance of personal successes (30), frequency of making plans for the future (13), skill at driving (1) and, probability of a better future (6). This scale appears to relate to a sense of agency with a possible emphasis on the future. The item on driving skill appears to be somewhat of an anomaly, but may relate to a positive view of self. Item 32 also loaded onto this factor, which could have been due to ambiguity of wording.

Two initial names for these scales could be 'downgrading the negative' (Factor 1) and 'future/agency' (Factor 2). The extent to which people's scores represent illusions and to the extent to which they reflect accurate reflections of reality cannot be directly assessed. Presumably, an individual's scores are both a composite of response style, attitude to the world and actual properties of the world.

## **Results: Part 2: Correlations of PIS with Other Scales (Convergent and Divergent Validity)**

Table 6 shows the descriptive statistics and skewness and kurtosis data for the comparison scales and the two factors of the PIS. Complete data were obtained for all but one scale (SEI).

Table 6.

*Descriptive Statistics for Established Scales*

Scale	N	Missing	Mean	Median	Standard. Deviation	Skewness	Std. Error of Skewness	Kurtosis	Std. Error of Kurtosis
PIS Factor 1	144	0	9.02	9.34	.38	.08	.20	-.05	.40
PIS Factor 2	144	0	6.34	6.82	.37	.04	.20	-.43	.40
MMPI Dn Scale	144	0	14.40	14.09	3.52	-.02	.20	.27	.40
MMPI K Correction Scale	144	0	13.34	13.00	4.05	.25	.20	.72	.40
MMPI Lie Scale	144	0	2.79	3.00	1.89	.65	.20	.11	.40
BDI Score	144	0	10.68	10.00	7.30	.90	.20	.65	.40
Mania Inventory	144	0	13.43	13.00	7.64	.37	.20	-.40	.40
Coopersmith Self-Esteem	142	2	63.63	64.00	20.75	-.35	.20	-.54	.40

While two scales - the BDI and MMPI Lie scale showed statistically significant positive skew (i.e., skewness/standard error of skewness is greater than 2) an examination of the distributions shows that the skewness is not especially severe. A log10 or square root transformation designed to make the distribution more normal was unlikely to influence the correlation with other variables.

The correlation matrix of scales is presented below in Table 7. The main points of interest are the strong relationship among the positive illusions scale and many of the additional measures. In particular, those more likely to engage in “Downgrading the Negative” (Factor 1) tended to have higher self-esteem ( $r = -.55$ ), and lower depression ( $r = .60$ ). Other moderate correlations occurred between Downgrading the Negative (Factor 1) and the MMPI K correction ( $r = -.40$ ), and the denial subscale ( $r = -.33$ ). Also evident were relationships between mania and depression ( $r = .41$ ), denial and defensiveness ( $r = .67$ ), self-esteem and depression ( $r = -.55$ ), self-esteem and defensiveness ( $r = .46$ ), and self-esteem and denial ( $r = .46$ ). However, no correlation with PIS Factor 2 exceeded .30.

Table 7.

*Correlations between Positive Illusion Scales and Established Measures.*

<i>Scale</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>
1 PIS Factor 1								
2 PIS Factor 2	.09							
3 Gender	.16	.02						
4 BDI Score	-.60	-.23	.29					
5 SRMI Mania Inventory	-.30	.03	.03	.41				
6 MMPI Lie Scale	.20	.09	-.04	-.06				
7 MMPI K Scale	.40	.06	-.07	-.31	-.30	.43		
8 MMPI Dn Scale	-.33	.01	.11	-.17	-.27	.38	.67	
9 Coopersmith Self-Esteem	.55	.28	-.14	-.55	-.19	.20	.46	.45

*Note.* Gender: male = 1, female = 2;

N ranges from 132 to 144;

Assuming a sample size of 132, when  $r > .17$ ,  $p < .05$ ; when  $r > .23$ ,  $p < .01$

## Discussion and Conclusions

**Psychometric Properties of the Scale.** This study was concerned with developing a measure of positive illusions. It found that the initial 34 items showed poor factor analytic properties and iterations considerably reduced the number of items in the scale. This left 11 items with two relatively uncorrelated scales with seven and four items in each scale. These two scales appeared to represent (a) ‘downgrading of the negative’; and (b) ‘positive views of agency and future’. The first showed good internal consistency but the second had poor internal consistency. Hence, the strategy of developing a scale from a comprehensive selection of the strategies described by Taylor and Brown (1988) did not yield either a large and reliable scale, or factors reflecting either Taylor and Brown’s original three categories of illusions or our own set of eight logically-derived categories of illusions.

Several factors may have contributed to the scale’s inexact representation of the positive illusions construct. The attempt to represent the broad range of strategies described by Taylor and Brown (1988) may have resulted in too loose a collection of items – a collection which may have been over-inclusive. Taylor and Brown (1988) have suggested that the positive illusions construct is made up of both cognitive and social strategies. However, this study focussed on cognitive types of illusions for examination, and this could have resulted in a distortion of the construct. Since cognitive illusions strategies were to be tested in this study, in this respect it may be that item development should have more closely reflected the type of self-talk likely to be used by individuals (rather than the strategy types described by Taylor and Brown (1988)).

**Score Patterns.** The score patterns on the PIS scale appeared to indicate a consistent and moderate level of positive illusions use, with a mean item score of 1.7 (on a 0-3 scale) across the 34 items. Three items were skewed but none had single scale endorsements of above 80%. While the 'K' and 'L' scales from the MMPI showed average levels of defensiveness and attempts to 'fake good' as regards psychological symptoms, the mean score on the Beck Depression Inventory was slightly higher than the cut-off point of 9 for asymptomatic levels of depression. The denial subscale of the MMPI also showed elevation from the published means, but the SRMI mean score of 13.43 compares to the original experimenter's control-group mean for mania scores of 12-13 (Shugar et al., 1992).

**The Experimental Hypotheses.** This study also tested the proposition that the use of positive illusions would be related to specific mental health indicators, i.e., depression, mania, and self-esteem score levels. Correlations between the PIS Factor 1 and the BDI, the SRMI, and the SEI, show that this is likely to be the case, with the predicted correlations all significant at  $p < .01$ . The first hypothesis, that scores for positive illusions would correlate negatively with scores for depression, was borne out with a correlation coefficient of  $-.60$  with PIS Factor 1.

The study's second hypothesis predicted that positive illusions would correlate positively with the level of self-esteem, which appeared to be the case with a coefficient of  $-.55$  for Factor 1. Tennen and Herzberger (1987) theorised that high self-esteem needs maintenance in the form of self-protective attributions, while Taylor (1983) concluded from her studies of people whose self-esteem had been severely challenged (in this case, by a diagnosis of cancer), that self-esteem needs to be restored and maintained with the use of enhancing evaluations of the self.

Studies referring to medical illness (Beisser, 1979; Hackett & Cassem, 1974; Levine et al., 1987) have indicated that denial is an effective anxiety-reduction strategy. Sackeim and Gur (1973) reported self-deception as showing a negative correlation with psychopathology self-reports. The third experimental hypothesis proposed that positive illusion scores would correlate positively with scores for denial and the fourth, that positive illusion use would positively correlate with defensiveness. Taylor, Collins, Skokan, and Aspinwall (1989) differentiated denial from positive illusions, describing it as a defensive response that is primitive and rigid. However, they acknowledged that denial may be related to positive illusions. The present study seems to have borne this out, with positive correlations between positive illusion scores and both denial and defensiveness. Presumably, in an individual motivated to protect themselves from information carrying potential threats to the self-concept, more than one strategy type may be engaged. Hence, denying of salient information to the self and others (denial, defensiveness), and the positive biasing of information that cannot rationally be blocked out (positive illusions). That these strategies may also have a role in self-esteem maintenance, is reflected in the positive correlation between denial and high self-esteem, which was predicted by Hypothesis Six; however, the negative correlation between denial and depression scores, proposed by Hypothesis Seven, was at a very low level. A low score on the K scale of the

MMPI can be related to a simple absence of any psychopathology to report. However, the positive correlation between denial and defensiveness scores in this study, imply that these two may be closely related in the form of strategies, rather than just reflecting a lack of symptoms. Finally, Hypothesis Five, which predicted that scores for depression would correlate negatively with scores for self-esteem, was borne out with a correlation coefficient of  $-.55$ .

**Limitations.** One concern about the refined set of items is that they might result from a statistical artefact. It is possible that chance correlations particular to the present sample led to the particular scale recommendations that emerged. It would be necessary to validate this study in a different sample to determine whether the scale's reliability and clear factor loadings continue. At the very least it would be expected that the reliability and factor structure would be poorer than in the current sample where the specific items were selected for their good properties. The second concern is that the scales that emerged are not particularly meaningful theoretically.

**Participant Stress Levels.** The score levels on the variety of clinical measures used in this study give indications that this group of participants were experiencing mild stress. This is helpful to categories - especially in non-clinical populations, and with once-only administration. Tanaka-Matsumi and Kameoka (1986) report that high BDI scores in college students may represent dysphoria rather than depression per se; Kendall et al. (1987) the study's aims, which also seek to examine a diathesis-stress model. The mean score on the Beck Depression Inventory was slightly higher than the published cut-off point of 9, for example. While the BDI (Beck et al., 1979) is a highly reliable instrument, cautions have been sounded about its use to allocate into diagnostic categories: once-off BDI administration should not result in diagnostic classification as the definition of a depressive disorder implies minimum periods for symptoms. At the same time, they conclude that since the instrument is so reliable, its use to explore relationships to other variables is still justified.

Mean scores on the Little-Fisher Denial subscale were also slightly elevated, showing a general tendency to use denial. The participants were undergraduate students in their first year, and they were tested at a time which fell close to their schedule of end-of-year examinations. In this high-functioning and homogeneous population (in terms of age, education stage, and work situation) score elevations might be due to situational factors. Contributing, may have been their relatively recent entry into a new environment, the normal stress of imminent exams, a lack of track record and therefore uncertainty as to their performance level on the examination, or a combination of inexperience, exam stress, and inability to predict the expected success of their performance.

In the current study, relationships between manic features and other constructs appear to run counter to expectations consistent with the usual view of mania. The classic picture of mania as related to grandiosity, inflated self-esteem, and a high level of 'faking good' (Ashworth, Blackburn, & McPherson, 1982; Donnelly

& Murphy, 1973; Winters & Neale, 1985) did not appear to fit with the construct relationships that emerged from the data. In this group of participants, manic symptoms did not occur with the 'masked' (i.e., faking good) patterns of low self-esteem that Winters and Neale (1985) felt they had identified. Rather, SRMI scores showed a weak negative correlation to self-esteem (consistent with a low level of well-being) - but this was overt and undefended. Winters and Neale's interpretation would have predicted a high self-esteem score on the overt SEI measure, but a noticeable level of defensiveness and a high 'L' score on the MMPI subscale. In fact, mania scores on the SRMI were positively correlated with BDI depression scores (.41,  $p < .01$ ). This co-occurrence may run counter to the picture usually accepted in affective disorders, where mania and depression are seen as opposite and incompatible states at either ends of the affective continuum. Mania scores also showed negative correlations to both defensiveness and denial, rather than positive ones. The scores on self-reported symptoms of mania showed a wide range in the level of responses, with a substantial minority operating in the clinical range.

In this group of apparently normal young people under some stress, the score results imply that both manic and depressive symptoms may appear as the expressions of difficulties in adapting to stressors. Both symptom sets showed similar relationships to constructs related to wellbeing: those of high self-esteem levels, an adaptive level of denial and defensiveness, and active strategies to bolster the self-concept. Either the strategy sets are incompatible with either of these affective states, or the move into manic or depressive symptoms is marked by a failure to generate self-protective strategies.

**Gender Effects.** While some studies have shown tendencies towards gender differences in prevalence or scores for some disorders such as depression (Kessler et al., 1993; Regier et al., 1998), later studies have found that whilst males may be affected by fewer overt biological factors, and tend to admit and seek help less, when stressors are controlled for or very similar, there is no significant difference in prevalence rates for depression (Hayes et al., 2012; Miller et al., 2011) and there do not appear to be differences in gender rates in the present study. For example, there was no significant correlation between either PIS Factor 1 or Factor 2 and gender; and of the other scales, only the BDI demonstrated a moderate correlation with gender at .29. Due to the complexity of the planned analyses and the number of scales in use, it was decided that in this case, gender would not be a major avenue of investigation as with so many analyses; this would have required greater numbers in order to yield valid results for the upcoming regressions and path analyses.

## **Methodological Issues**

The major methodological issue for this first study was that test sheets were presented in a standardised order. This may have produced a slight drop-off in scores for the scales presented last, but this point of methodology would be unlikely to account for the low alpha in the PIS. Since the positive illusions construct shows potential in its predicted pattern of relationships to other constructs, a refinement in scale development seemed to be the best approach to understanding the role of these strategies further. This study used university students, who are not necessarily a representative population. However, they do tend to experience some events in common which means that additional phenomena may be possible to observe in the entire cohort. The proportion of males in this phase of the study was lower, perhaps due to the subject the students had in common (psychology).

## **Conclusion**

The first draft of the positive illusion scale showed low reliability and an uncertain factor structure. However, correlation analysis indicated that the positive illusion construct appeared to begin to form a relevant psychological entity: while the second identified factor performed poorly with internal consistency and construct validity, Factor 1 presented as more reliable. The next study focused on making a number of improvements to the operationalisation of the positive illusions construct.

## CHAPTER 6: Study 2. Refining the Positive Illusion Scale

This study reports on the second attempt at developing the Positive Illusions Scale (PIS). The first step was to refine the PIS. Given the shortcomings of the scale, as discussed in Study 1, this second version of the scale used items designed to reflect the three categories identified by Taylor and Brown in their 1988 article, and additionally, a fourth category - the 'Downgrading of the negative' category identified by Snyder in 1989 and found to be relevant in Study 1. This was undertaken rather than simply re-developing the inclusive 'grab-bag' of operations described by Taylor and Brown (1988). Also, items were framed into a self-talk format (e.g., "I don't let the things I'm no good at, get me down") supporting an accurate reflection of the proposed cognitive processes of positive illusions (and earlier reviewed in Chapter 3 above). This format is often incorporated into self-report measures (for example, the Beck Depression Inventory: Beck et al. 1962; Beck, Rush, Shaw, & Emery, 1979; the Coopersmith Self-Esteem Inventory: Coopersmith, 1967; the Self-Critical Cognitions Scale: Ishiyama & Munson, 1993).

The re-developed PIS was analysed for factor structure and reliability. Then, the refined scale underwent further comparisons with existing psychological constructs, to see whether the pattern of correlations found in Study 1 remained, and whether the association with depression still held. The study also aimed to explore the relationships between positive illusions and life events. While the measure used (The Life Events Inventory: Tennant & Andrews, 1976) incorporates scales for events deemed both negative (Distress Scale) and possibly either positive or negative, but still life-changing (Life Change Scale), the primary measure of interest was the Distress scale. (In the scale, 67 life event items were scaled for the degree of a) emotional distress they implied, and b) the degree of life change involved).

It has been speculated (e.g., Janoff-Bulman, 1989) that positive illusions will act as a buffer for people when they do experience potentially distressing events, thereby supporting feelings of safety and positive aspects of their self-concept - hence our emphasis on distressing life events. Specifically, it was expected that positive illusions would moderate the relationship between life stress and depression such that those with high levels of PIS would show a weaker relationship between life stress and depression than those with low levels of positive illusions. There was not expected to be a direct correlation between positive illusions and negative life events per se.

This idea is also supported by the literature on the importance of the maintenance of self-concept in the vulnerability towards depression (Koenig, Clements, & Alloy, 1992). This literature indicates that self-esteem too, should show a better outcome if it is effectively protected by the use of positive illusions during a negative life experience. The author expected to find then, that people who evidenced a significant level of distress would fare better in their self-esteem if they evidenced a high level of positive illusions at the time of the event.

As well as examining the relationship between positive illusions and mean levels of self-esteem, this phase of the study investigated the relationship between positive illusions and the stability of self-esteem. The stability of self-esteem has been described as an important protective factor in the level of vulnerability towards depression (Kernis et al., 1993; Kernis, 2005), and in acting as a signal as to the effectiveness of processes protective of the self-concept (Judge & Bono, 2001; Roberts & Monroe, 1994). Positive illusions are conceptualised as being an important part of those processes. Hence, one would expect positive illusions and self-esteem to be highly related in a cross-sectional framework. But of more interest is the notion that, as a part of self-concept maintenance, illusions would also be strongly related to self-esteem stability. In keeping with the literature, it was predicted that high positive illusions at Time Point 1 would predict self-esteem stability across time (Roberts & Monroe, 1994) and so three time points were incorporated into the test design.

In this second stage of testing, self-report scales similar to those used in Study I were employed. However, some new measures were added. The Beck Anxiety Inventory (Beck, Epstein, Brown, & Steer, 1988) was used to measure anxiety. This was done to gain more information about the specificity of illusions. The literature has predicted that positive illusions should have the strongest association with depression and self-esteem (Sheldon & King, 2001; Mor & Winquist, 2002) and so comparison was needed to ascertain whether illusions did indeed show a stronger relationship with these constructs, or whether they impacted equally upon another major negative affect state, i.e., anxiety. The tendency towards depression and anxiety as comorbid conditions has long been observed (Frances et al., 1992; Kessler, Merikangas, & Wang, 2008). Not only do these studies indicate that there may be definitional overlap, but that one condition may predispose towards the other and/or that both may share a more basic underlying cause.

At this stage of the instrument development, concurrent validity for the PIS also needed examination. Few constructs seemed to directly reflect the illusions concept. However, The Defensive Positive (DP) scale of the Tennessee Self-Concept Scale (Fitts, 1965) was designed to measure a form of 'subtle defensiveness' featuring the use of positive self-descriptions. It was constructed following the notion that people with psychiatric problems would harbour negative self-concepts (even if in a disguised version) and so people with no diagnosable emotional problems would evidence defensive structures to maintain self-esteem. These positive self-descriptions are thought to be linked to positive distortions of the self-concept, and so the DP scale was selected as a comparison measure for the PIS.

Finally, a test-retest design was used to measure the relationship between illusions and self-esteem stability, which needs ergo, to be measured over time. With 10 scales used in total at Time Point 1, a minimum data set was employed at Times 2 and 3 to avoid undue burden on the research participants, and to concentrate on issues of instrument development and the measurement of self-esteem stability that are central to this study.

## **Further Instrument Development: The Positive Illusions Scale**

**Categories.** Items forming the second draft of the PIS were based upon four categories of illusions strategies. Three were proposed by the positive illusions literature ('Exaggerated perceptions of control', 'Unrealistic optimism for the future', and 'Unrealistically positive self-evaluations': Taylor & Brown, 1988). The fourth category was derived from the results of the first Positive Illusions pilot study (see Chapter 5), which found that the strategy proposed by Snyder (1989) - of individuals downgrading negative self-relevant information, seemed to play an important role in the illusions construct.

**Items.** Taylor and Brown (1988) proposed that both social and cognitive strategies underpin the process of using positive illusions. However, the second draft of the scale was designed to access the cognitive, as opposed to social, aspects of peoples' illusions. Social strategies include managing interactions so as to minimise negative feedback and selecting supportive peers. Cognitive strategies involve biases in the selection and encoding of materials relevant to the self-concept. This approach enables examination of the relationship of illusions to psychological outcomes, explores the role of these strategies, and is able to represent self-talk processes clearly.

Items were generated in the context of knowledge offered by studies on self-esteem, self-critical cognitions, and optimism (Kawash & Koseluk, 1990; Kozelu & Kawash, 1990; Ishiyama & Munson, 1993). The items were designed to be short and clear, follow a self-talk format, and be relevant to the four categories of illusions strategies. The idea of 'Unrealistically positive self-evaluations' from Taylor and Brown's (1988) model, was modified to reflect self-talk, which might be used in maintaining key aspects of a positive self-concept. This followed the findings on positive self-talk explored by Kendall, Howard, and Hays (1989) and Taylor, Lichtman, and Wood (1984), and stands in contrast to the self-critical cognitions measure of Ishiyama and Munson (1993). Items were devised for instance, to describe individuals' happiness with their moral standards, their judgement as to their value as people, their appraisals of success in life progress, and their satisfaction with their actions. Items reflecting the downgrading of negative self-relevant information recorded the distancing process that might be used when facing events likely to threaten a person's positive self-judgements. Such events included making mistakes, failing, behaving badly, being ignored, and being criticised. Failure in this category is likely to be important, as its subject matter is close to the ruminations typical of a depressive process, e.g., "I am always failing"; "He criticised me because I am always useless"; "She ignored me because I am worthless".

Another group of items were devised to represent an overestimation of personal control. These items reflected perceived control over personal events (subject to either random outcomes or the typically mixed results of everyday life) and one's own control relative to that exerted by others. Items reflecting people's perceptions of the future were based on findings from Free and Cantril (1968), Markus and Nurius (1986), and Brickman, Coates, and Janoff-Bulman (1978). Reflecting Taylor and Brown's (1988) analysis, the items

represented beliefs that the future would continue to be better than the present, and that personal outcomes in the future would be positive, rather than negative or mixed.

Twenty-eight items were devised. These were examined by four senior clinicians for their accuracy in representing peoples' cognitive strategies. Three of these professionals were practising psychologists who also hold doctorates and senior lectureship positions at The University of Melbourne. The fourth is a senior psychologist and head of department in the public health service in Melbourne. All 28 items were approved by the four clinicians as reflecting the constructs intended; they are listed in Appendix B1.

**The scale.** To control for a response bias in the scoring direction, eight items were given negative anchors. Further items were deemed unsuited to reversal into negative anchors due to grammatical considerations. 'Unrealistic optimism for the future' and 'Exaggerated perceptions of control' items were mixed together, and followed 'Unrealistically positive self-evaluation' and 'Downgrading negative self-relevant information' items which similarly mixed, were placed at the beginning of the questionnaire. This order appeared more cohesive to the reader than pursuing complete randomisation of the items. A 4-point scoring system was added to the items, with -2 representing 'Like Me' and +2, 'Unlike Me'. Since no logical midpoint existed between 'Like and Unlike me', a zero midpoint was omitted. A questionnaire was constructed, with introductory instructions included (See the questionnaire below).

**The University of Melbourne**

Please print:

Initials.....Age:.....years.....months

Subject:.....Year.....

Sex: M.....F..... Date:.....

On this form you will find a list of statements. Please circle the number which most closely reflects how 'Like You' or 'Unlike You' you feel the statements are. There are no right or wrong answers. Please mark all 28 items.

Example of scale use:

-2.....	-1.....	+1.....	+2.....
Like	Quite Like	Quite Unlike	Unlike
Me	Me	Me	Me

Like	Unlike
Me	Me

- |                               |   |
|-------------------------------|---|
| -2..... -1..... +1..... +2    | 1. I don't let the things I'm no good at, get me down.                    |
| -2..... -1..... +1..... +2    | 2.* I become upset over my mistakes.                                      |
| -2..... -1..... +1..... +2    | 3. I keep up my standards of behaviour consistently.                      |
| -2..... -1..... +1..... +2    | 4. If I fail, I'll forget it quickly.                                     |
| -2..... -1..... +1..... +2    | 5. I write my bad behaviours off to experience.                           |
| -2..... -1..... +1..... +2    | 6. I'm happy with my moral standards.                                     |
| -2..... -1..... +1..... +2    | 7. * If someone I know ignores me, I'll get worried about what I've done. |
| -2..... -1..... +1..... +2    | 8. * I'm not happy with myself as a person.                               |
| -2..... -1..... +1..... +2    | 9. I have more good qualities than the people around me might realise.    |
| -2..... -1..... +1..... +2... | 10. I'm especially good at the things which matter.                       |

Like  
Me

Unlike  
Me

-2..... -1..... +1..... +2...

11. \* I'm not doing very well, considering.

-2..... -1..... +1..... +2...

12. Considering what's going on in my life, my coping is above average.

-2..... -1..... +1..... +2...

13. I don't spend much time thinking about the bad aspects of my personality.

-2..... -1..... +1..... +2...

14. When someone I know criticises me, I don't take it to heart.

-2..... -1..... +1..... +2...

15. I make my own "good luck".

-2..... -1..... +1..... +2...

16. I often engage in making confident plans for my future.

-2..... -1..... +1..... +2...

17. I'm more likely than most people, to achieve what I want in the future.

-2..... -1..... +1..... +2...

18.\* I think it's likely I'll encounter a "bad patch" in the future.

-2..... -1..... +1..... +2...

19. There are mostly good things to look forward to.

-2..... -1..... +1..... +2...

20.\* Others often ruin things for me.

-2..... -1..... +1..... +2...

21. I spend a lot of time having daydreams about pleasant events in my future.

-2..... -1..... +1..... +2...

22.\* I sometimes feel like a helpless victim of circumstance.

-2..... -1..... +1..... +2...

23.\* I don't think things will improve for me in the future.

-2..... -1..... +1..... +2...

24. Wishing for something strongly, helps me get it.

-2..... -1..... +1..... +2...

25. I can control most of the outcomes in my life.

-2..... -1..... +1..... +2...

26. I think I'm more likely than my friends, to have the things I want in the future.

-2..... -1..... +1..... +2...

27. I am able to change bad situations into good ones.

-2..... -1..... +1..... +2...

28. I exert the biggest influence over what happens to me.

(Note: asterisks denote a reverse-anchor item.)

## **Aims and Hypotheses**

**Aims.** The major purposes of this study were to refine the PIS, determine its factor structure, to continue to examine its convergent and divergent validity, and to ascertain whether the PIS acted as a predictor of depression, anxiety, and self-esteem level and as a moderator of the determinants of depression and self-esteem. The test-retest design examined the role of positive illusions in the face of distressing life events, and the relationship between anxiety, depression, positive illusions, and the stability of self-esteem (note that only the SEI was administered at Time Point 2: see Procedure, below).

### **Hypotheses.**

1. At Time Point 1, scores for positive illusions will correlate negatively but significantly with scores for depression, and positively and significantly with self-esteem, denial, TSCS DP scale, and defensiveness.
2. Scores for positive illusions at Time Point 1 will make a significant and independent contribution to the scores for depression at Time Point 1, over and above the contributions made by self-esteem, denial, and defensiveness.
3. The level of positive illusions scores at Time Point 1, will show a significant positive relationship to self-esteem stability (defined as intra-subject variability of  $> 1$  standard deviation between Time Point 1 and Time Point 3 scores).
4. Positive illusions scores will moderate the effect of high 'distressing' life events scores on significantly lower scores for depression, such that those with high levels of PIS would show a weaker relationship between life stress and depression than those with low levels of positive illusions.

## **Participants**

The first group comprised 47 1<sup>st</sup> year undergraduates (34 females, and 13 males) from The University of Melbourne with a mean age of 20.04 years (S.D. = 5.28 years). These participants were enrolled in the introductory psychology course, and they obtained study credits by completing a varying mixture of subject pool participation and written assignments. This group was tested on a first occasion in a lecture room, took home one measure to re-test (SEI; Time Point 2) 1 week later and was tested using the battery at a third time point 2 weeks later (Time Point 3).

However, enrolling participants through the subject pool resulted in inadequate numbers. Therefore, it was necessary to recruit further participants. The second group of participants comprised 86 undergraduates (52 females, and 34 males) from the University of Melbourne. Their mean age was 20.48 years (SD = 2.63 years). They were tested at the beginning of the second semester. This group obtained a free snack-lunch upon completion of the first battery, and took home the single test to complete 1 week later. Those who

returned 2 weeks later to complete the repeat test set, were also eligible to enter a draw for two \$50 book vouchers. All participants gave informed, written consent before participating: one male subject, aged 17, also obtained parental consent. There was an issue concerning ethical pressure on confidentiality (see Appendix B2).

Differences between the two groups were possible due to characteristics of the participants themselves, the timing of the testing, or recruiting methods. Therefore, analyses were carried out to determine whether there were any statistically significant differences in the score profiles between the two groups. The two groups showed no significant difference on scores for the 24-item PIS at either Time Point 1 or Time Point 3, as tested by *t*-tests (2-tailed). The two groups showed no significant difference in scores at Time Point 1 for self-esteem ( $p < .92$ ), mania ( $p < .73$ ) or anxiety ( $p < .19$  [see Tables 1 through to 5, Appendix B3]). There were no significant differences found for age ( $p < .53$ ), or gender ( $p < .17$ ). Therefore, the two groups were combined into one group ( $n = 137$ ) and all subsequent analyses were performed on this single group.

## Measures

Self-rating scales were administered to measure symptoms of depression, mania, and anxiety. As in the previous study, the Beck Depression Inventory (Beck et al., 1961; Beck, Rush, Shaw, & Emery, 1979) and the Self-Report Manic Inventory (Shugar, Schertzer, Toner, & Gasbarro, 1992) were used to measure the levels of depressive and manic symptoms, respectively. These two measures were described comprehensively in Study 1. As in Study 1, the K and L scales of the MMPI and the MMPI denial (Dn) subscale were administered as they had been in the first study, and as previously described.

**The Beck Anxiety Inventory (BAI).** (Beck, Epstein, Brown, & Steer, 1988) contains 21 items that measure anxiety symptoms in adults and adolescents. Items were drawn from the Anxiety Checklist Beck and Rush (1985) the PDR Checklist (which measures the side effects of anti-anxiety medications [Hollon & Beck, 1978]) and the Situational Anxiety Checklist (Beck, 1982). Eighty-six items were drafted describing anxiety symptoms. Statements describing anxiety symptoms such as “Hands trembling” are rated from 0 to 3. A further sample of 160 outpatients showed an internal consistency for the scale of .92 (Beck et al., 1988). The test-retest correlation was .75. A stepwise discriminant function analysis showed that the BAI adequately distinguished between different types of anxiety: panic disorder with agoraphobia, panic disorder without agoraphobia, social phobia, obsessive-compulsive disorder, and generalised anxiety disorder all at  $p < .001$ . Fydrich, Dowdall, and Chambless, (1992) reported correlations of .58 and .47 with the Trait and State subscales of the State-Trait Anxiety Inventory. The BAI was used in this study to ascertain whether positive illusions impact mainly upon depression, or whether they have a less specific effect upon other negative psychological states.

**The Defensive Positive Scale of the Tennessee Self-Concept Scale.** The Tennessee Self-Concept Scale (TSCS: Fitts, 1965) measures distinct aspects of the self-concept. One hundred self-descriptive items are rated from ‘Completely False’ (1) to ‘Completely True’ (5) by participants. The TSCS is intended for use by people with at least a Grade 6 reading competency. Six scales were derived from item analysis, with items selected to differentiate one group of participants from all other groups. The scales represented defensive positive, general maladjustment, psychosis, personality disorder, neurosis, and personality integration dimensions. Demographic norms were developed from data on a group of 626 people. The demographic variables included geographic location, age, education and racial group. The Defensive Positive (DP) scale was chosen to act as a concurrent validity check for the PIS scale. The DP scale was designed to measure a form of “subtle defensiveness” (p.5) where positive self-descriptions arise from a defensive mechanism. The DP scale shows a test-retest alpha coefficient of .90. Except for the number of deviant signs (NDS), all scores showed a normal distribution. The scale differentiates adequately between psychiatric patients and non-patients at the  $p > .001$  level; it also differentiates those classified as high in personality integration, when compared to norms. A high score on the DP scale indicates a great deal of distortion in relation to the self-concept, while a low score indicates little attempt to support self-esteem. It was predicted that scores for the DP subscale and the PIS would correlate positively and significantly, but not at a level which might indicate a complete overlap of the two constructs. Similarly, it was predicted that the pattern of correlations between the DP subscale and the other constructs used in the testing, would show a similar pattern to those relating to the PIS.

**The Life Events Inventory.** This scale (Tennant & Andrews, 1976) was developed using Australian populations. Sixty-seven items were developed from 61 items used by Paykel, Prusoff, and Ulenhuth (1971) in a scale measuring distress, and 43 items from the measure developed by Holmes and Rahe (1967) to measure the degree of change produced by an event. Two sets of scaling were devised, reflecting the two originating components of scale items. The index item for both sets of scaling was ‘a serious personal physical illness’. Participants ranked all items using both criteria, with the index as comparison. Tennant and Andrews used Spearman rank order correlations to measure rating consistency between males and females, and different occupational statuses. These were all  $r < .98$ . Correlations between the compatible events on the Paykel et al. (1971) and Holmes and Rahe (1967) scales were .92 and .87, respectively. The correlation between the Distress and Life Change scales was low at .44, indicating that life changes and the level of associated emotional distress are distinct qualities of an event.

Tennant and Andrews (1976) noted the importance of using life events scales on populations similar to those used for their development, as cultural assessments of life events vary widely. More than 30 years have passed since the scale’s development, bringing some cultural changes of their own. Accordingly, the words “husband” and “wife” were replaced with the currently more relevant “partner”. The word “Sydney”, not relevant to Victorian residents, was altered to “here” for the purposes of this study.

**The Coopersmith Self-Esteem Inventory.** (SEI: Coopersmith, 1967). As in the first study, this inventory was used to measure self-esteem. As reported by Kernis, Cornell, Sun, Berry, and Harlow (1993), the stability of an individual's self-esteem (and not just its absolute level) may influence the amount of effort made towards the maintenance of the self-concept. Kernis et al. used 10 points to separate the anchor points of the Rosenberg Self-Esteem Scale to precisely measure the amount of fluctuation in scores over time. For Study 2, a similar principle was used with the SEI. Its anchor points of 'Like Me' and 'Unlike Me' were separated by 10 points, each of which was given a score (-5 to + 5 respectively). In the current study, the stability of self-esteem was calculated as the standard deviation of total SEI scores across the three repeated administrations.

## **Procedure**

The first group of participants were recruited through advertisements placed on subject pool noticeboards. Participants attended one of six scheduled test sessions where they were administered the battery of eight self-report questionnaires. Repeat sessions were scheduled 2 weeks later. The second group of participants responded to posters placed in the Student Union building on the day of three scheduled test sessions. Their repeats were also administered 2 weeks later. The initial test battery comprised the Self-Report Manic Inventory (Shugar et al., 1992), the Beck Depression Inventory (BDI: Beck et al., 1962; Beck, Rush, Shaw, & Emery, 1979), the 2nd-draft Positive Illusions Scale (PIS-28), the Beck Anxiety Inventory (BAI: Beck et al., 1988), the K and L scales of the MMPI (Meehl & Hathaway, 1946), the MMPI Denial subscale (Dn: Little & Fisher, 1958), the Defensive Positive scale of the Tennessee Self-Concept Scale (DP: Fitts, 1964), the Life Events Inventory (LEI: Tennant & Andrews, 1976), and the Coopersmith Self-Esteem Inventory (SEI: Coopersmith, 1967). This group of tests enabled an examination of the relationships between these psychological concepts, and validity checks for the positive illusions concept, since illusions are described in the literature as close to the defensively positive self-descriptions measured by the DP subscale of the TSCS (Swann & Read, 1981).

Participants also took home a Coopersmith Self-Esteem Inventory to complete after 1 week: they were required to note the day's major news headline on the front of the test booklet (Time Point 2). This was intended to reinforce compliance with repeating the test on the correct day. At the repeat session for the test battery (Time Point 3) participants completed the 2nd draft Positive Illusions Scale (PIS-28), the Coopersmith Self-Esteem Inventory (SEI), and the Life Events' Inventory (LEI). Whereas a repeat administration of the PIS scale enabled a check on test-retest reliability, the LEI would give information on people's continuing life stressors. The last administration of the SEI would give an indication as to whether the level of positive illusion scores at Time Point 1, would predict the level of self-esteem at Time Point 3.

Test sets were presented in randomised order, to minimise order effects in the test responses. Completion of each test set was preceded by the signing of a consent form. Written instructions were provided, and the instructions were reinforced by the experimenter at the beginning of test sessions. After

completing the second test battery, participants were given debriefing sheets that explained the aims of the study in lay terms (See Appendices A7 and A8 for instructions and debriefing sheets). Participants were invited to make further inquiries of the experimenter if they wished. The first battery took from 35 to 60 minutes to complete, with an average completion time of 45 minutes. The second battery took from 10 to 35 minutes to complete, with an average completion time of 20 minutes. The measures were administered as shown below in Table 1.

Table 1.

*Scale Administration for Study 2*

Time Point 1	Time Point 2	Time Point 3
BDI		
PIS		PIS
BAI		
K		
L		
Dn		
DP		
LEI		LEI
SEI	SEI	SEI
SRMI		

*Note.* BDI = Beck Depression Inventory; PIS = Positive Illusions Scale; BAI = Beck Anxiety Inventory; K = K scale of the MMPI; L = L scale of the MMPI; Dn = Denial scale of the MMPI; DP = Defensive Positive Subscale, Tennessee Self-Concept Scale; LEI = Life Events Inventory; SEI = Coopersmith Self-Esteem Inventory SRMI = Self-Rating Mania Inventory.

### Statistical Analyses

Factor analysis was used to describe the factor structure of the PIS, which was compared with the structure proposed by the literature (Taylor & Brown, 1988). The reliability of the 2nd draft of the (28-item) PIS was tested using Cronbach’s alpha and item-total correlations to measure the consistency and cohesion of the scale. Hypothesis 1 predicted that scores for positive illusions would correlate significantly and negatively with scores for depression, positively with scores for self-esteem and the DP subscale, positively with scores for denial, and positively with scores for defensiveness. These associations were tested using Pearson product-moment correlations to define the relationships between these constructs.

Hypothesis 2 was tested by multiple regressions in order to determine the proportion of variance in depression scores, accounted for by the PIS, denial, self-esteem, and defensiveness constructs, respectively. Hypothesis 3 (that positive illusions at Time Point 1 would show a significant positive relationship to self-

esteem stability) was tested with a correlation matrix incorporating the computed self-esteem instability quotient, and the main clinical measures.

Hypothesis 4 predicted that positive illusions would moderate the effect of distressing life events, producing lower depression levels. This was tested using a moderation regression.

## **Ethical Issues**

Procedures were as in Study 1 – see Chapter 5. See Appendix B2 for ethical issues particular to Study 2.

## **Results**

Results are broken into four sections. The first looks at the performance of the revised PIS. In the second section PIS is compared with existing psychological constructs. The third section examines PIS performance as a predictive variable. The fourth, explores the relationship between positive illusions and self-esteem.

### **Results Part 1: Analysing the Positive Illusions Scale – Factor Structure and Reliability**

**Missing data.** The data included 118 complete cases. Hence, 10 cases were excluded due to list-wise deletion.

**Item performance.** Table 2 shows the descriptive statistics for the 28 PIS items: the percentage of participants endorsing the different scores for each item and the mean, standard deviation (SD), and median for each item on the 28-item PIS. In particular, Item 6 showed a problem with skewness at scoring level 1. However, this was just over 60%, and the rest of its score pattern shows some variation in the participants' scoring patterns. Item 19 with over 40% was deficient also, with items 7, 16, 21, 28, all showing scoring at a level of over 35%. An asterisk in Table 2 denotes reverse-anchor items. It should also be noted that in Table 2 percentages depended upon how many participants endorsed each item; some items were missed by some participants resulting in percentages that do not always add up to the same total.

Table 2.

*Descriptive Statistics of PIS Time 1 Items*

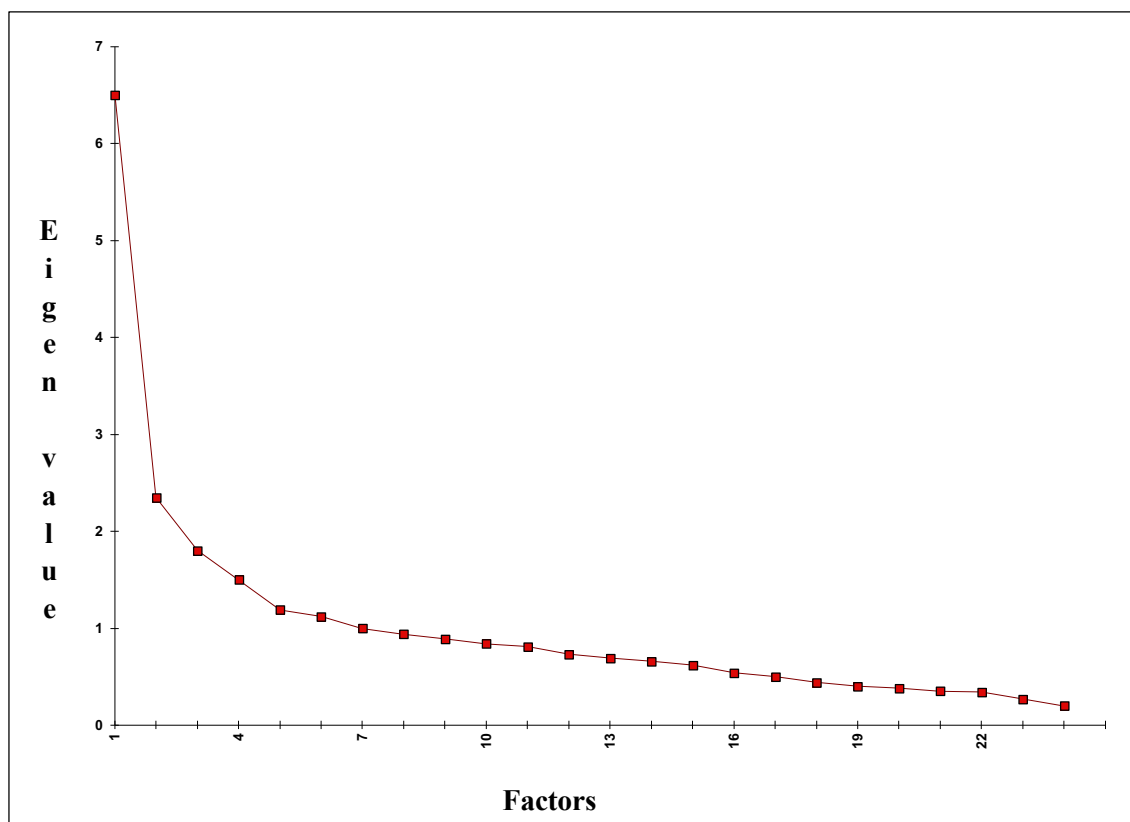
Item Number	% 1	% 2	% 3	% 4	Mean	Median	S.D.	Factor
1	18.9	35.4	29.9	15.7	2.43	2	.97	2
*2	23.6	40.9	24.4	11.0	2.23	2	.94	2
3	31.5	42.5	16.5	9.4	2.04	2	.93	Excluded
4	8.7	18.1	44.9	28.3	2.93	3	.90	2
5	18.0	39.8	27.3	14.8	2.39	2	.95	2
6	61.7	32.0	4.7	1.6	1.46	1	.66	3
*7	35.9	38.3	18.0	7.8	1.98	2	.93	2
*8	7.0	21.9	30.5	40.6	3.05	3	.95	2
9	21.1	42.2	28.1	8.6	2.24	2	.89	3
10	21.3	54.3	20.5	3.9	2.07	2	.76	1
*11	5.5	20.5	44.1	29.9	2.98	3	.85	Excluded
12	30.7	46.5	17.3	5.5	1.98	2	.84	Excluded
13	13.4	25.2	39.4	22.0	2.70	3	.96	2
14	7.1	21.3	41.7	29.9	2.94	3	.89	2
15	27.2	39.2	23.2	10.4	2.17	2	.95	1
16	36.2	44.1	10.2	9.4	1.93	2	.92	1
17	24.4	47.2	18.9	9.4	2.13	2	.89	1
*18	15.9	43.7	30.2	10.3	2.35	2	.87	Excluded
19	44.1	41.7	11.8	2.4	1.72	2	.76	2
*20	3.9	15.0	40.9	40.2	3.17	3	.83	3
21	36.2	36.2	19.7	7.9	1.99	2	.94	Excluded
*22	8.7	29.1	32.3	29.9	2.83	3	.96	3
*23	1.6	7.1	43.3	48.0	3.38	3	.69	3
24	18.1	39.4	23.6	18.9	2.43	2	.00	1
25	29.4	48.4	18.3	4.0	1.97	2	.80	1
26	20.2	40.3	32.3	7.3	2.27	2	.87	1
27	13.4	54.3	23.6	8.7	2.28	2	.80	1
28	37.3	42.9	16.7	3.2	1.86	2	.81	1

*Note:* percentages are prior to item reversal; \*denotes an item with a reverse- anchor

**Factor analyses.** An iterative approach was employed, using exploratory factor analysis. As in Study 1, this method progressively removed items based upon the statistical indications, to develop a more refined and internally consistent, construct-valid scale (Cudeck, 2000).

**Factor analysis iteration 1.** All of the 28 items in the renewed scale were used in this analysis. An examination of the Kaiser-Meyer-Olkin Measure of Sampling Adequacy showed a value of .77. This is an improvement upon the figures for the scale used in Study 1. However, the correlation matrix did not include a lot of correlations above .3, suggesting factorability may not be good. This may be partially due to the scale used for measurement, but it also likely reflects that the instrument needs improvements. As in Study 1, it was assumed that removing items with poor factor loadings would improve the potential for factorability. The first question when performing a factor analysis is to determine an appropriate number of factors to extract. The renewed development of the PIS scale used four related factors to construct the measure. Three of the item categories were those proposed by the positive illusions literature (Taylor & Brown, 1988) and the fourth derived both from the results of the first study (see Chapter 6) which endorsed the strategy proposed by Snyder (1989) – that of downgrading negative self-relevant information. The Scree plot for the 28-item PIS scale is shown below.

**Figure 1.** Scree Plot for the 28-Item PIS Analysis



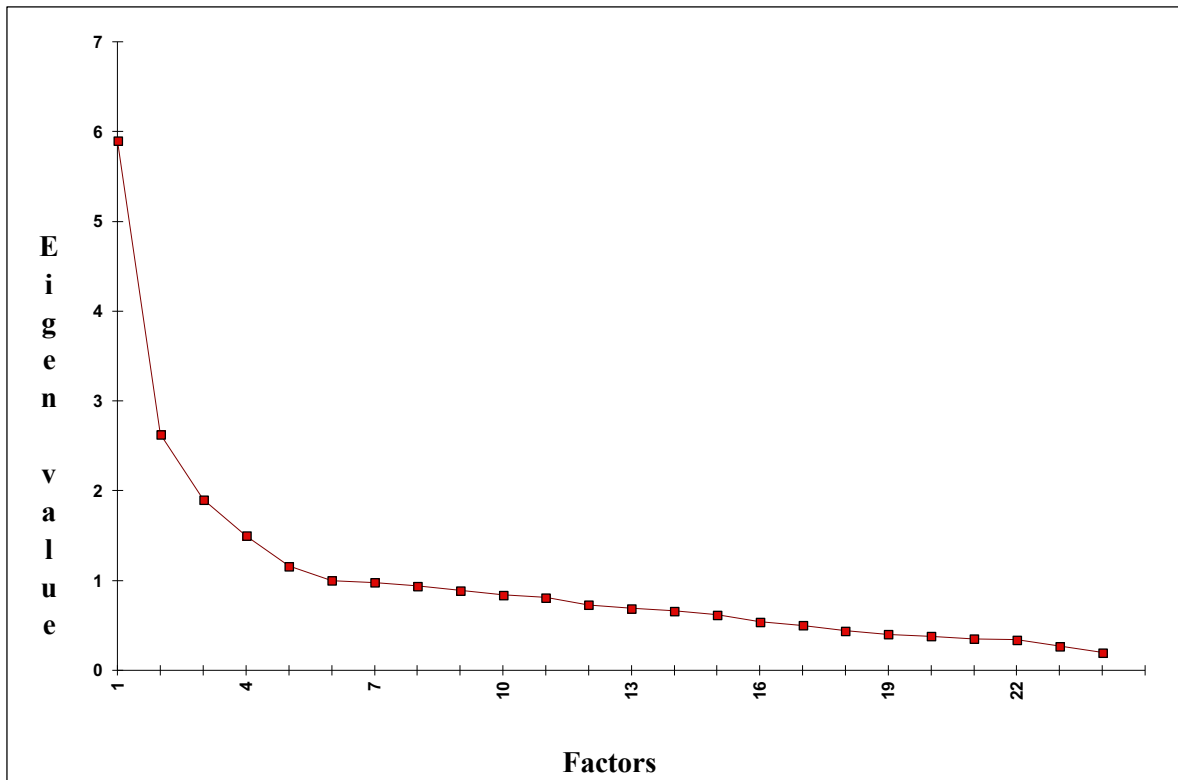
The eigenvalues over 1 rule is well known for recommending too many factors (Preacher & MacCallum, 2003) and this case was no exception. It recommended eight factors (see Appendix B4). The scree plot shown in Figure 1 however, shows one major component followed by smaller second, third and fourth components, which in turn are followed by a steady plateau in variance accounted for. This probably suggests four factors, although an argument could be made that it suggests two factors. The Parallel Test

suggested that three components should be extracted, based on the rule that only factors that have eigenvalues larger than the 95% confidence interval of the equivalent random data (O'Connor, 2000) (See Appendix B5). Velicer's Minimum Average Partial (MAP) test was also used to examine factorability (Velicer, 1976; Velicer & Jackson, 1990). The MAP test for 28 items similarly suggested three components should be extracted (see Appendix B6 and B7).

Turning to the item level, the lack of clarity in the factor structure implied that removal of some items would improve the scale – in terms of items loading onto multiple factors, kurtotic distributions, low communalities, and skewed distribution. Maximum Likelihood analysis was used to shed light on the factor structure (see Appendix B4). Here, items 3, 6, 11, and 24 had extracted factor loadings (communalities) below .2 and items 12, 18, and 21 had communalities below .1 (see also Appendix B8). (See also the basic correlation matrix in Appendix B9). These items are all potential candidates for deletion, as they are not well reflected in the factor structure (see also Appendix B10). Promax rotation was selected throughout this study: it is an oblique rotation in that it allows for correlated factors, which is more likely in this case given the nature of the constructs (Everitt & Dunn, 1991). All items without a loading of at least .25 in the rotated pattern matrix were removed from further analyses. In the rotated pattern analysis, a rotation converged in five iterations. Items 3, 11, 12, 18, and 21 did not load onto any of the three factors obtained (see Appendix B10). These five items were discarded, leaving 23 items for further examination. It is important to note that no “composite badness” score was calculated in this Study: this calculation was used in Study 1 as the correlation between items was so low. Therefore, based on the factor analysis and item performance in iteration 1, five items were deleted from the PIS scale, leaving 23 items for further analysis.

**Factor Analysis Iteration 2.** The Kaiser-Meyer-Olkin Measure of Sampling Adequacy on the reduced set of 23 items was .80. This is a further improvement on Iteration 1 and suggests a moderate covariance matrix for factor analysis. Further factor analysis was employed to examine the relationship between items on the PIS. The maximum likelihood extraction method was used as it is a ‘true’ factor analysis method and is more appropriate than principal components analysis for extracting the underlying constructs which are being investigated (Olsson, Troye, & Howell, 1999). The eigenvalues over 1 Rule suggested six factors (see Appendix B11) but as previously mentioned this should not be a strong recommendation (Preacher & MacCallum, 2003). The Scree plot suggested three or four factors, and this is shown in Figure 2. The Parallel test suggested three factors (see Appendix B12) and the MAP test recommended three components (see Appendix B13 and B14).

**Figure 2.** Scree Plot for 23-Item PIS Analysis



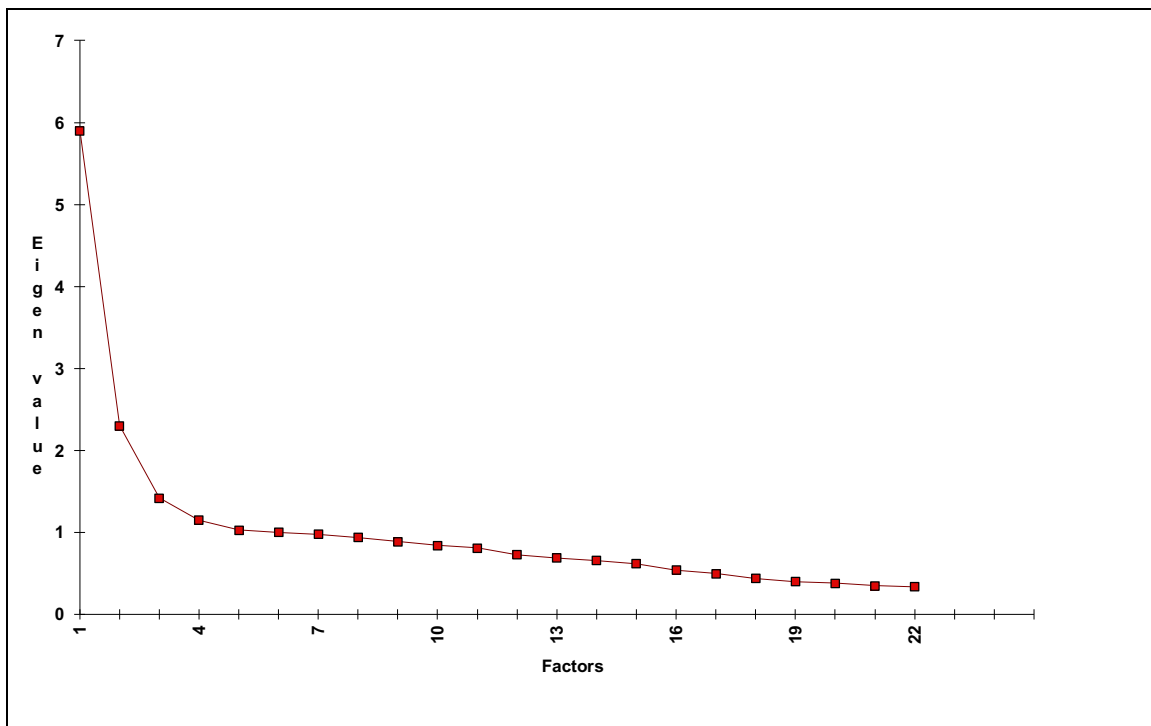
The factor correlation matrix supports the idea that the factors should be allowed to correlate, because all the correlations between factors are above an absolute value of .25. The loadings in the pattern matrix (see Appendix B15) showed three factors: only items 13 and 9 showed any cross-loadings above .25. No item showed an extracted factor loading of below .20 (see Appendix B16). Factors 1 and 2 correlated at .43, Factors 1 and 3 at .25, and 2 and 3 at .33.

On further inspection, it made sense to delete question 9. In the rotated pattern matrix, it loaded onto both Factors 1 and 3 but with weak values. An examination of the item revealed that it was double barreled; the question reads: “I have more good qualities than the people around me might realise.” Answering “like me” implies two things, one positive and one negative. The positive is that I see myself as having good qualities. The negative is that I perceive others as not appreciating me. Hence, item 9 was deleted. As mentioned above, item 13 also had cross-loadings. However, the reliability of the two scales was good and the item’s wording was acceptable and so at this stage, item 13 was retained for further testing of the scale. In summary, the results of the factor analysis for Iteration 2 were still less than clear, and one further item (item 9) was deleted for empirical and theoretical reasons. This left 22 items for further analysis.

**Factor Analysis Iteration 3.** The Kaiser-Meyer-Olkin Measure of Sampling Adequacy on the reduced set of 22 items was .81, slightly improving upon Iteration 2. Further factor analysis was employed to examine the relationship between items on the PIS. The maximum likelihood extraction method was used as it is a “true” factor analysis method and is more appropriate than principal components analysis for

extracting the underlying constructs that are being investigated (Olsson, Trove, & Howell, 1999 [see Appendix B17]). The Eigenvalues over 1 Rule suggested six factors, but as previously mentioned this should not be a strong recommendation (Preacher & MacCallum, 2003). The Scree plot suggested two factors, and this is shown in Figure 3. The Parallel test suggested two factors (see Appendix B18) and the MAP test recommended two components (see Appendix B19).

**Figure 3.** Scree Plot for 22-Item PIS Analysis



The factor correlation matrix supports the idea that the factors should be allowed to correlate, because the correlations between factors were at .44. No factor showed an extracted factor loading value of below .10 (see Appendix B20). The loadings in the rotated pattern matrix (see Appendix B21) showed two factors: Only item 13 showed notable cross-loadings. Factors 1 and 2 correlated at .44.

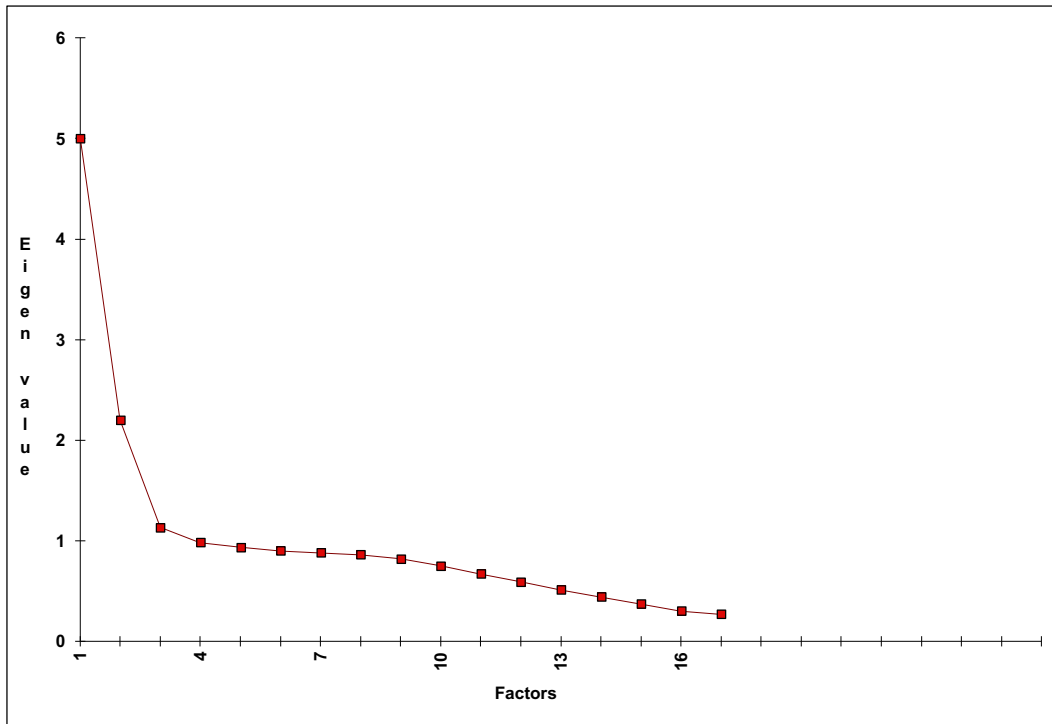
In relation to the previous solution, it appears that the factors were starting to form two meaningful factors. Factor 1 is referring to an optimistic belief in one's capacity to bring about positive outcomes in the future. Factor 2 reflects a positive response to negative life events, such as not dwelling on negative things or interpreting negative things events as learning experiences.

At this stage, it was felt that the factor structure was still less clear than it should be. Item deletion was arrived at in a combination of statistical (loadings lower than .30 or cross-loadings) and conceptual (not congruent with common theme of factor) grounds: items 6 (happiness with moral standards - conceptual incongruency), 22 (helpless victim - conceptual incongruency), 23 (poor thoughts about future - loading lower than .30), 13 (thinking about bad personality – cross-loading) 20 (others often ruin it for me - loading

lower than .30). The pattern matrix is shown in Table 21, Appendix B21. This left 17 items for further analysis.

**Factor Analysis Iteration 4.** For the remaining 17 items, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy was .82, which suggests a reasonable covariance matrix. The overall extraction was performed using the maximum likelihood method. An oblique rotation was used with two factors. The Scree plot suggested two factors. It is depicted in Figure 4 below.

**Figure 4.** Scree Plot for 17-Item PIS Analysis



In terms of initial eigenvalues, this accounted for 56.13% of the variance while the extracted sum of squared loadings for the two factors accounted for 36.12% of the variance (see Appendix B22 – Total Variance Explained). The correlation between the two factors was .38. In this iteration, only items 7 and 24 showed an extracted factor loading of below .27 (see Appendix B23). The Parallel test also indicated two factors (see Appendix B24). The MAP test also suggested two factors (see Appendix B25). The pattern matrix for the final 17 PIS items is shown on Table 3 below.

Table 3.

*Pattern Matrix: 17- Item PIS Scale*

	Factor	
	1	2
PIS17	.83	
PIS15	.71	
PIS16	.70	
PIS25	.62	
PIS27	.59	
PIS26	.57	
PIS28	.54	
PIS24	.41	
PIS10	.39	
PIS4		.77
PIS2		-.60
PIS1		.59
PIS5		.55
PIS14		.52
PIS8		-.50
PIS19		.40
PIS7		-.36

*Note.* Extraction Method: Maximum Likelihood; Rotation Method: Promax with Kaiser Normalization; Rotation converged in 3 iterations.

These groups of items resulted from a number of items being dropped. This has however, yielded items that appear to have a common conceptual core to each factor and it shows a clean set of factor loadings. In sum, the results of the factor analysis suggested two moderately correlated factors. These two factors were conceptually cohesive.

### **Reliability of the 17-item PIS**

The two PIS factors were moderately correlated. Hence, the item-total statistics are presented for the overall PIS scale, and for the two subscales, in Tables 4, 5, and 6 below. The reliability analysis in Table 4 suggests that the overall PIS scale had good internal reliability, where “reliability if item deleted” statistics show that no item could be removed to improve the reliability. For the overall scale, Cronbach’s alpha was .84, for Factor 1, Cronbach’s alpha was .84, and for Factor 2, Cronbach’s alpha was .77. Factor 1 had very good internal reliability, and Factor 2, moderately good internal reliability.

Table 4.

*Indices of Internal Reliability, 17-Item PIS*

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item- Total Correlation	Cronbach's Alpha if Item Deleted
PIS10	42.78	57.88	.47	.82
PIS15	42.89	55.03	.56	.81
PIS16	42.67	56.91	.43	.82
PIS17	42.84	56.67	.47	.82
PIS24	43.16	59.15	.24	.83
PIS25	42.68	56.77	.52	.82
PIS26	42.99	56.78	.48	.82
PIS27	43.01	55.69	.63	.81
PIS28	42.57	56.92	.51	.82
PIS1	43.14	56.71	.42	.82
PIS14	43.65	57.262	.44	.82
PIS19	42.43	58.02	.48	.82
PIS2	43.46	58.04	.34	.83
PIS4	43.63	57.86	.38	.82
PIS5	43.10	57.46	.38	.83
PIS7	43.71	59.22	.26	.83
PIS8	42.64	56.51	.44	.82

Note: N= 118.

Table 5.

*Indices of Internal Reliability Factor 1: Optimistic Internal Locus of Control*

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item- Total Correlation	Cronbach's Alpha if Item Deleted
PIS10	22.89	23.14	.42	.83
PIS15	23.00	20.35	.64	.80
PIS16	22.78	21.03	.57	.81
PIS17	22.66	20.54	.66	.80
PIS24	23.27	22.58	.34	.84
PIS25	22.80	21.70	.59	.81
PIS26	23.09	21.57	.55	.81
PIS27	23.14	21.53	.62	.81
PIS28	22.70	22.16	.52	.82

Note: N = 118.

Table 6.

*Indices of Internal Reliability Factor 2: Positive Response to Adversity*

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item- Total Correlation	Cronbach's Alpha if Item Deleted
PIS1	17.32	15.43	.51	.73
PIS14	17.83	16.00	.48	.73
PIS19	16.60	16.92	.44	.74
PIS2	17.66	15.64	.50	.73
PIS4	17.81	15.20	.59	.71
PIS5	17.28	16.27	.42	.74
PIS7	17.90	17.07	.30	.76
PIS8	16.84	15.98	.44	.74

Note: N = 118.

**Scale Interpretation**

Tables 7 and 8 below show the items from the two PIS factors identified.

Table 7.

*Factor 1 PIS Items.*

Item		Item	
10	I'm especially good at the things which matter.	15	I make my own "good luck".
16	I often engage in making confident plans for my future.	17	I'm more likely than most people, to achieve what I want in the future.
24	Wishing for something strongly, helps me get it.	25	I can control most of the outcomes in my life.
26	I think I'm more likely than my friends, to have the things I want in the future.	27	I am able to change bad situations into good ones.
28	I exert the biggest influence over what happens to me.		

Table 8.

*Factor 2 PIS Items.*

Item		Item	
1	I don't let the things I'm no good at get me down.	19	There are mostly good things to look forward to.
4	If I fail, I'll forget it quickly.	2*	I become upset over my mistakes.
5	I write my bad behaviours off to experience.	7*	If someone I know ignores me, I'll get worried about what I've done.
14	When someone I know criticises me, I don't take it to heart.	8*	I'm not happy with myself as a person.

*Note:* items 2Data 7 and 8 are reversed scored items.

Factor 1 included items illustrative of feelings of control and agency, for example making one's own good luck (15), controlling most of the outcomes in life (25), being able to change bad situations into good ones; also optimistic agency such as being more likely than most people to achieve goals in the future (17), being more likely than friends to have desired things in the future (26), and making confident plans for the future (16). This factor is similar to the future/agency factor identified in Study 1.

Factor 2 featured items descriptive of positive responses to adversity such as forgetting failure quickly (4), writing off one's bad behaviours (5), not becoming upset over mistakes (2), and not taking criticism to heart (14). One anomalous item described happiness with oneself (8). This scale was similar in nature to the factor named "Downgrading the Negative" from Study 1. The two scales were termed Optimistic Internal Locus of Control (1) and Positive Response to Adversity (2).

Once again, it is possible that chance correlations peculiar to the present sample led to the scale configurations that emerged from the analyses. It was believed necessary to assess the integrity of both the two sub-scales and the overall 17-item PIS scale in a further study – Study 3.

## **Results Part 2: Relationships Between the Positive Illusion Scale and Clinical Scales at Times 1, 2, and 3.**

This section examined the outcomes for predictions from Hypothesis 1: that scores for positive illusions would correlate negatively but significantly with scores for depression, and positively and significantly with scores for self-esteem, denial, TSCS DP scale, and defensiveness. Hence, this part of the overall study extends the number of scales compared to the PIS. The self-rating Mania Scale did not appear to form clear relationships with the constructs under examination in Study 1; the relationship between positive illusions and life events, and mania, were explored here, but no hypotheses were made about these relationships. Table 9 shows the means, SDs, medians, kurtosis and skewness statistics for each of the clinical scales.

Table 9.

*Clinical Scale Descriptive Statistics*

	N	Mean	Median	SD	Skewness	SE	Kurtosis	SE
Beck Depression Scale	128	7.67	6.00	7.00	1.21	0.21	1.09	0.42
Beck Anxiety Scale	128	9.61	7.00	9.18	1.40	0.21	1.34	0.42
MMPI L Scale	128	3.39	3.00	2.17	0.82	0.21	1.00	0.42
MMPI K Scale	128	13.33	13.00	4.86	0.16	0.21	-0.72	0.42
MMPI Dn Scale	128	14.64	15.00	4.53	-0.07	0.21	-0.88	0.42
SRMI Scale	126	12.71	12.00	7.59	0.43	0.22	-0.32	0.43
DP Scale	128	52.52	54.50	12.06	-0.66	0.21	1.16	0.42
Self Esteem Time 1	124	67.85	72.00	21.77	-0.59	0.22	-0.35	0.43
Self Esteem Time 2	61	66.16	68.00	19.30	-0.28	0.31	-0.61	0.60
Self Esteem Time 3	52	68.31	68.00	20.35	-0.33	0.33	-0.61	0.65
Live Events Inventory Distress Time 1	128	63.63	50.00	60.93	2.47	0.21	10.04	0.42
Live Events Inventory Change Time 1	128	92.81	73.00	78.02	2.83	0.21	15.37	0.42
Live Events Inventory Distress Time 3	60	41.67	30.00	39.95	1.57	0.31	2.10	0.61
Live Events Inventory Change Time 3	60	61.35	51.00	47.87	1.23	0.31	0.97	0.61
PIS F1: Positive Outlook Time 1	127	2.88	2.89	0.57	-0.36	0.21	0.20	0.43
PIS F2: Positive Response to Adversity Time 1	128	2.48	2.50	0.57	-0.30	0.21	-0.35	0.42
PIS Overall Time 1	128	2.68	2.72	0.46	-0.46	0.21	0.31	0.42
PIS F1: Positive Outlook Time 3	59	2.94	2.89	0.43	0.26	0.31	0.00	0.61
PIS F2: Positive Response to Adversity Time 3	60	2.52	2.50	0.49	-0.26	0.31	-0.67	0.61
PIS Overall Time 3	60	2.74	2.74	0.35	0.11	0.31	-0.27	0.61

*Note.* Dp Scale = Defensive Positive subscale, Tennessee Self-Concept Scale

Table 9 shows that the Beck Depression and Anxiety scores were both moderately positively skewed as to be expected when applied to a normal population. However, these did not exceed a Critical Ratio of 2. MMPI scales, SRMI, DP, and Self-esteem all showed a reasonably symmetric spread with no major departures from normality. Life event scales showed a moderate positive skewness. Time 1 life event scales had an outlier case far removed from the majority of the distribution. This case was given the value of the next most extreme value to reduce its influence on analyses involving it.

The two subscales of PIS and the overall scale appeared normally distributed. The BDI, BAI and LEI figures indicate quite a high degree of skewness. However, the degree of the skewness is well tolerated in parametric statistics; since parametric statistics are quite robust the decision was to not transform these measures for reasons of simplicity and replicability.

The mean scores on the established measures fell within the ranges expected for a normal population and overall, indications of pathology were low. The BDI mean score was 7.67, with a median of 6.00. The score range was 32, and the mean and median fitted into the score range for minimal levels of depression. However, 45 participants scored greater than, or equal to, 10 on the BDI, and 10 participants had scores greater than or equal to 20 - a level which represents significant symptomatic levels of depression (Beck & Steer, 1987). Mean scores for the BAI fall in the range reflecting minimal anxiety levels (Beck & Steer, 1990). The median of 7.00 showed that outliers with very high scores affected the mean. Twelve participants had scores above 30, indicating severe clinical levels of anxiety.

The MMPI Denial (Dn) mean score was a little elevated, when compared to the Little and Fisher (1958) means of 11.94 for males (SD 4.51) and 12.45 for females (SD 4.26). Skewness in most of the scores was low, meaning that there was no specific bias towards high or low scores. Mean scores for the K and L scales of the MMPI fell at the 51st and 50th percentiles, respectively (Millon, Green, & Meagher, 1982). According to Greene (1980), this implies that this population was unlikely to be faking good on a large scale, and did not show a very high degree of pathology.

The SRMI showed a median of 12 and a range of 33. The mean score compares to the original experimenter's overall control group mean for mania scores of 12-13 (Shugar et al., 1992). Using Shugar et al.'s suggested range of cut-offs, 59 individuals showed scores of greater than or equal to 14, 37 greater than or equal to 18, and 18, greater than or equal to 22. As a proportion of the participants, this distribution is similar to that shown in Study I.

The overall mean score for the DP subscale of the TSCS, compares with the published mean of 54.4 (Fitts, 1964). As a group then, the participants did not display particularly elevated use of the defensive-positive strategies described by Fitts (1964). Mean scores for self-esteem compare closely with the published means for adults, of 68.40 for males (SD 18.5) and 71.6 for females (SD 19.5) (Coopersmith, 1967).

Correlations between the two subscales of the PIS, the total PIS scale and the clinical measures were undertaken in order to measure these associations. They are depicted in Table 10 below.

The test-retest correlation of the PIS factors was above the frequently used threshold of .5: Factor 1,  $r = .69$ ; Factor 2,  $r = .74$ ; Overall PIS,  $r = .74$ . Hence, it can be concluded that there is not a significant

difference between the scores for the PIS-17 at Time Points 1 and 3. The individual mean score at Time Point 1 was 2.68, and at Time Point 3, 2.74, for overall PIS scores. The standard deviations at Time Points 1 and 3 were similar. The scores are quite highly correlated. Hence it can be concluded that the rank ordering of individuals is quite similar. These tests do not ascertain whether overall score levels are different. The 60 participants who completed to Time 3, versus the 68 who dropped out, were analysed using *t*-tests, and no significant difference was found at Time Point 1 for PIS scores, between the two groups. Table 10 illustrates correlations between the PIS and other clinical measures at Time 1.

Table 10.

*Correlations Between the 17-Item PIS, and All Clinical Measures (at Time Point 1).*

Measures	PIS 17
Dn	.28**
K	.31**
L	.12
BDI	-.54**
BAI	-.29**
SRMI	-.01
DP	.60**
LEI Distress	-.14
LEI Change	-.03
SEI	.66**

*Note.* \*\* =  $p < .01$ ; \* =  $p < .05$  (two-tailed); Dn= Denial scale of the MMPI; K = K scale of the MMPI; L= L scale of the MMPI; BDI= Beck Depression Inventory; BAI = Beck Anxiety Inventory; SRMI= Self-Rating Mania Inventory; DP = DP subscale, Tennessee Self Concept Scale; LEI Distress = Life Events Inventory Distress Scale; LEI Life Change = Life Events Inventory Life Change Scale; SEI = Coopersmith Self-Esteem Inventory; PIS (17) = Positive Illusions Scale, 17-item version.

The 17-item PIS correlated negatively with depression ( $p < .01$ ). The 17-item PIS also correlated significantly with the measures of denial and defensiveness, self-esteem, and the DP subscale. The BAI showed a significant negative correlation with the 17-item PIS measure.

Correlations between all the clinical scales are shown in Table 11 below. Scores for depression on the BDI showed a significant negative correlation with scores on the SEI, with depression and self-esteem sharing approximately 42% of the score variance. Depression scores also correlated negatively with the denial (Dn) scale of the MMPI. Mania measured by the SRMI showed a significant negative correlation with the K scale of the MMPI. There was a significant correlation between SEI scores and those of the denial scale of the MMPI. The pattern of correlations with the DP subscale was similar to that related to PIS.

Table 11.

*Correlations: PIS Scales and Clinical Scales*

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	Gender <sup>y</sup>																				
2	Beck Depression Scale	.09																			
3	Beck Anxiety Scale	.11	.62																		
4	MMPI L Scale	-.18	-.27	-.20																	
5	MMPI K Scale	-.02	-.54	-.41	.38																
6	MMPI Dn Scale	.10	-.45	-.32	.15	.75															
7	SRMI Scale	.05	.36	.39	-.21	-.37	-.17														
8	DP Scale	-.09	-.68	-.51	.45	.51	.36	-.24													
9	Self Esteem Time 1	.04	-.69	-.44	.14	.58	.55	-.20	.70												
10	Self Esteem Time 2	.00	-.67	-.41	.16	.45	.47	-.26	.71	.88											
11	Self Esteem Time 3	.14	-.40	-.14	.26	.37	.37	-.27	.65	.80	.87										
12	Live Events Inventory Distress Time 1	.00	.34	.33	-.25	-.35	-.26	.40	-.26	-.29	-.36	-.29									
13	Live Events Live Events	.01	.28	.25	-.23	-.34	-.21	.47	-.22	-.21	-.24	-.30	.87								
14	Inventory Distress Time 3	.12	.38	.33	-.17	-.29	-.12	.33	-.22	-.16	-.32	-.15	.63	.53							
15	Live Events Inventory Change	.14	.27	.25	-.05	-.28	-.10	.29	-.22	-.20	-.27	-.15	.59	.65	.85						
16	PIS F1: Positive Outlook Time 1	-.01	-.33	-.14	-.04	.14	.18	.09	.47	.46	.50	.31	.06	.18	.00	-.01					
17	PIS F2: Positive Resp. to Adversity T1	-.14	-.57	-.36	.24	.37	.29	-.11	.51	.63	.62	.54	-.28	-.23	-.38	-.39	.33				
18	PIS Overall Time 1	-.09	-.54	-.29	.12	.31	.28	-.01	.60	.66	.64	.49	-.14	-.03	-.21	-.22	.82	.81			
19	PIS F1: Positive Outlook T3	.15	-.12	-.17	.01	-.06	.01	.12	.32	.30	.36	.24	.09	.23	-.16	-.01	.69	.16	.52		
20	PIS F2: Positive Resp. to Adversity T3	.03	-.47	-.12	.25	.37	.33	-.15	.59	.61	.60	.62	-.32	-.28	-.23	-.20	.35	.74	.62	.20	
21	PIS Overall Time 3	.11	-.37	-.19	.17	.19	.21	-.01	.57	.58	.61	.56	-.14	-.02	-.25	-.13	.66	.59	.74	.78	.77

Note. Gender (Male coded 1; Female coded 2); Correlation matrix used pairwise deletion:  $N = 128$  time 1;  $N = 61$  time 2;  $N = 52$  time 3; hen  $N = 128$ , if  $r > .18$ ,  $p < .05$ ; When  $N = 61$ , if  $r > .25$ ,  $p < .05$ ; When  $N = 52$ ; if  $r > .28$ ,  $p < .05$

**Regression Analysis.** Hypothesis 2 predicted that scores for positive illusions at Time Point 1 would make a significant and independent contribution to the scores for depression at Time Point 1, over and above the contributions made by self-esteem, denial, and defensiveness.

For the regression analysis, five outliers were removed (due to their scores being in clinical ranges across measures) and square root transformations applied to scores for the L scale of the MMPI, the BDI, the DP subscale of the TSCS, and the (whole) PIS scale, all of which showed a Skewness ratio of >2. Regression analysis requires homoscedacity and so for this test the distinct needs of the analysis had to be considered.

**Hierarchical regressions predicting depression.** A hierarchical regression was performed predicting depression from self-esteem, the MMPI Dn Scale and MMPI K scale in the first block, and adding the PIS Overall in the second block. An examination of the correlations and multicollinearity indices suggested that MMPI Dn and MMPI K were correlated to a point of redundancy ( $r = .82$ ). Thus, the model was re-run without MMPI K. The results are shown in Table 12.

Table 12.

*Variables Predicting Scores on the Beck Depression Inventory*

Model	Variable	Unstandardized Coefficients		Standardized Coefficients	<i>T</i>	<i>p</i>
		B	Std. Error	Beta		
	(Constant)	23.66	1.69		14.00	.00
1	Self Esteem Time 1	-.20	.025	-.63	-8.0	.00
	MMPI Dn Scale	-.15	.120	-.10	-1.29	.19
	(Constant)	28.42	2.88		9.85	.00
2	Self Esteem Time 1	-.16	.032	-.50	-5.00	.00
	MMPI Dn Scale	-.18	.119	-.12	-1.57	.12
	PIS Overall Time 1	-2.63	1.30	-.17	-2.02	.05

*Note.* Dependent Variable: Beck Depression Scale

Adjusted *R* Square (.47) was significant at .01. The first block accounted for 48% of the variance in depression ( $F(2, 121) = 55.81, p < .001$ ). Adding the PIS Overall explained an additional 1% of variance, which although very small, amounted to a significant change in *R*-squared (*R*-square Change  $F(1, 120) = 4.08, p = .046$ ).

Regression coefficients in the full model (i.e., Block 2) were significant for self-esteem and PIS overall. Higher self-esteem and higher overall PIS predicted significantly lower depression. Self-esteem was the larger standardised beta coefficient – three times as big as that for the PIS.

**Hierarchical regression predicting anxiety.** A hierarchical regression was performed predicting anxiety from self-esteem, the MMPI Dn Scale and MMPI K scale in the first block, and then adding the PIS Overall in the second block. This was to examine whether PIS contributed to the variance in anxiety – a non-specific type of psychological distress – when it is predicted to have a specific impact upon depression. The results are shown in Table 13.

Table 13.

*Variables Predicting Scores on the Beck Anxiety Inventory*

Model	Variable	Unstandardized Coefficients		Standardized Coefficients	<i>t</i>	<i>P</i>
		B	Std. Error	Beta		
1	(Constant)	23.63	2.75		8.57	.00
	Self Esteem Time 1	-.15	.04	-.37	-3.78	.00
	MMPI Dn Scale	-.23	.19	-.11	-1.21	.22
2	(Constant)	23.77	4.78		4.96	.00
	Self Esteem Time 1	-.15	.05	-.36	-2.89	.00
	MMPI Dn Scale	-.23	.19	-.11	-1.20	.23
	PIS Overall Time 1	-.07	2.16	-.00	-.03	.97

*Note:* Dependent Variable: Beck Anxiety Scale

The first block accounted for 19% of the variance ( $F(2, 121) = 15.06, p < .01$ ). The second block explained 0% of additional variance: R-square change  $F(1, 120) = .00, p = .97$ . In contrast to the previous regression, Positive illusion scores did not add significant variance over and above self-esteem and the MMPI Dn scale in accounting for Beck Anxiety Scale scores.

**Moderation effects.** Positive illusions were predicted to be associated with lower depression, and major life events with higher depression. It was hypothesised (Hypothesis 4) that positive illusions would reduce the effect of major life events on depression (moderation/interaction effect).

The following regression (See Tables 14 and 15 below) addresses the third point, the moderation hypothesis. A moderation regression was performed centring the two variables (PIS, and LEI distress as this is conceptually likely to predict depression) before computing the interaction term.

Table 14:

*Model Summary for Moderation Regression Predicting Depression*

Model	<i>R</i>	<i>R</i> Square	Adjusted <i>R</i> Square	Std. Error of the Estimate	Change Statistics				
					<i>R</i> Square Change	<i>F</i> Change	df1	df2	Sig. <i>F</i> Change
1	.337 <sup>a</sup>	.114	.107	6.615	.114	16.197	1	126	.000
2	.605 <sup>b</sup>	.366	.356	5.616	.252	49.813	1	125	.000
3	.609 <sup>c</sup>	.371	.355	5.620	.004	.850	1	124	.358

*Note.* a. Predictors: (Constant), Negative events scale; b. Negative events score, overall positive illusion score; c. Interaction term between negative events and PIS

Table 14 shows that the first two models were significant but not the third model.

Table 15:

*Variables Predicting Depression in Moderation Regression*

Model	Unstandardized Coefficients		Standardized Coefficients	<i>t</i>	p	95.0% Confidence Interval for B		
	B	Std. Error	Beta			Lower Bound	Upper Bound	
1	(Constant)	4.922	.898					
	LEI Distress	.044	.011	.337	4.025	.000	.023	.066
2	(Constant)	26.075	3.093		8.431	.000	19.954	32.195
	LEI Distress	.035	.009	.268	3.731	.000	.017	.054
	Positive illusion score	-7.694	1.090	-.507	-7.058	.000	-9.852	-5.536
3	(Constant)	26.123	3.095		8.441	.000	19.998	32.249
	EEI Distress	.034	.010	.260	3.590	.000	.015	.053
	Positive illusion score (PIS)	-7.710	1.091	-.508	-7.067	.000	-9.869	-5.550
	Interaction LEI Distress ×PIS	-.018	.019	-.066	-.922	.358	-.055	.020

*Note.* Dependent Variable: Depression score

Table 15 shows significant effects for positive illusions and LEI Distress in both the second and third models (steps) but not for the interaction. In the current analysis, the results do not support a moderation hypothesis. Rather, the results suggest that positive illusions are associated with lower depression and distressing life events are associated with greater depression. The more complex hypothesis that positive illusions have a greater effect at reducing depression at higher levels of distressing life events was not supported.

However, it should be noted that moderation effects rarely emerge in studies involving correlating a set of standard self-report measures as a great deal of statistical power (and hence a very large sample) is needed. So, if they do emerge, the effect sizes tend to be small and can often be removed by transforming the dependent variable. In a meta-analysis of moderation effects Agunis, Beaty, Boik, and Pierce (2005) found that reported moderator effects reported in the literature tend to be small. Hence in the current study it is somewhat difficult to tell if PIS genuinely does not act as a moderator, or if it may have a small moderation impact.

**Self-esteem data.** Hypothesis 3 predicted that participants with unstable self-esteem (as measured over three time points) would show significantly lower levels of positive illusions scores than those with stable self-esteem. To assist in measuring participants' degree of variability in self-esteem scores, a 10-point scale was added to the standard Coopersmith Self-Esteem Inventory (SEI), which usually carries a Like Me/Unlike Me response. Hence, its anchor points of Like Me and Unlike Me were separated by 10 points, which were scored from -5 to +5. This produced a finer gradation of responses than the standard measure.

Individual self-esteem stability scores were the average of items (after reversal) on the -5 to +5 scale. Means over the three time points ranged from 1.24 to 1.42, and standard deviations from 1.55 to 1.69 (see Appendix B26). The variable appears relatively normally distributed, except for four cases that had values above 1.

The correlation matrix (see Appendix B27) contains several important findings. Individual differences in self-esteem are highly stable over the three time points. Correlations are between .80 and .92. The message here is that there is little fluctuation in self-esteem relative to individual differences. The correlation between the dimensional and binary versions of the scale is .97. Thus, the planned splitting of people into high and low self-esteem variability (at Time Point 1) is very unlikely to be any different based on whether the variability measure is based on the binary-item version or the 10-point item version. A slight advantage of the binary version of the self-esteem scale is that there are less missing data.

Table 15:

*Correlations: Self-Esteem (10-point scale) with other Clinical Variables*

Variable	Self Esteem Instability	Self Esteem (10-point scale) Time 1	Self Esteem (10-point scale) Time 2	Self Esteem (10-point scale) Time 3	PIS Overall Time 1	PIS Overall Time 3	Beck Depression Scale	Beck Anxiety Scale	SRMI Scale
Self Esteem Instability			-						
Self Esteem (10-point scale) Time 1	.17								
Self Esteem (10-point scale) Time 2	-.25*	.89**							
Self Esteem (10-point scale) Time 3	-.08	.83**	.92**						
PIS Overall Time 1	.05	.67**	.61**	.52**					
PIS Overall Time 3	.08	.63**	.64**	.63**	.73**				
Beck Depression Scale	.32*	-.69**	-.65**	-.42**	-.54**	-.36**			
Beck Anxiety Scale	.47**	-.42**	-.44**	-.23	-.29**	-.18	.61**		
SRMI Scale	.31*	-.16	-.26*	-.28*	-.05	-.00	.36**	.38**	

Note. \*Correlation is significant at the 0.05 level (2-tailed); \*\*Correlation is significant at the 0.01 level (2-tailed).

From the correlation matrix shown in Table 15, self-esteem instability shows low correlations with the absolute level of self-esteem at the three time points, although there is a small to medium negative correlation ( $r = -.25$ ) between time 2 self-esteem and self-esteem instability. This is important to note because self-esteem instability might have had a high correlation with actual self-esteem making any correlations observed with other constructs problematic. This supports the notion of self-esteem stability as a separate entity.

In terms of correlations with other constructs, some medium-level positive correlations emerged with depression, anxiety and mania all measured at Time 1. Significant correlations were not present however, for the PIS 17-item overall scale with self-esteem instability. Hence, Hypothesis 3 was not supported.

The sample size for these analyses is somewhat smaller than the overall sample, because instability measures required data at all three time points. Thus, confidence intervals around obtained coefficients are larger and the exact size of the population correlations between instability and the various measures is less clear. As a rough guide, the 95% confidence interval for correlations based on  $n=50$  is around plus or minus .3.

## **Discussion**

This study set out to further test the positive illusions concept using a refined measure and its relationship to related constructs. The psychometric properties of the modified scale were examined in detail. Important questions were whether positive illusions would: (a) show a correlation pattern consistent with that of the first study, using the refined scale; and (b) whether the correlations would be strongest within the predicted domains - that is, would PIS show the strongest relationship to self-esteem and depression rather than anxiety – another common emotional condition. The use of a life events measure helped to ascertain whether positive illusions might act as a buffer in the case of real-life negative experiences. This phase of the testing also examined the stability of self-esteem and its relationship to depression, anxiety and positive illusions and the links between self-esteem stability and positive illusions.

It should be noted that this Discussion section only provides an abbreviated summary of the results for Study 2. For a conceptual and theoretical analysis, the reader is referred to the major Discussion chapter at the end of this thesis.

## **Summary of Results: Features and Performance of the Revised Scale**

**Scoring Patterns.** The study's first hypothesis predicted that scores for positive illusions would correlate negatively and significantly, with scores for depression, and positively and significantly, with scores for self-esteem, denial, and defensiveness. Correlations between the PIS and the BDI and SEI were over .50 – and still significant but less than .35 for the two other constructs of denial and defensiveness. This supports the first hypothesis.

The second hypothesis predicted that scores for positive illusions would make a significant and independent contribution to the scores for depression and this was supported. Hierarchical regression analyses showed that PIS scores alone accounted for 1% of additional variance over and above other predictive variables. Although this was significant, the contribution of the PIS is very small. The third hypothesis predicted that participants with stable self-esteem would show significantly higher levels of positive illusions than those with unstable self-esteem. The indications for this were equivocal. The fourth hypothesis predicted that positive illusions would

moderate the impact of distressing life events, thereby producing lower depression scores. This hypothesis was not supported. No moderation effect was found. Rather, the results indicated that life events are closely related to depression and positive illusions also have an impact upon depression, but there is no interaction between the two predictor variables.

As in the first phase of the study, the group of test participants showed a moderate level of endorsement for positive illusions strategies, with a mean item score of 2.7 for the 17-item scale. This compares with quite a marked elevation in scores for the DP subscale of the Tennessee Self-Concept Scale (the published mean for this scale is 54.4, Fitts, 1964). The difference in score patterns for the two scales implies that they are measuring different constructs, as the discrepancy was apparent for the subject group as a whole, and for both the student samples. The Denial subscale of the MMPI was slightly elevated when compared to the original Little and Fisher (1958) score means (see Table 9).

**Reliability and factor analysis.** The reliability of the refined positive illusions measure (PIS 17) appeared to be high. With the less reliable items removed thereby leaving a 17-item scale, the alpha coefficient was reported at .84, an increase from .80 for the 28-item draft scale. Test-retest administrations showed that there was no significant difference between scores taken at Time 1, and those for Time Point 3 (the PIS was not administered at Time 2 as only Times 1 and 3 were invigilated, which was considered important for a new scale) the standard deviations for Times 1 and 3 were similar, showing that the general score pattern and not just the means, were similar at the two times of testing.

The four categories of positive illusion usage proposed in Study 2 (“Downgrading Negative Information”; “Exaggerated Perceptions of Control”; “Unrealistic Optimism for the Future”; and “Unrealistically Positive Self-Evaluations”) were not directly reflected in the data. Rather, a 2-factor structure was the best representation of the data. The two factors appeared to represent logical groups of items reflective of the Positive Illusions construct: the first factor, termed “Optimistic Internal Locus of Control” - indicated personal agency and connection to positive outcomes and the second: “Positive Response to Adversity” – which reflected the “Downgrading of the Negative” concept. Factor analysis for this scale showed two clear factors with no overlapping items: A Cronbach’s alpha value of .84 was obtained for Factor 1 and an alpha value of .77 for Factor 2.

**Concurrent validity.** The data indicated that the Defensive Positive subscale of the Tennessee Self-Concept Scale was an adequate comparison for concurrent validity. The 17-item version of the Positive Illusion Scale correlated with the DP scale at .60 ( $p > .01$ ); and the DP

subscale showed an approximately similar pattern of correlations with other clinical scales as it did to the PIS, for instance correlating at .36 with Dn, and .36 with K and .45 with the L scales of the MMPI ( $p > .01$ ). Given that there are no direct comparison instruments available, at this stage of the concept's development it seemed that the concurrent validity of the Positive Illusion Scale was satisfactory - as far as could be determined.

**Correlations.** As predicted by the first Hypothesis, the PIS scale correlated negatively with depression ( $p < .01$ ). The PIS17 and the BDI shared about 30% of score variance, indicating a significant association between the constructs. The correlation between the PIS and the SEI ( $p < .01$ ), showed that positive illusions and self-esteem have an important relationship, sharing 46% of score variance (for the 17-item PIS version).

Correlations between PIS scores and the measure of denial and defensiveness were significant for the PIS scale. A similar result was shown with the K scale of the MMPI for the 17-item PIS scale. In this study, the PIS did not show a significant correlation between endorsement of PIS strategies and mania symptoms; in fact, the correlation was close to zero.

The BAI showed a negative correlation with the PIS measure. This indicates that the use of positive illusion strategies may also provide some protection against the development of anxiety states, although the relationship was not as strong as it was with depression. The DP subscale of the TSCS was used as a check on concurrent validity for the new PIS scale. The level of association with the DP subscale indicated some concurrent validation for the PIS. These results provided support for the first experimental hypothesis.

Scores for depression on the BDI showed a significant negative correlation with scores on the SEI implying that depression does not tend to coexist with a high level of self-esteem - rather, the reverse. Depression and self-esteem shared approximately 42% of the score variance. Depression scores also correlated negatively with the denial (Dn) scale of the MMPI. During this study, scores on the BDI again showed a significant positive correlation with the SRMI. This implies that in this non-clinical population at least, symptoms of mania and depression tend to be co-existent and may be a joint expression of distress in some participants. Mania as measured by the SRMI showed significant negative correlations with the K scale of the MMPI, although the relationship only accounted for about 12% of score variance. SRMI scores showed a modest negative correlation with the SEI, which is supportive of this population's experience of manic symptoms as appearing negatively related to well-being. Mania scores were negatively related to the tendency to fake good as measured by the Lie scale of the MMPI.

There was a significant positive correlation between the SEI scores and those on the denial subscale of the MMPI. Defensiveness as measured by K, also showed a positive correlation with self-esteem. Both were at the  $p < .01$  level. Denial and defensiveness were positively related, and the constructs shared about 58% of the variance.

The pattern of correlations for the DP subscale was similar in pattern to that displayed by the PIS measure: negative correlations with the depression and anxiety scores, and positive correlations with denial, defensiveness, and self-esteem scores. The correlation with manic symptoms was negative, but at a low level.

**Self-esteem stability and PIS.** The absolute level of self-esteem in this population showed only a low correlation with the level of variability in self-esteem, indicating that the two phenomena may indeed be distinct from each other. Correlations between self-esteem stability and depression, and self-esteem stability and anxiety were at significant levels, but were not found between PIS and self-esteem variability as had been predicted by Hypothesis 3.

**Conclusions.** The second phase of testing fulfilled its aim of refining a measure for positive illusions which is reliable and stable over time, with good concurrent validity. The 2-factor structure of the PIS appeared to reflect closely Snyder's (1989) model of positive illusions as performing: (a) the maximisation of perceived personal connection to positive outcomes and (b) the rejection of negative information.

This study's analyses showed that positive illusions demonstrated stable relationships with denial, defensiveness, depression, anxiety and self-esteem. However, the strongest and most consistent links were evident between positive illusions and depression and self-esteem.

The relationship between self-esteem and depression is already well researched and in this study, only self-esteem and positive illusions, amongst all of the measures used, acted as independent significant predictors of depression. However, hierarchical regression indicated that self-esteem scores and positive illusion scores may either overlap or interact as predictors of depression.

**Directions for the next phase of testing.** The design of the next study incorporated the use of neuroticism and attributional style measures together with the repeated testing of depressive symptoms and the inclusion of a naturally occurring stressor to answer three major questions concerning the positive illusion concept that have so far remained unanswered.

First, the third study examined the extent to which positive illusions overlap with neuroticism and attributional style. 'Neurotic' is often conceptualised as describing the reverse to 'stable' or 'robust', and so it was thought important to establish whether illusions have a distinct role in self-concept maintenance, or whether they are merely part of a larger scale 'setting' factor, such as neuroticism. This study's model predicts that attributions form one part of a greater set of strategies that are informed by positive illusion-style beliefs. If this is so, illusions should maintain more consistent relationships with related constructs, and demonstrate greater and more stable predictive power over outcome measures.

Second, Study 3 examined the relationship over time, between illusions and depression. While Study 2 found that high levels of illusions appeared to be positively associated with self-esteem and negatively associated with depression, the optimum level at which positive illusions may operate over time is not yet known regarding outcomes for depression. Finally, the study analysed the impact of positive illusions on depressive symptoms following the experience of a naturally occurring negative life event (i.e., an exam).

## CHAPTER 7: Study 3A. Positive Illusions, Depression, Neuroticism and Attributional Style.

**Introduction and Overview of Study 3A and Study 3B.** Study 2 confirmed that the construct of positive illusions is one that is internally consistent and can be distinguished from other constructs. The revised (17-item) Positive Illusions Scale (PIS-17) was found to be highly reliable and stable on test-retest. The PIS-17 demonstrated good concurrent validity with the Defensive Positive scale of the Tennessee Self-Concept Scale. Scores on the revised PIS scale again correlated positively (albeit weakly to moderately) with denial, defensiveness and self-esteem. Correlations between positive illusions scores and both anxiety and depression were negative as predicted, and, again as predicted, the largest correlation coefficients were found in relation to depression and self-esteem levels. Positive illusion scores at Time 1 predicted 30% of the variance of depression scores at Time 1, and PIS scores at Time 1 accounted for 31% of the self-esteem score variance at Time 3. Positive illusion scores were positively related to the stability of self-esteem, and though life events alone did not seem to have a clear relationship with positive illusions, participants' outcomes were much poorer if they experienced negative life events and they did *not* have high PIS scores. So far, the work has demonstrated that the higher the level of positive illusions, the lower the scores are for depression, self-esteem and anxiety.

The work so far has not explored whether participants with higher positive illusions scores at Time 1 predict significantly lower levels of depression at a future time point, or better adjustment after the occurrence of an intervening stressor. Additionally, for participants with lower initial scores for depression, it has not been shown whether high positive illusion levels would act to maintain the stability of positive affective states over time, and in the face of intervening stressors.

Although positive illusions have demonstrated relationships (but not complete overlap of constructs) with denial, defensiveness and the Defensive Positive subscale of the Tennessee Self-Concept Scale, it is not yet known to what degree positive illusions might overlap or be subsumed by the concepts of neuroticism and attributional style (Robins & Hayes, 1995).

### **Aims for Study 3: Part A**

There were two parts to this final Study. Study 3A addressed confirmatory factor analysis for the 17-item PIS and further issues of construct validity, while Study 3B examined longitudinal issues. In Part A, the first aim was to ascertain whether the factor analysis in Study 2 could be replicated in a further group of participants, thus further testing the integrity of the PIS. The intention was to investigate the factor structure again, and further refine the scale if indicated. The second aim was to examine whether the PIS correlated negatively with a measure of neuroticism and continuous measures of both depression and anxiety, and whether it correlated positively with a positive attributional style. Study 3A examined issues at one time point – Time 1 – only.

In the literature review to this set of studies, it was considered important to investigate background or “setting” factors that could influence the formation of a positive illusion belief structure. A major possible such factor was identified as neuroticism. Neuroticism has been found to be strongly related to negative affect, anxiety, and depression (Andrews, Morris-Yates, Holt, & Henderson, 1990; Hettema, Neale, Myers, Prescott, & Kendler, 2006). However, this study proposed that neuroticism, while showing a negative and predictive relationship to PIS, would still contribute independent variance.

A positive attributional style was also described in the literature review to be one of the factors related to positive illusions (Kamen & Seligman, 1987; Robins & Hayes, 1995). The review conceptualised positive attributional style as one of many viable strategies employed by people who harbour positive illusions. If positive attributional style is a construct related to positive illusions, this would predict a positive association between the scores for positive illusions and attributions. However, since both the reliability and predictive power of attributional style has been criticised, this study predicts that positive illusions scores will predict a greater proportion of the scores for outcome measures than attributional style (Cutrona, Russell, & Jones, 1984). Scales were administered at a further two time points in Study 3 in Part B of the study: enabling further investigation into the predictive power of positive illusions upon depression and anxiety scores over time.

### **Hypotheses: Part A**

1. Positive illusion scores will significantly predict scores for depression within a cross-sectional timeframe (Time 1).
2. Positive illusion scores will show predictive value over depression scores above the contribution made by scores for neuroticism within a cross-sectional timeframe (Time

3. Positive illusion scores will act as a more powerful cross-sectional predictor of depression scores than scores of attributional style (ASQ: Peterson, Semmel, Von Baeyer, Abramson, Metalsky, & Seligman, 1982).
4. Interactions between positive illusion scores and self-esteem scores will predict scores for depression at Time 1.
5. Interactions between positive illusion scores, self-esteem scores, and life event distress scores will predict scores for depression at Time 1.

## Participants

Two groups of participants were recruited. The first comprised 51 first year undergraduates (33 females and 18 males) from The University of Melbourne with a mean age of 20.21 years ( $SD = 1.26$  years). This group was paid \$5 per hour, and those completing the entire test series were eligible to enter a prize draw with a \$150 restaurant voucher as the prize. This group was tested at Time 1, 5 weeks before their end of second-year exams; at Time 2, 2 weeks later; and at Time 3, immediately upon completing their set of exams.

The specific request for first-year volunteers yielded lower numbers than expected, with the 51 participants in this group insufficient for the analyses to be conducted, and a second group was therefore recruited via further posters on faculty noticeboards. This group comprised 105 undergraduates from all year levels. Their mean age was 21.56 ( $SD = 3.45$  years), with 63 females and 42 males. This group was subject to the same test time schedule as the first group. All participants gave their informed, written consent before participating; none was aged under 18 years.

At Time 1, independent *t*-tests found no significant differences between the two subgroups of participants on the PIS, BDI, BAI, Coopersmith Self-Esteem Inventory (SEI; Coopersmith, 1967), NEO Personality Inventory-Revised (NEO-PI-R; Costa & McCrae, 1985), and Attributional Style Questionnaire “Good” measures ( $p$ 's = .23 to .96). There was a trend ( $p = .07$ ) for Subgroup 2 members to obtain higher ASQ “Bad” scores than Subgroup 1 members but this was not significant. For the Life Events Inventory (LEI; Tennant & Andrews, 1976) “Distress” and “Life Change” measures, Subgroup 1 members obtained slightly higher scores than Subgroup 2 members ( $p = .05$  and  $.01$ , respectively). In view of these findings, the scores for all measures for the two subgroups were collapsed into total group scores. Despite this, both of the LEI scores need to be interpreted with some caution in view of the possible differences between the two subgroups on the two LEI-derived measures.

## Procedure

Participants were recruited by A4 and A3 posters placed on public noticeboards inside faculty buildings, and on fly-posting pillars across the campus. Participants attended one of the six scheduled test sessions (for each group) where they were administered the battery of 8 test questionnaires. The initial test battery comprised the LEI, “Questions About You and Your Studies”, the ASQ, the NEO PI-R, the SEI, the PIS, the BDI, and the BAI. Table 1 below, indicates the test schedule (although this Chapter is only concerned with Time 1 data).

Table 1

### *Measurement at Time Points*

	Time 1	Time 2	Time 3
Depression			
Anxiety			
Self-Esteem			
Neuroticism			
Positive Illusions			
Negative Life Events			
Attributional Style			
Self Critical Cognition			

Test sets were presented in a randomised order to minimise order effects in test responses. Completion of each test set was preceded by the signing of a consent form. Written instructions were provided, and the instructions were verbally reiterated by the experimenter at the beginning of test sessions. After completing the third test battery, participants were given debriefing sheets that explained the aims of the study in lay terms (see Appendix A7 and A8 for instructions and debriefing sheets). Participants were invited to make further enquiries of the experimenter if they wished. The first battery took between 30 and 65 minutes to complete, with the average completion time being 45 minutes. The second battery took between 10 and 35 minutes to complete, with an average time of 20 minutes. The third set took between 15 and 45 minutes to complete, with the average completion time being 35 minutes.

**Clinical measures.** Self-report scales were used to measure symptoms of depression and anxiety. As in Study 2, the BDI and the BAI were used to measure the levels of depression and

anxiety symptoms, respectively. The LEI (Tennant & Andrews, 1976) was again used to measure “Life Change” and “Distress”: scores relating to life events.

As before, the SEI was used to measure self-esteem. As in Study 2, a 10-point scale was used to supplement the authored instrument to elicit in more detail, how ‘Like Me’ or ‘Unlike Me’ the items were. The original version of the Coopersmith was found to have a reliability coefficient of .86 in Study 2 and the version with the 10-point scale, .84.

The Neuroticism Scale of the NEO PI-R (Costa & McCrae, 1992) was used to measure Neuroticism. The NEO PI-R is an instrument developed for adult populations that measures the traits of Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness. It offers a self-report or an observer-rated form, but the former format was used in this study. The NEO PI-R’s items were derived from a combination of rational method and factor analysis. Internal consistency for the Neuroticism scale (Form S) is reported at .92. Comparable coefficients have been reported across gender (McCrae & Costa, 1983a) and amongst college populations (Piedmont, McCrae, & Costa, 1992). The NEO PI-R was chosen for its reliability, and the six constituent ‘facet’ scales that it offers for the neuroticism dimension. These are N1 – Anxiety, N2 – Angry Hostility, N3 – Depression, N4 – Self-Consciousness, N5 – impulsiveness, and N6 – Vulnerability. Alpha coefficients for these were reported by Costa and McCrae (1992) as .78, .75, .81, .68, .70, and .77, respectively. McCrae and Costa (1983a) reported test-retest reliability for the N scale as .87, and a study using a 6-year test-retest design quoted a stability coefficient of above .68 for the N scale (Costa & McCrae, 1988b). External validity studies have been reported for the NEO PI-R: Adjective-based studies by McCrae and Costa (1985b, 1987), John (1983) and McCrae (1990b) reported satisfactory external and discriminant validity; however, in the present study, only the total score was used.

The revised version of the PIS (28 items) was used to measure the positive illusion construct. The overall alpha for this scale was found to be .86 in Study 2. Test-retest reliability was measured at .78 and the correlation between the (28-item) PIS and the Defensive-Positive (DP) - Subscale of the Tennessee Self-Concept Scale was .64.

The ASQ (Peterson et al., 1982) was used, as attributional style has been a major focus of investigation into depression. Peterson et al. developed the ASQ following the reformulation of the learned helplessness model (Abramson, Seligman, & Teasdale, 1978). In this model, internality, stability and globality are postulated as being important dimensions of perceived causality for events, these in turn being instrumental in contributing to vulnerability to depression. Peterson et al. developed a questionnaire with 12 items describing six ‘good’ events, and six

'bad'. Participants are asked to make their own attribution for each event, and then rate this on a 7-point scale indicating internality, stability and globality. This format was intended to enable the participants to identify their own attributions, but to combine this with a rating on the three dimensions. Peterson et al. reported the alpha coefficients for 'good' events at .75, and 'bad' events, at .72. When divided into Good/Bad for each of the internality, stability, and globality dimensions, the six subscales showed alpha coefficients ranging from .44 (good/global) to .69 (bad/global).

**Data Analyses.** Factor analysis was used to describe the factor structure of the PIS, which was compared with the structure proposed by the literature (Taylor & Brown, 1988). The reliability of the (28-item) PIS was tested using Cronbach's alpha and item-total correlations to measure the consistency and cohesion of the scale. The relationship between positive illusions and the other relevant clinical scales was tested using Pearson product-moment correlations and multiple regressions (Hypotheses 1-5).

## **Ethical Issues**

Participants completed a standard University of Melbourne consent form designed for experiments using human participants. Signed consent forms were kept in a locked filing cabinet, separate from the data sets, which were marked by serial numbers. In accordance with NH & MRC guidelines, the sets will be kept for 5 years, post-publication of any results. During this time the only access granted to persons other than the investigators, will be for the purposes of checking replicability or ethical procedures. As in the previous study phase, there was an issue regarding confidentiality. With the collection of information on depressive symptoms, there was the potential for high scores to be noticed before the separation of identifying information on the consent forms. Concern for an individual may then have meant a breach of the confidentiality promised by the study. As approved by the Ethics Committee, this was resolved by adopting a policy of no intervention unless clear indications of suicidality were presented in a data set. Suicidality was gauged in terms of an endorsement of Item 9 on the BDI as either "I would like to kill myself" or "I would kill myself if I had the chance" or by any clearly suicidal self-generated comments on the other response sets.

The instructions informed participants that the surveys measured feelings and coping styles, and reminded students of the support services available to those in the University community experiencing stress, low mood, or difficulty coping. One of the participants endorsed Item 9 on the BDI at Time 1 as "I would kill myself if I had the chance". The participant also made suicidal comments on their attribution responses for the ASQ. The participant's nominated phone number

was used to contact them; however, this was a company listing and the company records did not show the participant's name. A letter was written to the participant's contact address noting that they had put their full name on the data sets instead of initials, and had made some comments indicating that they had experienced some particularly negative life events. The participant was invited to contact one of the experimenters via telephone or visit to the office, and was recommended to the counselling service. The participant did not in fact contact the experimenters. However, it should be noted that at Time 3, this participant recorded the opinion that their exam results had been *better* than expected, and so it is possible that their distress level had dissipated by this time.

## **Part A Results**

The results in this section are set out under various headings to assist the reader. The headings of "Factor Analysis" and "Reliability for the PIS Scale" introduce factor analyses and reliability studies. Under the heading of "Descriptive Statistics", the means, standard deviations, standard errors, skewness and kurtosis statistics are introduced for the various measures at Time 1. Under this heading, there is also a description of the removal of outliers and the transformations applied to the data at Time 1. The heading of "Correlations" introduces Pearson's correlations and canonical correlations. The final section labelled "Regressions" introduces the regression analyses that were used to test the experimental hypotheses.

### **Factor Analysis**

*Data screening.* The PIS was again screened for reliability issues. Table 2 shows the descriptive statistics for the 28 PIS items. None of the items showed a category value of above 70%, suggesting that there was meaningful variation in categories. The number of missing values was very small. The total data includes 141 cases. Due to list-wise deletion, 6 cases were deleted.

Table 2

*Descriptive Statistics: PIS Scale*

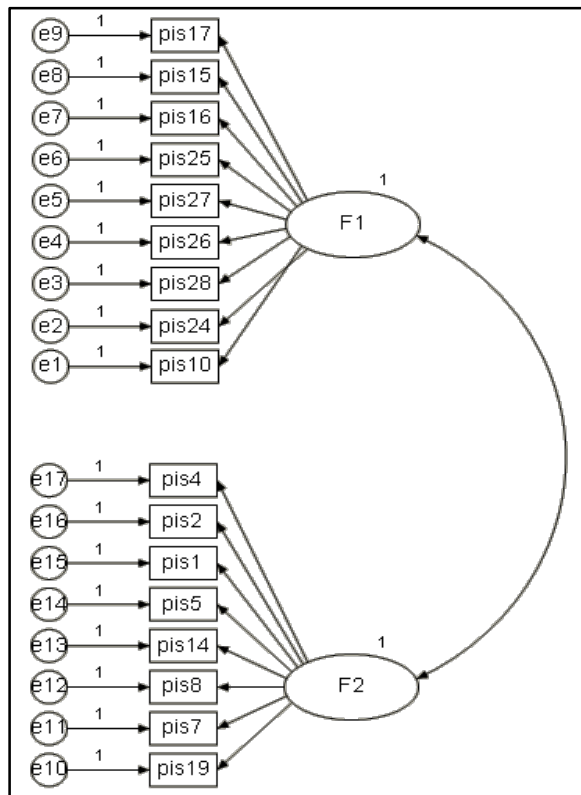
Item	n	Missing	Mean	Median	Min	Max	1	2	3	4
							Count	Count	Count	Count
pis1	140	1	2.41	2.00	1	4	27	48	45	20
pis2	139	2	2.89	3.00	1	4	9	31	65	34
pis3	139	2	2.09	2.00	1	4	34	70	23	12
pis4	140	1	2.91	3.00	1	4	10	33	57	40
pis5	140	1	2.29	2.00	1	4	23	67	36	14
pis6	140	1	1.55	1.00	1	4	72	61	5	2
pis7	140	1	2.85	3.00	1	4	15	30	56	39
pis8	140	1	2.06	2.00	1	4	48	48	31	13
pis9	140	1	1.96	2.00	1	4	38	72	28	2
pis10	140	1	1.96	2.00	1	4	35	78	24	3
pis11	140	1	2.12	2.00	1	4	37	58	36	9
pis12	140	1	2.09	2.00	1	4	30	71	35	4
pis13	140	1	2.54	3.00	1	4	20	46	52	22
pis14	140	1	3.01	3.00	1	4	8	27	60	45
pis15	140	1	2.29	2.00	1	4	25	64	37	14
pis16	140	1	2.13	2.00	1	4	43	49	35	13
pis17	139	2	2.11	2.00	1	4	32	66	35	6
pis18	139	2	2.14	2.00	1	4	29	69	33	8
pis19	140	1	1.79	2.00	1	4	48	78	9	5
pis20	139	2	1.99	2.00	1	4	35	78	19	7
pis21	140	1	2.14	2.00	1	4	40	56	29	15
pis22	140	1	2.15	2.00	1	4	30	68	33	9
pis23	140	1	1.64	2.00	1	4	63	66	9	2
pis24	139	2	2.39	2.00	1	4	28	50	40	21
pis25	140	1	2.06	2.00	1	4	38	62	33	7
pis26	140	1	2.27	2.00	1	4	26	54	56	4
pis27	140	1	2.16	2.00	1	4	22	78	36	4
pis28	140	1	1.72	2.00	1	4	60	62	15	3

To identify outliers the Mahalanobis distance was calculated for each case. The critical value of Mahalanobis distance with  $df = 28$  at .001 was 56.9. Only one case had a value larger than critical and this case (number 125) had a value of 62.48. As the sample size was moderately

large and the value was not significantly above 56.90, the exceeded value was retained for ease of replicability, so that a future investigation may be run both with and without this outlying case, to determine whether the findings would vary without its inclusion.

**Confirmatory factor analysis.** First, though, a confirmatory factor analysis (CFA) was run using the two factors and 17 items specified in Study 2, as the study was now dealing with a more developed model. Note that these 17 items are a subset of the 28 items shown in Table 2. Cases with missing values were deleted listwise, resulting in 135 cases included in the analysis. Figure 1 illustrates the hypothesised model. The observed variables are represented by squares in the diagram and unobserved (latent) variables represented by ovals. There were a total of 19 latent variables in the diagram: two representing the factors of interest and 17 additional variables (here labelled ‘e’) representing measurement error specific to each of the observed variables.

**Figure 1.** Confirmatory Factor Analysis for the 17-Item PIS



The 17 PIS items are also similarly numbered in Table 2 of this chapter. Factor 1 from Study 2 included items illustrative of *feelings of control and agency*, for example, making one’s own good luck (Item 15), being able to change bad situations into good ones – also illustrative of *optimistic agency* such as being more likely than most people to achieve goals in the future (Item 17), being more likely than friends to have desired things in the future (Item 26), and making

confident plans for the future (Item 16). Factor 2 on the other hand, featured items which are descriptive of *positive responses to adversity* such as forgetting failure quickly (Item 4), writing off one's bad behaviours (Item 5), not becoming upset over mistakes (Item 2), and not taking criticism to heart (Item 14). Given this structure, it was expected that Factor 1 would incorporate PIS items 17, 15, 16, 25, 27, 26, 28, 24, and 10; and Factor 2, the remaining 8 items.

Results from the CFA indicated lack-of fit of the hypothesised model (chi-square = 197.75,  $df = 118, p < 0.00$ ). The model fit was less than 5 (CMIN/DF) indicating a mediocre model fit (Hu & Bentler, 1999) and the  $p$  value was less than .05. The RMSEA value of 0.07<sup>1</sup> is bigger than the value of .05 suggested by Hu and Bentler (1999) and the PCLOSE value is unacceptable at .027 (Detailed output of CFA is presented in Tables 1 to 6, Appendix C).

It means that it was not possible to replicate the factor structure obtained in Study 2 for the different sample of individuals collected in Study 3. One of the possible reasons might be the large significant correlation between the two factors ( $r = .69, p < .00$ ). Other details of the CFA are shown in Tables 2-5 in Appendix C. Of interest is the poor fit of PIS item 24 shown in those tables in Appendix C). Although Modification Indices are provided in Appendix C6, it was decided not to pursue this investigation any further. Because the hypothesised factor structure could not be confirmed exactly as stated, the next step was to perform exploratory factor analysis on the full 28 items of the PIS shown in Table 2 (EFA).

**Exploratory factor analysis.** In EFA, 135 cases and the full 28 items of the PIS were used (See Table 2 in this chapter). An examination of the Kaiser-Meyer-Olkin Measure of Sampling Adequacy showed a value of .76. Based on the recommendations of Kaiser (1981), this represents a 'middling' correlation matrix for employing factor analysis. Bartlett's Test of Sphericity also suggested that the null hypothesis of zero correlation among items should be rejected (chi-square = 1121.82,  $df = 378, p < 0.00$ ). This suggests that there is enough common variance in the items and substantial level of correlation between items to perform factor analysis.

Following the factor analysis procedure employed in Study 2, the maximum likelihood extraction method was employed. The following tests were applied for factor extraction: the *eigenvalues over 1* rule, MAP and parallel tests. The *eigenvalues over 1* rule suggested nine factors (see Table 3). It is well known that this rule tends to suggest too many factors (Everitt & Dunn, 1991).

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<sup>1</sup> Good fit is indicated by a chi-square close to 0 and  $RMSEA < 0.05$  (Hu & Bentler, 1999).

Table 3.

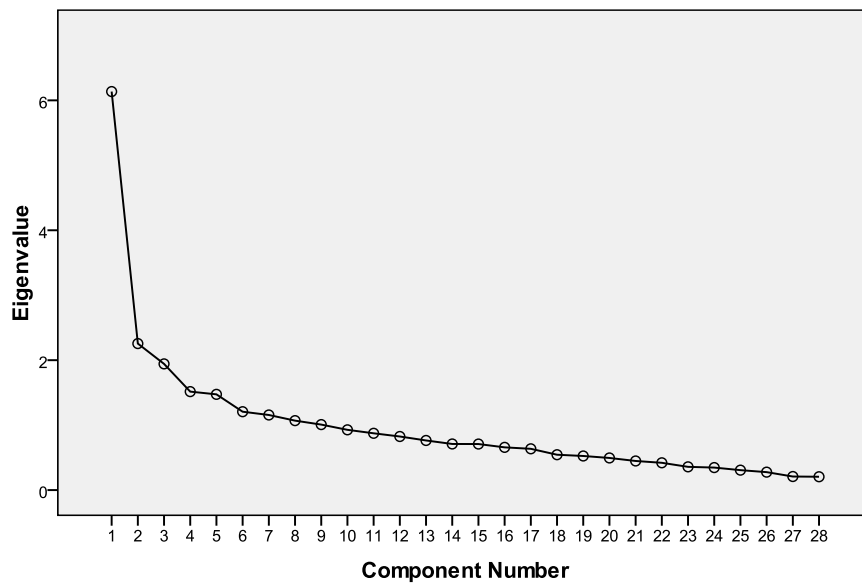
*Factor Extraction for 28-Item Positive Illusion Scale*

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.14	21.91	21.91	6.14	21.91	21.91	4.58	16.35	16.35
2	2.26	8.06	29.97	2.26	8.06	29.97	2.88	10.27	26.62
3	1.94	6.94	36.91	1.94	6.94	36.91	1.71	6.10	32.71
4	1.52	5.41	42.32	1.52	5.41	42.32	1.57	5.62	38.33
5	1.47	5.26	47.59	1.47	5.26	47.59	1.54	5.49	43.82
6	1.21	4.31	51.89	1.21	4.31	51.89	1.52	5.44	49.26
7	1.16	4.13	56.02	1.16	4.13	56.02	1.40	5.00	54.27
8	1.07	3.82	59.84	1.07	3.82	59.84	1.32	4.70	58.97
9	1.01	3.60	63.44	1.01	3.60	63.44	1.25	4.48	63.44
10	.93	3.31	66.76						
11	.87	3.12	69.88						
12	.83	2.95	72.82						
13	.76	2.73	75.55						
14	.71	2.54	78.09						
15	.71	2.54	80.62						
16	.66	2.35	82.97						
17	.64	2.27	85.24						
18	.54	1.94	87.18						
19	.53	1.88	89.06						
20	.50	1.77	90.82						
21	.45	1.60	92.42						
22	.42	1.50	93.92						
23	.36	1.28	95.20						
24	.35	1.24	96.44						
25	.31	1.10	97.54						
26	.28	.99	98.52						
27	.21	.75	99.27						
28	.21	.73	100.00						

The Scree plot (Figure 2) shows one major component followed by smaller second, third and fourth components, which are then followed by a plateau in variance accounted for by the model. This probably suggests four factors. However, an argument could be made that it

suggests two factors given the significant drop in eigenvalues between the first two factors, compared with the factors that follow.

**Figure 2.** Scree Plot for the 28-PIS item Analysis



The parallel test (Table 4) and the MAP test (Figure 3) suggested three factors. In the parallel test, we choose the number of factors that correspond to the eigenvalue in the data greater than the 95th percentile or random data.

**Figure 3.** Map Test for 28-Item PIS (Only Shown Up to 10)

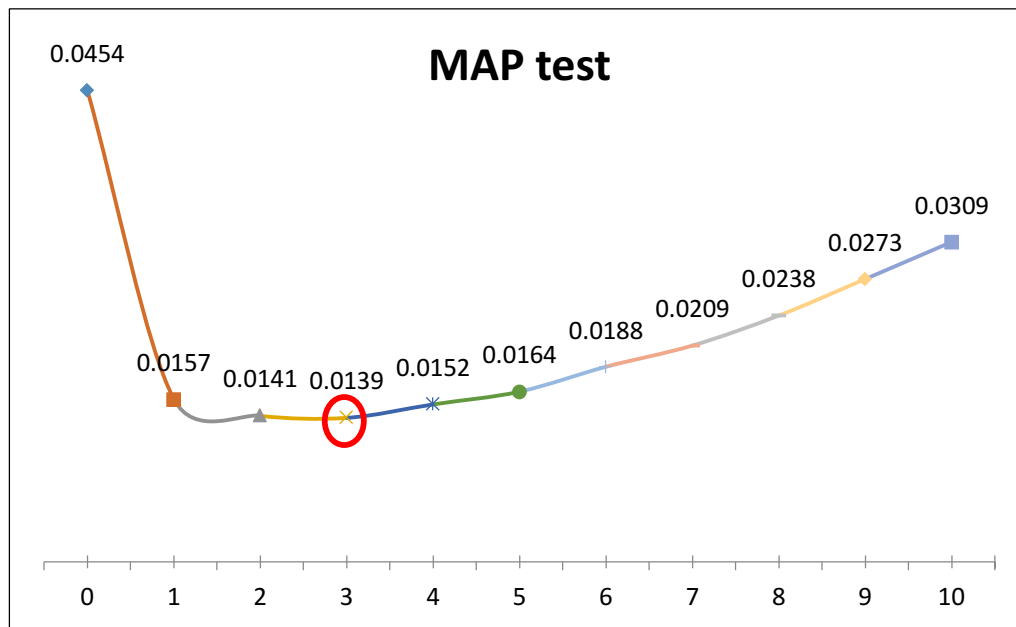


Table 4.

*Parallel Test for 28-Item PIS (only shown for up to 15 Roots)*

Root	Means	95%	Actual Data
1	2.08	2.23	6.14
2	1.91	2.03	2.26
3	1.78	1.87	1.94
4	1.67	1.76	1.52
5	1.57	1.65	1.47
6	1.49	1.56	1.21
7	1.41	1.48	1.16
8	1.33	1.39	1.07
9	1.26	1.32	1.01
10	1.19	1.25	0.93
11	1.13	1.19	0.87
12	1.07	1.12	0.82
13	1.01	1.06	0.76
14	0.95	1.00	0.71
15	0.89	0.95	0.71

In MAP tests, we choose the number of factors that corresponds to the minimum average partial correlation (Everitt & Dunn, 1991). Two axes in Figure 3 above are used to illustrate the size of the loadings.

Integrating the above recommendations, a solution to extract three factors appeared to be desirable. On this basis, analysis proceeded, extracting three factors using maximum likelihood method. Given that factors were likely to be correlated, Promax rotation was selected. For ease

of representation, correlations of 0.25 or less were excluded from the printout, as correlations of less than 0.25 were deemed not to be robust enough to be meaningful.

First, we looked at communalities for each item (see Table 5). Items 3, 6, 9, 12, 18, 21 had extracted communalities less than 0.1. These items are all potential candidates for deletion as they are not well reflected in the factor structure. The pattern matrix (see Table 6) confirmed that items 3, 6, 9, 12, 18, 21 were not well represented in the common factor structure (i.e., loadings less than 0.25).

Therefore, the factor analysis was then re-run with the same setting but without the six deleted items and specifying three factors (It is worth noting that items 3, 12, 18, 21 were also deleted in Study 2 on the same premises). The KMO MSA factorability for three-factor structure without the six deleted items improved (0.82). The loadings in the pattern matrix were above 0.40 with items 19, 25, 15, 8, and 5 showing cross-loadings between 0.26 and 0.34 (See Table 7).

Table 5.

*Communalities for 28 PIS Items*

Item	Initial	Extraction
pis1	.353	.321
pis2	.348	.173
pis3	.232	.085
pis4	.411	.321
pis5	.333	.319
pis7	.382	.221
pis8	.516	.434
pis9	.301	.076
pis10	.484	.409
pis11	.391	.339
pis13	.542	.550
pis14	.400	.364
pis15	.378	.313
pis16	.400	.316
pis17	.629	.534
pis18	.233	.069
pis19	.512	.476
pis20	.394	.193
pis22	.389	.260
pis23	.434	.300
pis24	.340	.130
pis25	.525	.442
pis26	.599	.585
pis27	.582	.569
pis28	.527	.369
pis6	.348	.056
pis12	.281	.082
pis21	.229	.026

*Note.* Extraction Method: Maximum Likelihood.

Table 6.

*Pattern Matrix: 28-PIS items and 3 Factors*

Item	Factor		
	1	2	3
pis26	.762		
pis27	.746		
pis17	.699		
pis10	.642		
pis16	.576		
pis19	.552		.318
pis23	.523		
pis25	.507		.276
pis28	.487		
pis24	.432		
pis15	.404		.281
pis9			
pis21			
pis13		.759	
pis14		.610	
pis4		.534	
pis7		.503	
pis8		.491	.371
pis1		.473	
pis2		.441	
pis5	.267	.414	-.298
pis22			.494
pis20			.472
pis11			.462
pis3			
pis18			
pis6			
pis12			

*Note.* Extraction Method: Maximum Likelihood; Rotation Method: Promax with Kaiser Normalization.

Table 7.

*Pattern Matrix for 22 PIS Items and 3 Factors*

Item	Factor		
	1	2	3
pis26	.781		
pis27	.735		
pis17	.725		
pis10	.654		
pis16	.595		
pis19	.552		.283
pis23	.526		
pis25	.496		.307
pis28	.485		
pis24	.410		
pis15	.398		.299
pis13		.783	
pis14		.628	
pis4		.542	
pis7		.505	
pis8		.496	.341
pis1		.475	
pis2		.423	
pis5	.256	.404	-.286
pis20			.533
pis22			.515
pis11			.420

*Note.* Extraction Method: Maximum Likelihood; Rotation Method: Promax with Kaiser Normalisation; <sup>a</sup> Rotation converged in 4 iterations.

MAP and Parallel tests were then run to investigate more thoroughly, whether three factors were still recommended in the model. This was done for two reasons: First, because in the pattern matrix, some items across three factors had cross-loadings above 0.26; and second, because six

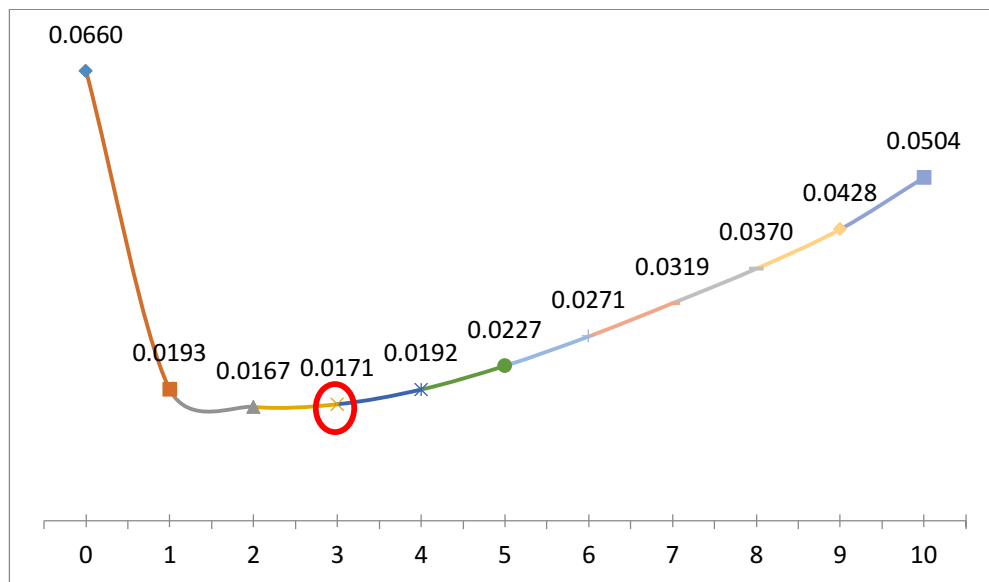
items were deleted from the analysis. Both Parallel and MAP tests shifted to recommending two factors. Results of Parallel and MAP tests are presented in Table 8 and Figure 4.

Table 8.

*Parallel Test for 22-Item PIS (only shown for up to 15 Root - Items 3, 6, 9, 12, 18, 21 Deleted).*

Root	Means	95%	Data
1	2.08	2.23	5.97
2	1.91	2.03	2.13
3	1.78	1.87	1.77
4	1.67	1.76	1.20
5	1.57	1.65	1.12
6	1.49	1.56	1.01
7	1.41	1.48	0.88
8	1.33	1.39	0.85
9	1.26	1.32	0.82
10	1.19	1.25	0.75
11	1.13	1.19	0.68
12	1.07	1.12	0.67
13	1.01	1.06	0.64
14	0.95	1.00	0.55
15	0.89	0.95	0.53

**Figure 4.** MAP Test for 22-Item PIS (Only Shown up to 10)



In the parallel tests, we chose the number of factors that correspond to the eigenvalue in the data greater than the 95th percentile or random data. In MAP tests, we chose the number of factors that corresponds to the minimum average partial correlation (Everitt & Dunn, 1991). Two axes in Figure 4, above, are used to illustrate the size of the loadings.

Based on the MAP and parallel tests results, a factor analysis was then re-run with two factors using the same settings as above (Maximum likelihood extraction, Promax rotation with option not to print correlations of 0.25 or less). The pattern matrix is shown in Table 9.

Table 9.

*Pattern Matrix for 22 PIS Items and 2 Factors*

Item	Factor	
	1	2
pis17	.748	
pis26	.691	
pis27	.674	
pis19	.645	
pis16	.634	
pis10	.630	
pis25	.603	
pis23	.549	
pis28	.534	
pis15	.501	
pis24	.366	
pis11	.348	
pis22		
pis20		
pis13		.794
pis14		.646
pis8		.544
pis7		.520
pis4		.476
pis1		.466
pis2		.425
pis5		.321

*Note.* Extraction Method: Maximum Likelihood; Rotation Method: Promax with Kaiser Normalization; a Rotation converged in 3 iterations.

The KMO MSA factorability for two-factor structure remained the same (0.82) but there were no cross-loadings and all loadings were above .03 except for items 20 and 22 (Table 9). These two items were therefore removed from the analysis as their loadings were less than .25. The factors were correlated at ( $r = 0.51$ ).

## Reliability

Results of reliability analysis suggested that reliability for scales for factors 1 and 2 were very good. In particular, for factor 1 Cronbach's alpha for 12 items was 0.85.

Table 10.

*Item-Total Statistics – PIS Factor 1*

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
pis10	22.66	30.53	.57	.85
pis11	22.51	31.05	.38	.84
pis15	22.33	30.26	.47	.83
pis16	22.50	29.24	.52	.83
pis17	22.52	29.08	.67	.82
pis19	22.84	30.28	.60	.83
pis23	22.99	31.51	.48	.83
pis24	22.24	32.14	.22	.86
pis25	22.57	29.51	.58	.83
pis26	22.36	29.86	.58	.83
pis27	22.47	29.93	.65	.82
pis28	22.90	30.45	.56	.83

However, subsequent investigation of the results in Table 10 suggests that item 24 was weakly correlated with the overall score. The estimated value of alpha if the given item were removed from the model would also increase. Based on the above results, item 24 was omitted. The inter-item correlation matrix for Factor 1 also shows the comparatively lower correlations of item 24 with other items of that factor (see Table 11).

Table 11.

*Inter-Item Correlation Matrix for Factor 1*

Item	pis10	pis11	pis15	pis16	Pis17	Pis19	Pis23	pis24	pis25	pis26	pis27	pis28
pis10	1.000											
pis11	.203	1.000										
pis15	.203	.296	1.000									
pis16	.367	.276	.328	1.000								
pis17	.436	.324	.341	.532	1.000							
pis19	.324	.362	.378	.326	.466	1.000						
pis23	.380	.232	.259	.301	.352	.491	1.000					
pis24	.207	-.010	.130	.180	.210	.168	.024	1.000				
pis25	.352	.305	.382	.307	.465	.489	.269	.150	1.000			
pis26	.501	.226	.262	.336	.572	.392	.373	.157	.357	1.000		
pis27	.492	.248	.366	.373	.491	.405	.423	.266	.407	.499	1.000	
pis28	.487	.250	.329	.277	.353	.342	.296	.137	.538	.372	.494	1.000

Cronbach's alpha for the second factor with eight items was 0.79. Table 12 shows the item-total statistics for Factor 2. It can be seen from Table 12 that the corrected item-total correlation between each item and scale was no less than 0.37. Cronbach's alpha would decrease if any of the eight items were deleted.

Table 12.

*Item-Total Statistics – PIS Factor 2*

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
pis1	18.58	15.03	.50	.26	.72
pis2	18.10	16.45	.37	.18	.75
pis4	18.09	15.72	.44	.32	.73
pis5	18.69	16.36	.37	.22	.75
pis7	18.15	15.74	.40	.20	.74
pis8	18.92	15.45	.43	.33	.74
pis13	18.45	14.47	.62	.45	.70
pis14	17.97	15.55	.50	.29	.73

Note.  $p < .01$

Table 13 represents inter-item correlations for Factor 2. Most were in the small to moderate range.

Table 13.  
*Inter-Item Correlation Matrix – PIS Factor 2*

Item	pis1	pis2	pis4	pis5	pis7	pis8	pis13
pis1	-						
pis2	.32	-					
pis4	.34	.24	-				
pis5	.28	.13	.41	-			
pis7	.23	.26	.19	.14	-		
pis8	.29	.25	.08	.19	.26	-	
pis13	.38	.20	.37	.32	.33	.51	-
pis14	.32	.20	.30	.37	.37	.30	.46

*Note.*  $p < .01$

Taking into account results from the reliability analysis, the factor analysis with two factors on 19 items was re-run (see Table 14). Kaiser-Meyer-Olkin Measure of Sampling Adequacy increased to 0.84, indicating that 19 items loaded more clearly onto a two-factor structure. These two factors accounted for 34.66% of the total variance. As can be seen from Table 14, all loadings in pattern matrix were above 0.37 and there were no cross-loadings. The correlation between factors slightly decreased (0.50).

Table 14.

*Pattern Matrix: 19-Item PIS, 2 Factors*

Item	Factor	
	1	2
pis17	.762	
pis26	.723	
pis27	.682	
pis19	.667	
pis16	.642	
pis10	.628	
pis25	.601	
pis23	.547	
pis28	.528	
pis15	.491	
pis11	.381	
pis13		.772
pis14		.645
pis8		.594
pis7		.545
pis4		.476
pis1		.458
pis2		.424
pis5		.374

*Note.* Extraction Method: Maximum Likelihood; Rotation Method: Promax with Kaiser Normalization; <sup>a</sup> Rotation converged in 3 iterations.

For Factor 1 (item 24 removed) it can be seen from Table 15 below that all items were highly correlated with the scale (the smallest correlation now being 0.41) indicating a robust model. The reliability for the scale corresponding to Factor 1 improved: Cronbach's alpha was .86 and the standardised alpha, .86.

Table 15.

*Item-Total Statistics for Factor 1 with Item 24 Removed*

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
pis10	20.30	27.22	.56	.84
pis11	20.14	27.41	.41	.85
pis15	19.97	26.96	.46	.85
pis16	20.12	25.96	.52	.85
pis17	20.15	25.80	.67	.83
pis19	20.47	26.91	.60	.84
pis23	20.62	27.93	.50	.85
pis25	20.20	26.14	.59	.84
pis26	19.99	26.50	.58	.84
pis27	20.10	26.72	.64	.84
pis28	20.54	27.09	.55	.84

Given the high correlation between the two scales, it was meaningful to compute a total reliability for the whole scale. The reliability of overall 19-item PIS scale was acceptable: The Cronbach's alpha was 0.86, and the corrected item-scale correlation shown in Table 16 was quite consistently adequate (above 0.29 for all items except item 2). However, an examination of 'reliability if item deleted' statistics shown in Table 16 indicated that no item could be removed from the total scales in a way that would improve the reliability.

Table 16.

*Item-Total Statistics – Total PIS scale*

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item- Total Correlation	Cronbach's Alpha if Item Deleted
pis1	40.89	64.50	.50	.85
pis2	40.41	68.81	.26	.86
pis4	40.40	67.23	.35	.85
pis5	41.00	67.33	.37	.85
pis7	40.47	67.56	.30	.85
pis8	41.23	64.91	.47	.85
pis10	41.34	66.85	.50	.85
pis11	41.18	66.98	.38	.85
pis13	40.77	65.00	.49	.85
pis14	40.28	66.36	.44	.85
pis15	41.01	66.24	.44	.85
pis16	41.16	66.12	.40	.85
pis17	41.19	64.87	.60	.84
pis19	41.51	66.66	.52	.85
pis23	41.66	67.97	.44	.85
pis25	41.24	65.18	.54	.84
pis26	41.05	65.02	.60	.84
pis27	41.14	65.59	.62	.84
pis28	41.58	66.31	.53	.85

To summarise, the following factors were extracted from the analyses:

*Factor 1:*

Item 10: If I fail, I'll forget it quickly

Item 11: I write off my bad behaviours to experience

Item 15: I make my own "good luck"

Item 16: I have control over what goes right and wrong

Item 17: I am the master of my destiny

Item 19: I can control most of the outcomes in my life

Item 23: I think I am more likely than most people, to achieve what I want in the future

Item 25: There are mostly good things to look forward to

Item 26: I spend a lot of time having daydreams about pleasant events in my future.

Item 27: I think things will improve for me, in the future

Item 28: I think I'm more likely than my friends, to have the things I want in the future

*Factor 2:*

Item 1: I keep up my standards of behaviour consistently

Item 2: I'm happy with my moral standards

- Item 4: I have more good qualities than people around me might realize
- Item 5: I'm especially good at the things that matter
- Item 7: Considering what's going on in my life, my coping is above average
- Item 8: I do not let the things I am no good at, get me down
- Item 13: I do not spend much time thinking about the negative aspects of my personality
- Item 14: When someone I know criticizes me, I do not take it to heart

The factor structure outlined above for the 19-item PIS is quite stable, and it is very similar to the factor structure obtained in Study 2. In Study 2, Factor 1 comprised items 10, 15, 16, 17, 24, 25, 26, 27, and 28. The differences were as follows: two items in Factor 1 (items 23 and 11) were retained in Study 3 but omitted in Study 2; item 24 was deleted in Study 3 (although, in Study 2, this item could also have been deleted as it had a lower item-scale correlation value in reliability analysis); and item 19 shifted from Factor 2 to Factor 1 in Study 3. Given the nature of this item, and the strong correlation between the two factors in both Studies 2 and 3, the factor structure appears stable. Factor 2 in Study 2 both comprised items 1, 2, 4, 5, 7, 8, 14, and 19; the only difference being an additional item (13) being retained in Study 3, and item 19 moving from Factor 2 to Factor 1 in Study 3. The study's original proposal suggested four categories in the positive illusions construct. The obtained factors found in this section more or less represent a combination of the previously-described Categories 1 and 2 found here (i.e., Factor 2) and the previously described Categories 3 and 4 (i.e., Factor 1). (See also Chapter 6 – Study 1).

### **Analysis Performed**

The following variables were considered in Study 3A: the PIS, BDI, BAI, SEI, NEO, LEI Distress, LEI Life Change, ASQ "Bad" scores, and ASQ "Good" scores. Basic descriptive statistics (skewness, min, max, mean, median, etc.) are presented for each variable (see Table 17). Outliers and violation from the normality assumption have been represented using box plots and normal probability plots, respectively (see Appendix C7). Some variables were transformed where required (see Appendix C8).

Table 17.

*Descriptive Statistics – All Clinical Scales*

Variables	n	Mean	Median	Mode	Std. Dev	Skewness			Kurtosis	
						Statistic	Std. Error	Ratio	Statistic	Std. Error
PISsubscale1	139	2.01	2.09	2.18	.51	.21	.20	1.06	-.34	.40
PISsubscale2	139	2.62	2.63	2.50	.55	.05	.20	.29	-.37	.40
PIStotal(PIS19)	138	2.28	2.26	2.47	.45	.21	.20	1.04	-.23	.41
BDI	137	8.55	8.00	4.00	5.47	.65	.20	3.15	-.41	.41
BAI	139	7.86	6.00	6.00	6.34	1.18	.20	5.76	1.51	.40
NEOPIN	140	98.59	99.50	86.00	20.31	-.23	.20	-1.15	.12	.40
SEI	138	62.12	64.005	56.00	20.83	-.21	.20	-1.02	-.90	.41
LEID	141	62.96	55.00	.00	49.50	1.23	.20	6.03	1.85	.40
LEIC	141	101.26	94.00	59.00	62.07	1.05	.20	5.15	2.21	.40
ASQG	140	4.98	5.00	5.00	.79	-.22	.20	-1.11	-.27	.40
ASQB	140	4.48	5.00	4.00	.82	.03	.20	.15	.32	.40
Valid N (listwise)	131									

*Note.* PIS total = Positive Illusions Scale, 19-item version; BDI = Beck Depression Inventory; BAI = Beck Anxiety Inventory; NEOPIN = NEO 'N' scale; SEI = Coopersmith Self-Esteem Inventory; LEID = Life Events Inventory Distress Scale; LEIC = Life Events Inventory Life Change Scale; ASQG = ASQ 'Good' scale; ASQB = ASQ 'Bad' scale.

The Beck Depression and Anxiety variables as well as life event variables (LEID and LEILC) were moderately positively skewed (i.e., the skewness/standard error of skewness was greater than two). All other variables demonstrated an adequately symmetric spread with no significant departures from normal distribution. The box plots for all variables (see Appendix C7) illustrate that the life event scales had outlier cases far removed from the majority of the distribution.

To deal with outliers and positive skew, square root transformation was applied to the following four variables: BDI, BAI, LEID, and LEIC. Results of these transformations are presented in Appendix C8. An examination of the distributions after transformation shows that the skewness was addressed but four outliers remained for SQRT\_LEIC (square root of LEI Life Change scale). It may have been of interest to explore these outliers given more time, but this would have been unlikely to effect substantive findings significantly.

**Correlations.** To determine how the PIS subscales and overall PIS-19 scale correlated with other measures, a Pearson's correlation was performed. The correlation matrix used pairwise deletion and the minimum number of cases used in correlations was 135.

Table 18.

*Correlations – Clinical Scales*

	PIS subscale1	PIS subscale2	PIS total	BDI	sqrt_BDI	BAI	sqrt_BAI	NEOPIN	SEI	ASQG	ASQB	LEID	sqrt_LEID	LEIC
PIS subscale1	-													
PIS subscale2	.43**	-												
PIS Total	.88**	.80**	-											
BDI	-.30**	-.47**	-.45**	-										
sqrt_BDI	-.28**	-.46**	-.43**	.97**	-									
BAI	-.28**	-.43*	-.41**	.52**	.51**	-								
sqrt_BAI	-.28**	-.43**	-.42**	.51**	.50**	.96**	-							
NEOPIN	-.47**	-.59**	-.62**	.54**	.52**	.49**	.51**	-						
SEI	.50**	.57**	.63**	-.61**	-.59**	-.53**	-.55**	-.76**	-					
ASQG	.27**	.11	.24**	-.10	-.06	-.01	-.01	-.15	.24**	-				
ASQB	.25**	.28**	.32**	.15	.17*	.10	.07	.19*	-.18*	.16	-			
LEID	-.02	.05	.03	.26**	.25**	.28**	.30**	.15	-.18*	.06	.03	-		
sqrt_LEID	-.05	.07	.01	.22**	.21*	.30**	.32**	.13	-.19*	.03	.05	.94**	-	
LEIC	-.11	.03	.08	.12	.10	.22*	.24**	.03	-.06	.13	-.00	.83**	.83**	-
sqrt_LEIC	-.14	.03	.10	.11	.09	.21*	.23**	.01	-.06	.10	.02	.81**	.87**	.96**

*Note.* PISsubscale1 = Positive Illusions (19-item) Scale Factor 1; PISsubscale2 = Positive Illusions (19-item) Scale Factor 2; PIStotal = Positive Illusions Scale – all 19 items; BDI = Beck Depression Inventory; sqrt\_BDI = Beck Depression Inventory (square-root transformed); BAI = Beck Anxiety Inventory; sqrt\_BAI = Beck Anxiety Inventory (square-root transformed); NEOPIN = NEO ‘N’ scale; SEI = Coopersmith Self-Esteem Inventory; ASQG = ASQ ‘Good’ scale; ASQB = ASQ ‘Bad’ scale; LEID = Life Events Inventory Distress Scale; sqrt\_LEID = Life Events Inventory Distress Scale (square-root transformed); LEIC = Life Events Inventory Life Change Scale; sqrt\_LEIC = Life Events Inventory Life Change Scale (square-root transformed); \*\* Correlation is significant at the 0.01 level; (2-tailed); \* Correlation is significant at the 0.05 level (2-tailed).

Table 18 shows the BDI and BAI correlated positively and significantly with neuroticism and life events scales, and correlated negatively with the self-esteem and PIS scales ( $p < 0.01$ ). It is worth noting that the difference in correlations among variables with and without the square root transformation was small (i.e., in the .01 to .03 range for all transformed variables). Both LEI scales showed low correlations with other measures. The PIS subscales and PIS overall PIS-19 ('PIS- total') scale showed moderate significant (negative) correlations with neuroticism ( $p < 0.01$ ) and positive moderate significant correlations with self-esteem ( $p < 0.01$ ). There was no relationship between scores on LEI scales and positive illusion scales. Correlations between the PIS-19 and the ASQ scores appeared at a lower level and were positive for ASQ 'Good' and 'Bad' scales.

### Regression Analysis

Separate hierarchical regression analyses were performed with depression and anxiety as dependent variables, each with three steps. In Step 1, all independent variables were entered, excluding the PIS-19. Step 2 used the inclusion of the PIS-19, and Step 3 then incorporated the interaction terms. These analyses are detailed below.

### Hierarchical regressions predicting depression.

To predict depression a hierarchical regression with three steps was performed. The first block comprised the BAI (square-root transformation), the SEI, the NEOPIN, the LEI "Distress" and "Life Change" scores (both with square root transformations), and ASQ "Good" and "Bad" scores. To test whether PIS added variance in predicting depression over and above other existing predictors, the PIS variable was included as the second block. As the two PIS subscales were highly correlated, the total measure of PIS-19 was used. Table 19 represents the model summary.

Table 19.

*Model Summary: Depression*

Model	R	R Square	Adjusted R Square	Std. Error of Estimate	R Square Change	Change Statistics			
						F Change	df1	df2	Sig. F Change
1	.63 <sup>a</sup>	.39	.36	.78	.39	11.28	7	.12	.00
2	.63 <sup>b</sup>	.39	.35	.79	.00	.31	1	.12	.58

Note. a. Predictors: (Constant), asqb, sqrt\_leic, sei, asqg, sqrt\_bai, neopin, sqrt\_leid; b. Predictors: (Constant), asqb, sqrt\_leic, sei, asqg, sqrt\_bai, neopin, sqrt\_leid, PIStotal (The dependent variable = sqrt\_bdi)

Regardless of the dependent variable (depression or anxiety), interaction terms (pis\*sqrt\*leid pis\*sqrt\*leilc pis\*sei\*sqrt\_leid pis\*sei\*sqrt\_leilc) were added at the third step; however, examination of the correlations and multicollinearity indices (the Variance Inflation Factors for all interaction terms and separate predictors of interaction terms were larger than 10), suggested that interaction terms were correlated to a point of redundancy and were removed from the further analysis. It is worth mentioning that centering of the variables did not help to reduce the problem of multicollinearity.

The first block accounted for 39% of the variance in depression ( $F(7, 123) = 11.28, p < .00$ ). Adding the total PIS explained an additional 0.2% of variance, which amounted to a nonsignificant change in  $R$ -squared ( $R$ -square Change  $F(1, 122) = 0.31, p = .58$ ). Inspection of Table 20 shows that the variables with the highest beta weights were the self-esteem score ( $p < .001$ ) and the anxiety score ( $p < .02$ ). The former variable accounted for the largest unique contribution to predicting depression. In particular, lower self-esteem and higher anxiety scores predicted significantly higher depression, while the hypothesis that PIS would add explanatory power over and above main the predictors was not supported. Comparison of the simple correlations shows that relationship among PIS and depression was moderated once other predictors were accounted for in the regression model. It is worth noting that there was a low level of multicollinearity between the predictors (VIF values were less than 5 for all predictors).

Table 20.

*Model Estimates: Regression Predicting Depression*

Model	Unstandardised Coefficients		Standardised Coefficients			Correlations			Collinearity Statistics		
	B	Std. Error	Beta	t	Sig.	Zero Order	Partial	Part	Tolerance	VIF	
1	(Constant)	2.828	.967		2.953	.004					
	sqrt_bai	.181	.077	.215	2.363	.020	.477	.208	.166	.598	1.673
	Neopin	.002	.006	.037	.312	.755	.502	.028	.022	.361	2.771
	Sei	-.019	.006	-.413	-3.469	.001	-.580	-.299	-.244	.349	2.866
	sqrt_leid	.054	.042	.189	1.273	.206	.199	.114	.090	.224	4.466
	sqrt_leilc	-.049	.043	-.166	-1.133	.259	.079	-.102	-.080	.231	4.326
	asqg	.047	.093	.038	.501	.617	-.076	.045	.035	.850	1.177
	asqb	.075	.089	.061	.837	.404	.143	.075	.059	.918	1.089
2	(Constant)	2.604	1.041		2.500	.014					
	sqrt_bai	.176	.077	.209	2.280	.024	.477	.202	.161	.590	1.694
	neopin	.001	.006	.016	.129	.897	.502	.012	.009	.328	3.050
	Sei	-.019	.006	-.402	-3.311	.001	-.580	-.287	-.234	.338	2.955
	sqrt_leid	.054	.043	.190	1.275	.205	.199	.115	.090	.224	4.467
	sqrt_leilc	-.047	.043	-.159	-1.080	.282	.079	-.097	-.076	.230	4.356
	asqg	.058	.096	.047	.604	.547	-.076	.055	.043	.813	1.231
	asqb	.061	.092	.051	.664	.508	.143	.060	.047	.858	1.166
PIStotal	.124	.225	.056	.554	.581	.410	.050	.039	.490	2.042	

## Hierarchical regression predicting anxiety.

To predict anxiety scores a hierarchical regression with three steps was performed. The first block comprised the BDI (square-root transformation), the SEI, the NEOPIN, the LEI distress and life change score (both with square root transformation), and ASQ “Good” and “Bad” scores. To test whether PIS added variance in predicting anxiety over and above other existing variables, the PIS variable was included as the second block. As the two PIS subscales were highly correlated the total measure of PIS-19 was used. Table 21 represents the model summary.

Table 21.

*Model Summary: Anxiety*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	Df1	Df2	Sif. F Change
1	.65a	.43	.40	.90	.43	13.17	7	123	.00
2	.66b	.43	.40	.90	.01	1.21	1	122	.27

*Note.* a. Predictors: (Constant), sqrt\_leic, asqb, sei, asqg, sqrt\_bdi, neopin, sqrt\_leid; b. Predictors: (Constant), sqrt\_leic, asqb, sei, asqg, sqrt\_bdi, neopin, sqrt\_leid, PIStotal (The dependent variable= sqrt\_bai)

The first block accounted for approximately 40% of the variance in anxiety scores [ $F(7, 123) = 13.17, p < .00$ ]. Adding the PIS total explained an additional 0.6% of variance, which amounted to an insignificant change in *R*-squared (*R*-square Change  $F(1, 122) = 1.21, p = .27$ ).

Inspection of Table 22 shows that the variables with the highest beta weights were the neuroticism score ( $p < .001$ ) and the depression score ( $p < .02$ ). The former variable accounted for the largest unique contribution to predicting depression. In particular, higher neuroticism scores and higher depression levels predicted significantly higher anxiety, while the hypothesis that PIS would add explanatory power over and above the main predictors was not supported. A moderate correlation between PIS total and anxiety was washed out when other predictors were included in the regression in the model. It is worth noting that there was low level of multicollinearity between the predictors (VIF values were less than five for all predictors). A regression diagnostic revealed that there were no outliers and three cases had leverage statistics slightly higher than critical. The maximum Cook’s D value was .16, which is at a level well under a value of one.

Table 22.

*Model Estimates: Regression Predicting Anxiety*

Model	Unstandardised Coefficients		Standardised Coefficients			Correlations			Collinearity Statistics	
	B	Std Error	Beta	t	Sig.	Zero Order	Partial	Part	Tolerance	VIF
Constant	-.024	1.141		-.021	.983					
1 sqrt_bdi	.240	.102	.202	2.363	.020	.477	.208	.161	.637	1.571
neopin	.017	.006	.305	2.768	.007	.539	.242	.189	.383	2.610
Sei	-.011	.007	-.192	-1.602	.112	-.530	-.143	-.109	.324	3.082
Asqg	.182	.106	.125	1.707	.090	.005	.152	.116	.868	1.152
Asqb	-.149	.102	-.103	-1.461	.147	.027	-.131	-.100	.929	1.076
sqrt_leid	.050	.049	.147	1.020	.310	.333	.092	.070	.223	4.487
sqrt_leilc	.027	.050	.077	.540	.590	.250	.049	.037	.229	4.361
Constant	-.514	1.224		-.420	.675					
2 sqrt_bdi	.232	.102	.195	2.280	.024	.477	.202	.155	.633	1.579
neopin	.015	.007	.263	2.253	.026	.539	.200	.153	.341	2.929
sei	-.009	.007	-.170	-1.399	.164	-.530	-.126	-.095	.316	3.170
asqg	.205	.108	.141	1.892	.061	.005	.169	.129	.834	1.199
asqb	-.177	.105	-.123	-1.685	.095	.027	-.151	-.115	.874	1.144
sqrt_leid	.050	.049	.148	1.029	.306	.333	.093	.070	.223	4.487
sqrt_leilc	.031	.050	.088	.619	.537	.250	.056	.042	.228	4.384
PIStotal	.282	.257	.107	1.098	.274	.381	.099	.075	.493	2.027

## Study 3A Summary of Results

### *Hypotheses: Part A*

1. Positive illusion scores will significantly predict scores for depression within a single timeframe (Time 1).
2. Positive illusion scores will show predictive value over depression scores above the contribution made by scores for Neuroticism within a single timeframe (Time 1).

While the total PIS (19-item) scale correlated with the BDI at Time 1 at .43 ( $p < 0.01$ ), the regression analysis appeared to indicate that positive illusions did not contribute to the variance in depression scores independently of the main predictor variables; thus, this second hypothesis was not supported.

3. Positive illusion scores will act as a more powerful predictor of depression scores than scores for the ASQ within a single timeframe (Time 1).

While the ASQ “Good” measure showed a moderate correlation with the PIS-total (PIS-19) scores at Time 1 (.24) and the ASQ “Bad” measure, a correlation of .32, these two measures correlated only weakly with depression, anxiety and neuroticism. The ASQ measures did not show any significant effects in the regression analysis, so this third hypothesis was not supported.

4. Interactions between positive illusion scores and self-esteem scores will predict scores for depression at Time 1.
5. Interactions between positive illusion scores, self-esteem scores, and Life Event Distress scores will predict scores for depression at Time 1.

The interaction terms were correlated to a degree, which indicated further analysis would not be valid, and so these two hypotheses were not supported.

### **Conclusions.**

Study 3A satisfactorily addressed confirmatory factor analysis for the Positive Illusion Scale and further issues of its construct validity. This study’s analyses however, indicate that more complex modelling tools are needed to elucidate the relationships among the key variables over time. For example, with interaction terms correlated too highly the exact relationships among positive illusions, self-esteem, life events and depression remain unclear at this point. Path analysis in Study 3B will also indicate more precisely the roles of positive illusions and Neuroticism in depression outcome at different time points.

## CHAPTER 8: Study 3 Part B. Positive Illusions, Neuroticism, Life Events and Self-Esteem as Predictors of Depression over time.

In the preceding Study 3A analyses, the PIS scale (19 items) correlated negatively with depression ( $p < .01$ ). The PIS-19 and the BDI shared 20% of score variance, indicating a significant association between the two constructs; the 19-item PIS Scale shared 39% of the variance with self-esteem scores. The BAI showed a negative correlation with the PIS measure. This indicates that the use of positive illusion strategies may also provide some protection against the development of anxiety states, although the relationship was not as strong as it was with depression.

Study 2's analyses showed that positive illusions have stable relationships with denial, defensiveness, depression, anxiety, and self-esteem. However, the strongest and most consistent links were evident between positive illusions and both depression and self-esteem.

### **Aims for Study 3: Part B**

The present study (3B) examined the extent to which positive illusions overlap with neuroticism. 'Neurotic' is often conceptualised as describing the obverse of 'stable' or 'robust', and so it was important to establish whether illusions have a distinct role in self-concept maintenance, or whether they are merely part of a larger scale 'setting' factor, such as neuroticism. Neuroticism (N) has been shown to be a large and stable construct that exerts influence over depression, anxiety, and self-regulation (Hardeveld et al., 2013; Steunenberg et al., 2009). Hence, it is considered to be a trait factor that is relatively constant. Since positive illusions are hypothesised to contribute to stability and self-regulation of emotions, a very large factor such as 'N' may then partly determine the level of PIS. However, it was expected that PIS would exert its own effects independent of N also.

Self-critical cognitions are accepted as a component of the depressive process (Coyne & Gotlib, 1983; Coyne & Wiffen, 1995) and so an examination was made as to whether positive illusions have a direct role in buffering against these. Self-esteem plays an important role in depression and may itself also be influenced by other factors such as Positive Illusions. Hence self-esteem at Time 1 was a predictor variable. Its measurement at Times 2 and 3 was extraneous to this thesis.

### **Hypotheses: Part B**

Path analysis was used to address the following hypotheses:

#### **Depression**

1. Positive illusions will predict scores for depression at Time 3.

2. Positive illusion scores will show significant predictive value for depression scores independent from the contribution made by scores for neuroticism.
3. Positive illusion scores will mediate the effects of life event scores upon depression at Time 3.

#### **Specific Path predictions**

- a. Neuroticism influences the level of positive illusions and positive illusions are predictive of depression independent of the effect of 'N' (see all five models for depression; Figures 3 to 7);
- b. Positive illusions mediate the impact of negative life events at each time point (see Models 2-5 for depression, Figures 4 to 7);
- c. Positive illusion scores will be significantly predictive for depression and together with scores for self-esteem (Time 1), these will predict scores for depression at Time 3 (see Model 3 for depression in Figure 5);
- d. Positive illusion scores will predict scores of self-critical cognitions at Time 3, which in turn influence scores for depression at Time 3 (see Model 4 for depression; Figure 6).
- e. Positive illusion scores will be significantly predictive for depression and together with scores for self-esteem will predict scores for depression at Time 3. Positive illusions will predict self-critical cognitions at Time 3 and that in turn will predict depression at Time 3 (see Model 5 for depression; Figure 7)

#### **Anxiety**

- 5) Positive illusions will predict scores for anxiety at Time 3.
- 6) Positive illusion scores will show significant predictive value for anxiety scores independent from the contribution made by scores for neuroticism.
- 7) Positive illusion scores will mediate the effects of life event scores upon anxiety at Time 3.

#### **Specific Path predictions**

- 8a) Neuroticism influences the level of positive illusions and positive illusions are predictive of anxiety independent of the effect of 'N' (see all five models for anxiety; Figures 9 -13).
- 8b) Positive illusions mediate the impact of negative life event at each time point (see Models 2-5 for anxiety; Figures 10-13).
- 8c) Positive illusion scores will be significantly predictive for anxiety and together with scores for self-esteem, these will predict scores for anxiety at Time 3 (see Model 3 for anxiety in Figure 11).
- 8d) Positive illusion scores at Time 1 will predict scores of self-critical cognitions at Time 3, which in turn influence scores for anxiety at Time 3 (see Model 4 for anxiety; Figure 12).

- 8e) Positive illusion scores will be significantly predictive for anxiety and together with scores for self-esteem, these will predict scores for anxiety at Time 3. Positive illusions will predict self-critical cognitions at Time 3 and that in turn will predict anxiety at Time 3 (see Model 5 for anxiety; see Figure 13).

## Participants

Two groups of participants were recruited to ensure sufficient numbers (see also Study 3A). At Time 1, independent *t*-tests found no significant differences between the two subgroups of participants on the PIS, BDI, BAI, Coopersmith Self-Esteem Inventory (SEI; Coopersmith, 1967), NEO Personality Inventory-Revised (NEO-PI-R; Costa & McCrae, 1985), and Attributional Style Questionnaire “Good” measures ( $p$ 's = .23 to .96). There was a trend ( $p = .07$ ) for Subgroup 2 members to obtain higher ASQ “Bad” scores than Subgroup 1 members but this was not significant. For the Life Events Inventory (LEI; Tennant & Andrews, 1976) “Distress” and “Life Change” measures, Subgroup 1 members obtained slightly higher scores than Subgroup 2 members ( $p = .05$  and  $.01$ , respectively). In view of these findings, the scores for all measures for the two subgroups were collapsed into total group scores. Despite this, both of the LEI scores need to be interpreted with some caution in view of the possible differences between the two subgroups on the two LEI-derived measures.

At Time 2, independent *t*-tests found no significant differences between the two subgroups for the three measures taken at that time point, namely the BDI, BAI, and SEI (all  $p$ 's = .37 to .98;  $n$ 's ranged from 80 to 88, depending on the measure of interest). Therefore, the scores for the two subsamples were combined for all five measures.

At Time 3, independent *t*-tests found no significant differences for the PIS, BAI, BDI and Self-Critical Cognitions Scale (SCC; Ishiyama & Munson, 1993) scores (all  $p$ 's = .13 to .88). There were significant differences between the two subsamples on the BDI ( $p = .03$ ), and SEI ( $p = .03$ ). On the BDI, students in Subgroup 1 ( $n = 29$ , depending on the measure) obtained slightly higher scores than those in Subgroup 2 ( $n = 56$ ). On the SEI, those students in Subgroup 2 obtained the significantly higher scores. However, because of the small numbers at Time 3, the scores of the two subgroups were combined, thereby providing a larger sample and increased power to test the major hypotheses ( $n = 84$  or  $88$ , depending on the measure of interest).

## Clinical measures

Self-report scales were used to measure symptoms of depression and anxiety. As in Study 2, the BDI and the BAI were used to measure the levels of depression and anxiety symptoms,

respectively. The LEI (Tennant & Andrews, 1976) was again used to measure “Life Change” and “Distress”: scores relating to life events. The revised version of the PIS (19 items) was used to measure the positive illusion construct (see Study 3A above). The Neuroticism Scale of the NEO PI-R (Costa & McCrae, 1992) was used to measure Neuroticism. As in the previous studies, the SEI was used to measure self-esteem. As in Study 2, a 10-point scale was used to supplement the authored instrument to elicit in more detail, how ‘Like Me’ or ‘Unlike Me’ the items were.

The SCC (Ishiyama & Munson, 1993) was used to measure negative self-critical self-talk. Ishiyama and Munson’s 13-item scale was derived from a 25-item measure that was refined for item reliability. The scale’s test-retest reliability was measured as .83 (across genders) over a 6.5-week interval. Internal consistency for the scale showed an alpha of .89. Factor analysis showed a two-factor structure; the resulting subscales showed alphas of .86 and .77. Total scores for the SCC correlated at -.71 with the Rosenberg Self-Esteem Inventory, and .42 with the BDI. Higher scores are indicative of a greater level of self-criticism. Table 1 below indicates the constructs measured at different time points in the study.

### **Naturalistic Stressor**

A naturally occurring life event (end-of-year exams) was utilised to examine the possible effect of positive illusions upon subsequent depression and anxiety scores. Administration of the test schedule was timed to test the participants at Time 1 (5 weeks before their end of second-year exams); at Time 2, 2 weeks later (still prior to exams); and at Time 3, immediately upon completing their set of exams. An examination was made of the mean score patterns for anxiety and depression over the course of this schedule.

### **Procedure**

As described in Study 3A, participants were recruited by A4 and A3 posters placed on public noticeboards inside faculty buildings, and on fly-posting pillars across the campus. Participants attended one of the six scheduled test sessions (for each group) where they were administered the battery of 10 test questionnaires. The initial test battery comprised the LEI, “Questions About You and Your Studies”, the ASQ, the NEO PI-R, the SEI, the PIS, the BDI, and the BAI.

Table 1 below, indicates the test schedule, with various tests applied at different time points. Participants took home the packet of test repeats for Time 2. In order to maximise the accuracy of the time interval, these participants were required to return the packets by a cut-off date, and a pro-forma on the first sheet required them to note the date and the day’s major news headline. This repeat

comprised the BDI, the BAI and the SEI. At Time 3, participants were administered (face to face) the BDI, the BAI, the SEI, the PIS, and the SCC.

Table 1.

*Measurement at Time Points*

	Time 1	Time 2	Time 3
Depression			
Anxiety			
Self-Esteem			
Neuroticism			
Positive Illusions			
Negative Life Events			
Self Critical Cognitions			

## Results

Comparison of means across three time points.

First, a data screening was applied to depression and anxiety measures at time points 2 and 3, as had been completed for Time 1 (see Table 2).

Table 2.

*Descriptive Statistics: BDI and BAI at Time 2 and Time 3*

	N	Mean	Mode	Std. Dev	Skewness			Kurtosis	
					Statistic	Std. Error	Ratio	Statistic	Std. Error
bdi_t2	87	6.82	3.00	4.52	.34	.26	1.31	-1.05	.51
bai_t2	86	5.99	2.00	4.78	.82	.26	3.13	-.07	.51
bdi_t3	86	5.95	.00 <sup>a</sup>	5.32	1.11	.26	4.28	.74	.51
bai_t3	87	5.99	.0 <sup>0</sup>	6.20	1.58	.26	6.12	2.80	.51

*Note.* Multiple modes exist, The smallest value is shown; bdi t2 = Beck Depression Inventory at Time 2; bai t2 = Beck Anxiety Inventory at Time 2; bdi t3 = Beck Depression Inventory at Time 3; bai t3 = Beck Anxiety Inventory at Time 3; Valid N (listwise) = 83.

It can be seen that all measures except the depression measure at Time 2 (bdi\_t2) were positively skewed and required square root transformation (it is worth noting that transformation was required not only to normalize the distribution of the variables, but also to make the comparison

across different time points possible, as the depression and anxiety measures were transformed at Time 1). Distributions of transformed measures are presented in Figure 1.

**Figure 1.** Distribution of Depression and Anxiety Scores at Different Time Points

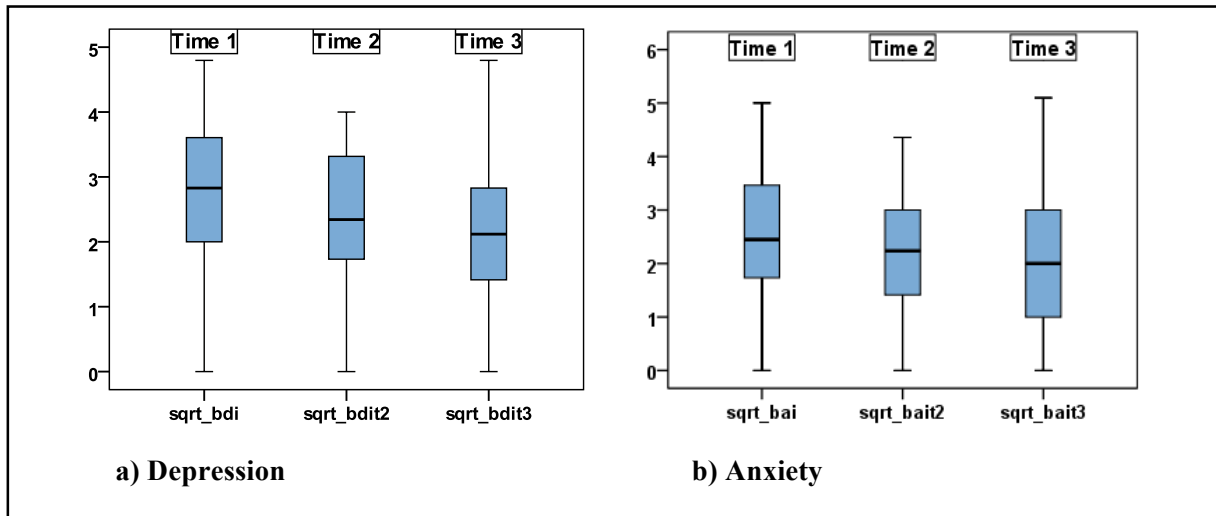
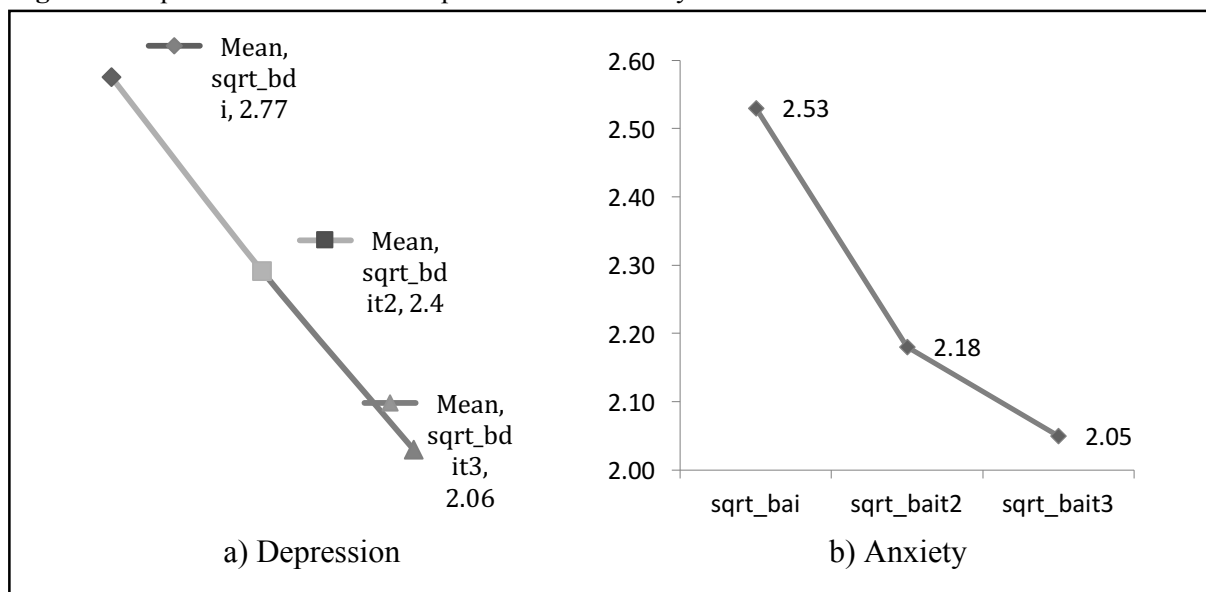


Figure 2 represents the mean of the square root of depression and the square root of anxiety scores at each time point. The square root transformations reduced the level of skewness in these scores.

**Figure 2.** Square Root Scores of Depression and Anxiety Scores at Different Time Points



Note. a = mean: square root, depression scores (Times 1, 2, and 3); b = mean: square root, anxiety scores (Times 1, 2, and 3).

The levels of depression and anxiety decreased at Time 2 compared to Time 1, and at Time 3 compared to Time 2. To see whether there was a significant difference in depression and/or anxiety scores across time, a repeated one-way ANOVA was applied but first, preparatory analyses for a

repeated one-way ANOVA for depression scores were performed. The test of sphericity examines the assumption that the variances of all repeated measures are equal. If the test produces non-significant results, the assumption is met. In this case, the sphericity assumption was met: the value for Mauchly's W was .95 and  $\chi^2=4.01$ , n.s.

It can be seen from Table 3 that there was a highly significant effect of the "time points" variable: in other words, there was a significant difference between the three time points in terms of the average score.

Table 3.  
*Test of Within-Subjects Effects the Three Time Points*

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Timepoints	Sphericity Assumed	20.41	2.00	10.20	9.63	.00
Error (timepoints)	Sphericity Assumed	171.60	1.00	1.06		
	Greenhouse-Geisser	171.60	162.00	1.11		

The post-hoc tests (Newman-Keuls) summarised in Table 4, below, demonstrate that depression scores at Time 2 differed from depression scores at Time 1 [ $F(1,81) = 6.03$ ,  $p < 0.02$ ], and the depression scores at Time 3 differed from depression scores at Time 2 [ $F(1,81) = 4.82$ ,  $p < 0.03$ ].

Table 4.  
*Tests of Within-Subjects Contrasts*

Source	Timepoints	Type III Sum of Squares	df	Mean Square	F	Sig.
Timepoints	Level 1 vs. Level 2	11.38	1	11.38	6.03	.02
	Level 2 vs. Level 3	9.07	1	9.07	4.82	.03
	Level 1 vs. Level 3	600.89	1	600.89	23.64	.00
Error (timepoints)	Level 1 vs. Level 2	152.89	81	1.89		
	Level 2 vs. Level 3	152.37	81	1.89		
	Level 1 vs. Level 3	1805.11	71	25.42		

To summarise, the ANOVA showed that the depression scores at three time points were significantly different,  $F(2,162) = 9.63$ ,  $p < 0.00$  (the raw means for Time 1 were 8.21, Time 2, 6.58 and Time 3, 5.49). Tests of within-subject contrasts showed that participants had significantly lower

depression scores at each consequent time point. A repeated one-way ANOVA for anxiety scores was performed, as was done for depression above. In this case, the sphericity assumption was also met; the value for Mauchly's W was .98 and  $\chi^2=2.00$ , n.s. Table 5, below, demonstrates that there was a significant effect of the "time points" variable: in other words, there was a significant difference between the three time points in terms of the average score.

Table 5.

*Tests of Within-Subjects Effects*

Source		Type III Sum of Squares	<i>df</i>	Mean Square	F	Sig.
Timepoints	Sphericity Assumed	10.42	2.00	5.21	3.97	.02
Error (timepoints)	Sphericity Assumed	218.06	166.00	1.31		
	Greenhouse-Geisser	218.06	162.10	1.35		

Table 6 below presents test results on the differences between successive time points of anxiety scores. To compare each anxiety score with every other anxiety score the Newman-Keuls post-hoc test was employed. The raw means for Time 1 were 7.86 (SD 6.34) for Time 2, 5.99 (SD 4.78), and for Time 3, 5.99 (SD 6.20). Time 2 and 3 scores did not differ but the other two comparisons were significant.

Table 6.

*Tests of Within-Subjects Contrasts*

Source	Timepoints	Type III Sum of Squares	<i>df</i>	Mean Square	F	Sig.
Timepoints	Level 1 vs. Level 2	10.32	1	10.32	3.90	.05
	Level 2 vs. Level 3	1.45	1	1.45	.64	.43
	Level 1 vs. Level 3	806.68	1	806.68	21.54	.00
Error (timepoints)	Level 1 vs. Level 2	219.82	83	2.65		
	Level 2 vs. Level 3	187.92	83	2.26		
	Level 1 vs. Level 3	2658.32	71	37.44		

## Impacts of the Stressor

To summarise, the data above show that depression scores decreased successively and significantly over time, and concomitantly, anxiety scores decreased significantly between Times 1 and 2. This was an unexpected effect, *since it had been assumed that scores may increase or remain steady at Times 1 and 2, then decrease at Time 3 due to the stressor event just before Time 3*. The reasons for this pattern could be conjectured (i.e., that anticipatory anxiety was high at a point distal to the exams, but engagement with exam-specific study reduced this); however, it could not be explained definitively. Hence, the impact of the stressor (exams) was not as had been anticipated. Given this, the life events measures previously outlined were used in the Path Analysis models as these provided a measure of stress that may influence depression scores and themselves be influenced by PIS scores.

## Data Analyses

A repeated-measures design was used, to accommodate the need for measurement of the constructs across time. Repeat administration of the outcome measures enabled establishment of participants' baseline pattern of scores before the induction of the stressor and an administration following the stressor, was intended to examine the possible buffering effect of positive illusions.

Path analysis (across timeframes) was chosen as the method for determining the relative contribution of the possible predictors to outcome score variance. This method was chosen due to the number of the predictors and the use of two time repeats before the final measurement of participants' symptoms. Path analysis is an extension of multiple regression that allows a researcher to go beyond regression by testing more complicated models, in particular models that comprise more than one dependent variable and includes both direct and indirect influence effects. In path models, all variables are observed. Another advantage of path analysis is that it allows the researcher to draw a diagram of hypothesised relationships that can be translated directly into the equations needed for the analysis (Schumacker & Lomax, 2004).

The disadvantage of path models is that path analysis does not distinguish which of two distinct path diagrams is more correct; neither can it assess the direction of a causal effect between two correlated variables. Rather, it is the researcher's responsibility to establish theoretical knowledge to apply path model successfully so that it can test the model proposed. Hence, a path model can never be accepted; it can only fail to be rejected (Klein, 1998; Loehlin, 1986; Schumacker & Lomax, 2004).

The main assumptions of path models are that there is a reasonable sample size – it is important to have an adequate sample size to determine and assess the significance of a path analysis. The recommended ratio is 20 cases per parameter in the model (Klein, 1998). Endogenous variables should be continuously and normally distributed, and there should be a linear relationship between

variables (for example, curvilinear, multiplication, or interaction relations are excluded). Residuals should be uncorrelated with all other variables and residuals in the model (Kaplan, 2000; Wolfe, 2003) and there should be one-way casual flow (Kaplan, 2000).

### Testing the main assumptions of Path Models.

The total sample was 143 respondents; 140 respondents participated at Time 1, 88 respondents participated at Time 2, and 87 respondents participated at Time 3. However, different respondents participated at different time points. It can be seen from Table 7 that 27.3% of respondents participated only at Time 1, 20.3% of respondents had participated at Time 1 and either Time 2 or Time 3, and only 47.6% of respondents had participated at all three time points. Therefore, the percentage of missing data is quite high.

Table 7.

#### *Participation Rates*

	T1 Only	T2 Only	T3 Only	T1 + T2	T1 + T3	T1 + T2 + T3
Count	39	3	0	14	15	68
Percent (%)	27.30	0.02	0.00	9.80	10.50	47.60

*Note.* T1 = Time 1; T2 = Time 2; T3 = Time 3.

While the path analysis in AMOS allows handling missing data by using the full-information maximum likelihood method, in this particular context this method is considered inappropriate (Arbuckle & Wothke, 1999). First, in some cases both Time 2 and/or Time 3 data were missing for all variables (rather than individual item non-responses being observed). Second, the good properties of maximum likelihood estimates are all “large sample” approximations and those approximations are poor in small samples (Meyers, Gamst, & Guarino, 2006). The current sample were relatively small.

Therefore, it was proposed to use only data for those participants who had participated at all three time points, i.e., 68 participants. It is worth noting that list-wise deletion was employed only for those cases that were not present at three time points. If a participant (i.e., case) participated at three time points but on some variables (but not all) data were missing, that case was not deleted (Alison, 2009; Millsap & Maydeu-Olivares, 2009).

Overall, the percentage of item non-response was less than 1%. Despite the substantial loss of power, the benefit of list-wise deletion is that this method of dealing with missing data is not prone to Type I errors. However, the possible threat for the path model is the relatively small number of cases (Millsap & Maydeu-Olivares, 2009).

### Assessing Participants Completing Compared with those Not Completing the

**Assessments.** It was important to assess whether the reduced sample of 68 respondents was representative of the original sample of 143 respondents on the main variables of interest. Furthermore, if it was not representative, then an assessment of the way in which the reduced sample differed was necessary.

We employed a logistic regression to test whether those individuals who did not participate at all three time points differed from those who participated at all three time points. A logistic regression was used to predict the logit of an event outcome from a set of predictors (Long, 1997). A six-predictor logistic model was fitted to the data to test whether respondents who participated at all three time points were different on key characteristics from those respondents who did not participate. The dependent variable = 1 if a respondent did not participate at all three time points and 0, otherwise. The six explanatory variables included variables measured only at Time 1: measures of clinical depression and anxiety (BDI and BAI), self-esteem, positive illusions, neuroticism, and number of stressful events. The results of the model are presented in Table 8.

The overall model fit was nonsignificant and the goodness of fit was  $p < .59$ . All the regression estimates were statistically non-significant (see the  $p$ -values in Table 8) and the odds ratios were close to one. According to Table 8, none of the independent variables was a significant predictor of respondent's participation at all three time points ( $p < .05$ ).

Table 8.

#### *Logistic Regression Analysis of 143 Respondents by their Participation Across Three Time Points*

Predictor	B	SE $\beta$	Wald's $\chi^2$	Df	P	$e^{\beta}$ (odds ratio)
BDI	-.04	.04	1.02	1	.31	.96
BAI	.00	.04	.01	1	.91	1.00
Neuroticism	.00	.02	.05	1	.82	1.00
Self-Esteem	-.02	.02	1.32	1	.25	.98
Negative Life Events	.00	.00	.25	1	.62	1.00
PIS	.02	.03	.26	1	.61	1.02
Constant	.92	2.82	.11	1	.74	2.59

*Notes.* Cox and Snell  $R^2 = 0.17$ ; Nagelkerke  $R^2 = .02$ ; Percentage predicted correct = 55.3%; H-L = Hosmer-Lemeshow Goodness-of-fit test, non-significant.

One inferential test and two descriptive measures are presented in the footnote to Table 9. The inferential goodness-of-fit test is the Hosmer–Lemeshow (H–L) test that yielded a  $\chi^2(8) = 6.53$  and was non-significant ( $p > .05$ ), suggesting that the model was a good fit to the data. In other words, the null hypothesis of a good model fit to data was tenable. It can be also seen from Table 9 that the

proportion of correctly predicted outcomes according to the model specification is 55.3%. Table 9 is a classification table that documents the validity of predicted probabilities.

Table 9.

*The Observed and Predicted Frequencies*

Observed	Predicted		
	Participated	Did not participate	% Correct
Participated	27	39	59.1
Did not participate	34	32	51.5
Overall % Correct			55.3

Notes. Sensitivity =  $27/(39+27)\% = 40.9\%$  ; Specificity =  $32/(32+34)\% = 48.5\%$  ; False negative =  $34/(34+27)\% = 55.7\%$ ; False negative =  $39/(39+32)\% = 63.9\%$

The percentage that this classified was 55% and hence this was not much better than chance. So based on logistic regression it was concluded that those respondents who participated at all three time points were not significantly different on the key variables of interest from those respondents who did participate only at one or two time points.

### **Descriptive statistics for Path Model variables**

Table 10 presents the descriptive statistics of all variables used in the path model. It can be seen that anxiety and depression measures at all time points, as well as a measure of negative life events, were slightly skewed or/and kurtotic (critical ratio (CR) > 2). These variables were given square-root transformations to meet the path model assumptions. The Time 2 BDI scale was included, despite its lower CR. Descriptive statistics of transformed variables are presented in Table 11. It can be seen that  $CR < 2$  for all transformed variables.

Table 10.

*Descriptive Statistics: Depression and Anxiety Ratings Across Time)*

Measure	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
					Statistic (SE*)	CR**	Statistic (SE*)	CR**
bdi1	.00	23.00	8.21	5.74	.79 (.29)	2.73	-.15 (.57)	-.28
bdi2	.00	16.00	6.58	4.57	.41 (.29)	1.44	-1.01 (.57)	-1.77
bdi3	.00	23.00	5.49	5.21	1.42 (.29)	4.89	1.92 (.57)	3.36
bai1	.00	23.00	7.69	6.14	.83 (.29)	2.87	-.22 (.57)	-.39
bai2	.00	19.00	5.87	4.86	.86 (.29)	2.99	.12 (.57)	.20
bai3	.00	26.00	5.31	5.48	1.52 (.29)	5.23	2.62 (.57)	4.56
leid	.00	222.00	65.07	51.68	1.38 (.29)	4.77	1.92 (.57)	3.36
neopin	39.00	138.00	98.46	20.53	-.44 (.29)	-1.54	.01 (.57)	.03
sei	20.00	96.00	61.55	21.27	-.12 (.29)	-.41	-1.05 (.57)	-1.82
scc	17.00	65.00	38.87	10.04	.31 (.29)	1.09	-.24 (.57)	-.42

*Notes.* \*SE = Standard Error; \*\* = Critical Ratio (CR) – the ratio of skewness/kurtosis statistics and the corresponding standard error; bdi1 = Beck Depression Inventory, Time 1; bdi2 = Beck Depression Inventory, Time 2; bdi3 = Beck Depression Inventory, Time 3; bai1 = Beck Anxiety Inventory, Time 1; bai2 = Beck Anxiety Inventory, Time 2; bai3 = Beck Anxiety Inventory, Time 3; leid = Life Events Inventory Distress Scale; neopin = NEO Pi ‘N’ scale; sei = Coopersmith Self-Esteem Inventory; scc = Self-Critical Cognitions Scale

Table 11.

*Descriptive Statistics (Transformed Variables)*

Measure	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
					Statistic (SE*)	CR**	Statistic (SE*)	CR**
bdi1_sqrt	.00	4.80	2.67	1.05	-.01 (.29)	-.04	-.39 (.57)	-.69
bdi2_sqrt	.00	4.00	2.35	1.03	-.44 (.29)	-1.52	-.30 (.57)	-.53
bdi3_sqrt	.00	4.80	2.03	1.21	.01 (.29)	.05	-.28 (.57)	-.49
bai1_sqrt	.00	4.80	2.49	1.23	-.17 (.29)	-.59	-.39 (.57)	-.69
bai2_sqrt	.00	4.36	2.14	1.14	-.20 (.29)	-.72	-.50 (.57)	-.88
bai3_sqrt	.00	5.10	1.93	1.26	.16 (.29)	.58	-.48 (.57)	-.85
leid_sqrt	.00	14.90	7.36	3.32	.00 (.29)	-.02	.43 (.57)	.76
neopin	39.00	138.00	98.46	20.53	-.44 (.29)	-1.50	.01 (.57)	.03
sei	20.00	96.00	61.55	21.27	-.12 (.29)	-.41	-1.05 (.57)	-1.82
scc	17.00	65.00	38.87	10.04	.31 (.29)	1.09	-.24 (.57)	-.42

*Notes.* \*SE = Standard Error; \*\* = Critical Ratio (CR) – the ratio of skewness/kurtosis statistics and the corresponding standard error; bdi1\_sqrt = square root of Beck Depression Inventory, Time 1; bdi2\_sqrt = square root of Beck Depression Inventory, Time 2; bdi3\_sqrt = square root of Beck Depression Inventory, Time 3; bai1\_sqrt = square root of Beck Anxiety Inventory, Time 1; bai2\_sqrt = square root of Beck Anxiety Inventory, Time 2; bai3\_sqrt = square root of Beck Anxiety Inventory, Time 3; leid\_sqrt = square root of Life Events Inventory Distress Scale; neopin = NEO Pi ‘N’ scale; sei = Coopersmith Self-Esteem Inventory; scc = Self-Critical Cognitions Scale

**Correlations.** Path analysis can be considered as a tool for modelling the correlations between variables. Thus, it is important that the correlation coefficient is an appropriate summary statistic of the relationship between the variables. Table 12 presents the intercorrelations for the various measures. It can be seen that all variables appear to be at least moderately correlated. The smallest correlation is observed between negative life events score (leid\_sqrt) and depression score at Time 2 (bdi2\_sqrt) and anxiety score at Time 2 (bai2\_sqrt).

Table 12.

*Correlations*

	bdi1_sqrt	bdi2_sqrt	bdi3_sqrt	bai1_sqrt	bai2_sqrt	bai3_sqrt	leid_sqrt	pistotal_sqrt	neopin	Sei
bdi1_sqrt	-									
bdi2_sqrt	.59**	-								
bdi3_sqrt	.60**	.69**	-							
bai1_sqrt	.51**	.32**	.56**	-						
bai2_sqrt	.37**	.58**	.60**	.58**	-					
bai3_sqrt	.41**	.46*	.66**	.58**	.57**	-				
leid_sqrt	.21*	.15*	.21*	.36**	.15*	.28**	-			
pistotal_sqrt	-.41**	-.33**	-.40**	-.47**	-.35**	-.22*	-.05	-		
Neopin	.49**	.39**	.48**	.67**	.52**	.41**	.32**	-.67**	-	
Sei	-.57**	-.39	-.49**	-.68**	-.36**	-.34**	-.29**	.67**	-.80**	-
Scc	.45**	.48**	.47**	.41**	.42**	.41**	.13**	-.56**	.66**	-.61**

*Note.* \*\* = significant at  $p < 0.01$ , \* = significant at  $p < 0.05$ ; bdi1\_sqrt = Beck Depression Inventory, Time 1; bdi2\_sqrt = Beck Depression Inventory, Time 2; bdi3\_sqrt = Beck Depression Inventory, Time 3; bai1\_sqrt = Beck Anxiety Inventory, Time 1; bai2\_sqrt = Beck Anxiety Inventory, Time 2; bai3\_sqrt = Beck Anxiety Inventory, Time 3; leid\_sqrt = Life Events Inventory Distress Scale; pistotal\_sqrt = Positive Illusions Scale total; neopin = NEO PI 'N' scale; sei = Coopersmith Self-Esteem Inventory; scc = Self-Critical Cognitions Scale

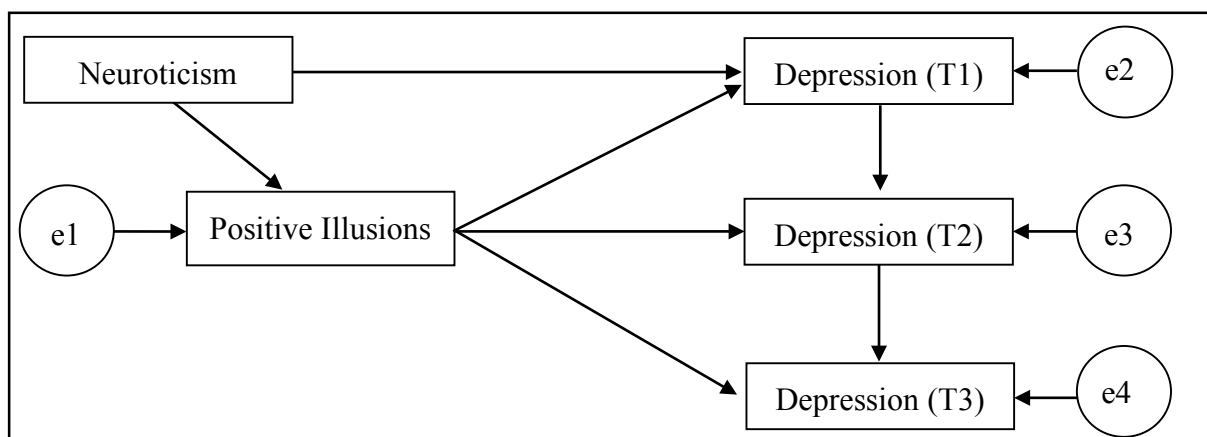
As would be expected, the strong association between anxiety and depression is evident here. Neuroticism appeared to be related to both depression and anxiety. As suspected, it was also strongly related to both positive illusions and self-esteem, as well as self-critical cognitions.

**Path analysis – Depression.** Five models of increasing complexity were developed to test the hypotheses presented. The complexity of the data lent itself to this number of proposals. However, given the number of models presented, goodness-of-fit was tested first, and only then was the most appropriate model was explored in detail. Below, path diagrams corresponding to each model are presented (Figures 3-7).

*Main Conventions of Path Diagram.* In path diagrams, observed variables are represented by rectangles. Relationships between variables are represented with arrows. *Bidirectional arrows*, showing that there is no explicitly defined casual relationship, represent correlation and covariance. *One-sided arrows* represent causal relationship between variables. Those variables that have one-sided arrows pointing into them are dependent variables, while those variables that have only bidirectional arrows and no incoming one-sided arrows represent independent variables. Therefore, a single-ended arrow points from cause to effect while a double-headed curved arrow assumes no causal relationship. Every dependent variable has an error variance (residual), i.e., the proportion of variance that has not been explained by the model. In the path diagram, circles represent the error variance with one-sided arrows pointing to the dependent variables. Path coefficients can be added, but this has been done only for Model 2 in later analyses when this model is discussed in detail.

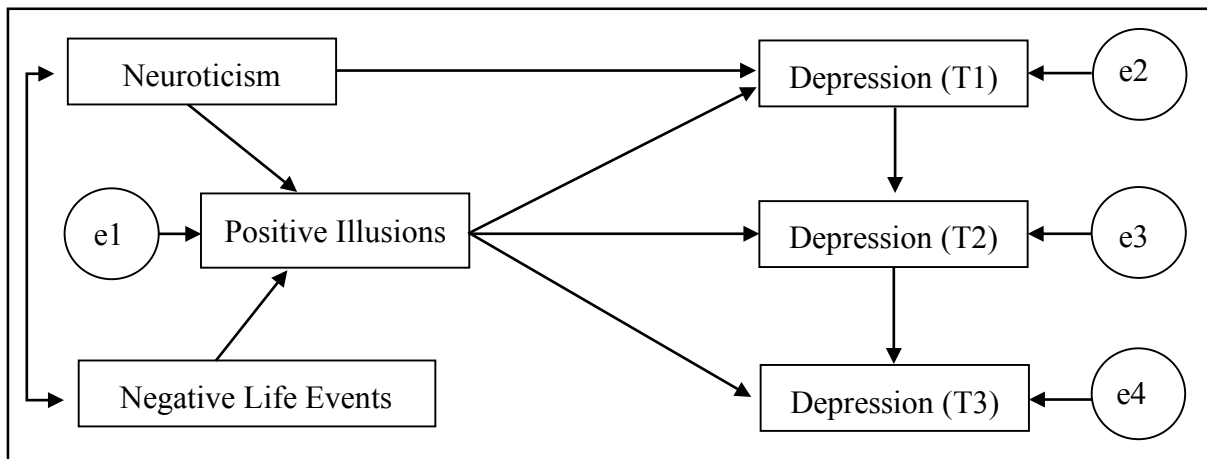
**Model 1.** Here, in Figure 3 positive illusions affect depression scores at Time 3. Neuroticism (N) is introduced as a large and important variable which influences the level of positive illusions (PIS). It is predicted that lower N will result in higher PIS and hence, lower depression, at all three time points. Additionally, PIS also exerts its own effect independent of the influence of N (see Hypotheses 1, 2, and 4a).

**Figure 3.** Path Analysis Model 1



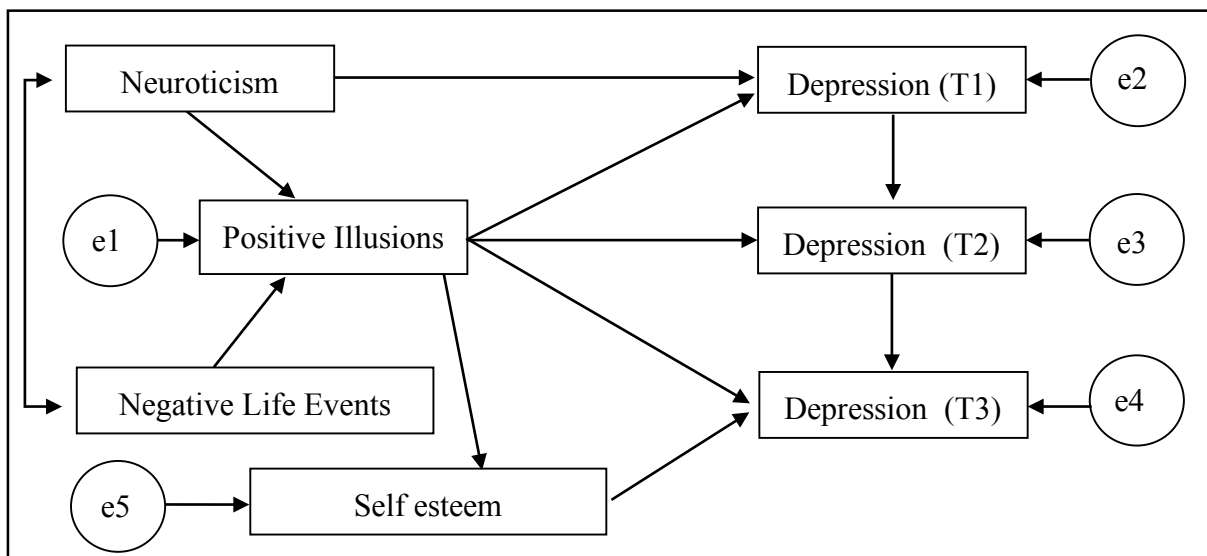
**Model 2.** Here, in Figure 4 while neuroticism influences PIS, PIS also mediates the effect of life events upon scores for depression at each time point (see Hypotheses 1, 2, 3, 4a and 4b).

**Figure 4.** Path Analysis Model 2



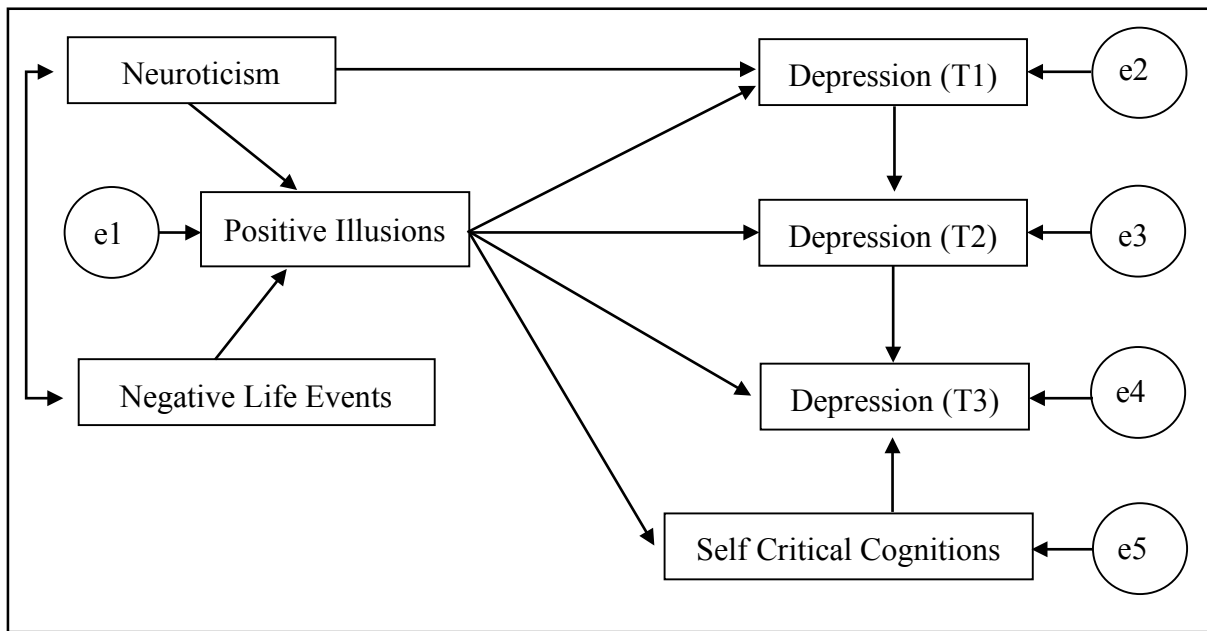
**Model 3.** In Model 3 and as shown in Figure 5 (and following on from the Model 2 above), neuroticism influences PIS scores, PIS scores mediate the effect of life events, and PIS scores also have an impact upon self-esteem, which affects depression scores along with both PIS and N (see Hypotheses 1, 2, 3, 4a, 4b, and 4c).

**Figure 5.** Path Analysis Model 3



**Model 4.** Here and as shown in Figure 6, in addition to neuroticism affecting PIS scores and PIS mediating the effect of life events, the influence of PIS upon self-critical cognitions is examined at Time 3. SCC also influences scores for depression (see Hypotheses 1, 2, 3, 4a, 4b, and 4d).

**Figure 6.** Path Analysis Model 4



**Model 5.** Here as shown in Figure 7, in addition to neuroticism influencing PIS scores and PIS mediating the impact of life events, PIS affects self-esteem levels and self-critical cognitions, both of which impact upon the outcomes for depression (see Hypotheses 1, 2, 3, 4a, 4b, 4c, 4d and 4e).

**Figure 7.** Path Analysis Model 5

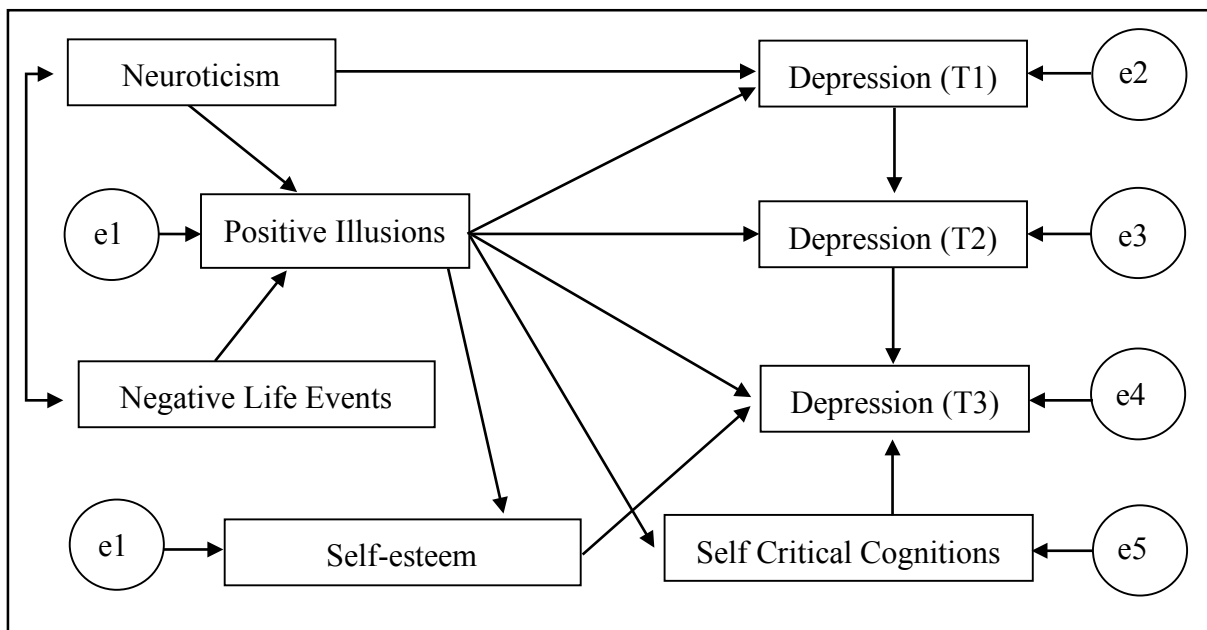


Table 15 summarises the five models, with the filled squares representing which measures were incorporated into the model. These models were estimated using AMOS.

Table 15

*Path Analysis Model Summary*

	Model 1	Model 2	Model 3	Model 4	Model 5
BDI at Time 1					
BDI at Time 2					
BDI at Time 3					
Neuroticism					
PIS					
Negative Life Events					
Self Esteem					
Social Critical Cognitions					

It is worth remembering that even if some estimates are significant it does not follow that the model fits the data well; therefore, the first step is to examine the model fit. A good-fitting model is the one that can reproduce the correlation (variance/covariance) matrix with little error from the path coefficients (Kaplan, 2000; Raykov & Marcoulides, 2006; Schumacker & Lomax, 2004). The goodness-of-fit of the proposed model (also called the default model (DM)) is assessed against two other models: (i) the saturated (SM) model and (ii) the independence model (IM). The SM is the model that has no degrees of freedom and there is a direct path from each independent (exogenous) variable to each other variable (Schumacker & Lomax, 2004). Different fit indices are available to the researcher; however, few agree as to which index provides the best answer to the question of model fit (e.g., Bollen & Long, 1993; McDonald & Marsh, 1990; Mulaik et al., 1989). The SM has a perfect fit (1.0). The independence model is the model where all correlations among variables are considered to be zero (i.e., there is no linear relationship between variables). The IM has the worst fit. The fit of the default model lies between these two models.

The following goodness-of-fit indices are commonly used:

- (i) CMIN – which is the likelihood ratio Chi Square (Elliott, 1994; Gierl & Mulvenon, 1995)
- (ii) NFI and CFI – the normed and comparative fit indices, respectively (Bentler & Bonett, 1980)
- (iii) RMSEA – which is the root mean square error of approximation (Browne & Cudek, 1993)
- (iv) AIC – otherwise known as Akaike's information criterion (Bozdogan, 1987)

The **CMIN** indicates whether the default model fits the data as well as the saturated model. The nonsignificant chi-square suggests that the fit between the default model and the data is no poorer than that between the saturated model and the data. Nevertheless, if the chi-square statistic is

significant, then the model does not fit the data adequately. Unfortunately, the chi-square statistic is a poor measure of overall goodness-of-fit. When the sample is relatively large, the chi-square test might be significant even the difference between saturated and default models is quite small. Thus, it is not uncommon to always obtain a significant chi-square. For this reason, researchers have resorted to examining a collection of goodness-of-fit statistics. In addition, some researchers divide chi-square by the number of degrees of freedom. If the ratio is  $\leq 2$ , the model is considered well fitted, and if the ratio  $> 5$ , the model is considered definitely not acceptable. If the ratio is between 2-5, some researchers might consider it acceptable. Given that this measure is not an accurate measure of goodness-of-fit it is never reported in isolation (Everitt & Dunn, 1991).

The **NFI** and **CFI** compare the default model to the independence model rather than to the saturated model. In particular, these indices indicate the proportion of improvement in the overall fit of the default model relative to the independence model. For these indices, values close to 1 are considered to indicate a good fit. The difference between these two indices is that the latter one may be less affected by the sample size (Roehrig, 1996).

The **RMSEA** index indicates the extent to which the model fails to fit the data per degree of freedom. Bad fit is associated with values greater than 0.1. This index is often reported when more complex models are tested. The **AIC** index is used for a different purpose than the indices described above. The **AIC** does not indicate how good or bad the default model fits the data; rather that it is used to make comparison among two or more default models. The model with the smallest AIC value is considered to have the best fit (see Bentler, 1990; Kaplan, 2000; Raykov & Marcoulides, 2006; Schumacker & Lomax, 2004).

Table 16 (on the following page) represents goodness-of-fit indices across all five models. From an inspection of Table 16, it can be seen that Model 2 has the best overall fit based on all indices. For all other models, the chi-square test is significant and the ratio is  $> 2$ , suggesting that these models have a poor fit. Model 1 and Model 2 have large NFI and CFI indices while NFI and CFI indices for Model 3 to Model 5 are within the range 0.74 to 0.88. Model 2 also has the smallest RMSEA index equal to 0.08, while for other models, RMSEA is 0.15 or larger.

The examination of the AIC index suggests that Model 1 and Model 2 fit the data best, as the AIC indices are 41.59 and 50.61, respectively. Even though the Model 1 has a smaller AIC index, the preferred model is Model 2, as Model 1 does not fit the data well overall according to the CMIN (the ratio CMIN to degrees of freedom is 2.53) and RMSEA (0.15) indices.

Table 16

*Summary of Fit Statistics for the Five Models in Predicting Depression*

	Model 1			Model 2			Model 3			Model 4			Model 5		
	DM	SM	IM	DM	SM	IM	DM	SM	IM	DM	SM	IM	DM	SM	IM
CMIN	7.59*	.00	141.25**	8.61	.00	153.05**	52.33**	.00	235.93**	30.95**	.00	200.49**	74.94**	.00	283.65**
DF	(3, 17)	(0, 20)	(10, 10)	(6, 21)	(0, 27)	(15, 12)	(10, 25)	(0, 35)	(21, 14)	(10, 25)	(0, 35)	(28, 7)	(15, 29)	(0, 44)	(36, 8)
NFI	.95	1.00	.00	.94	1.00	.00	.78	1.00	.00	.85	1.00	.00	.74	1.00	.00
CFI	.97	1.00	.00	.98	1.00	.00	.81	1.00	.00	.89	1.00	.00	.78	1.00	.00
RMSEA	.15	-	.45	.08	-	.38	.26	-	.40	.18	-	.31	.25	-	.33
AIC	41.59	40.00	161.25	50.61	54.00	177.05	102.33	70.00	263.93	80.95	70.00	214.49	132.94	88.00	299.65

*Notes.* \* significant at  $p < .05$ ; \*\* significant at  $p < 0.01$ ; DF = degrees of freedom; DM = default model; SM = saturated model; IM = independence model; CMIN = the likelihood ratio Chi Square; NFI and CFI – the normed and comparative fit indices, respectively; RMSEA = the root mean square error of approximation; AIC = Akaike's information criterion

## Interpretation of Model

Models 1, 3, 4, and 5 were discarded due to poor fit statistics.

As Model 2 was the best-fitting model (a ratio of  $<2$ ;  $\chi^2 = 8.61$ ,  $df = 6$ ,  $p = .20$ , large NFI and CFI indices of .94 and .98, and the smallest RMSEA index of 0.08) the relationships between the variables are set out in detail below for examination.

First, some definitions are in order. A path coefficient indicates the direct effect of one variable (cause) on another variable (effect) (Alwin & Hauser, 1975). Coefficients can be standardized and unstandardised and have the same meaning as coefficients in multiple regression analysis. Standardized path coefficients are estimated from correlations and are used to assess relative importance of each variable but cannot be compared across samples. Unstandardised coefficients are affected by the measurements of the variable and cannot be used to infer the relative importance of the variable in the study but can be used to compare models across different samples (Duncan, 1975). Below, both standardized and unstandardised coefficients are presented.

Table 17

### *Explanation of Terms Used*

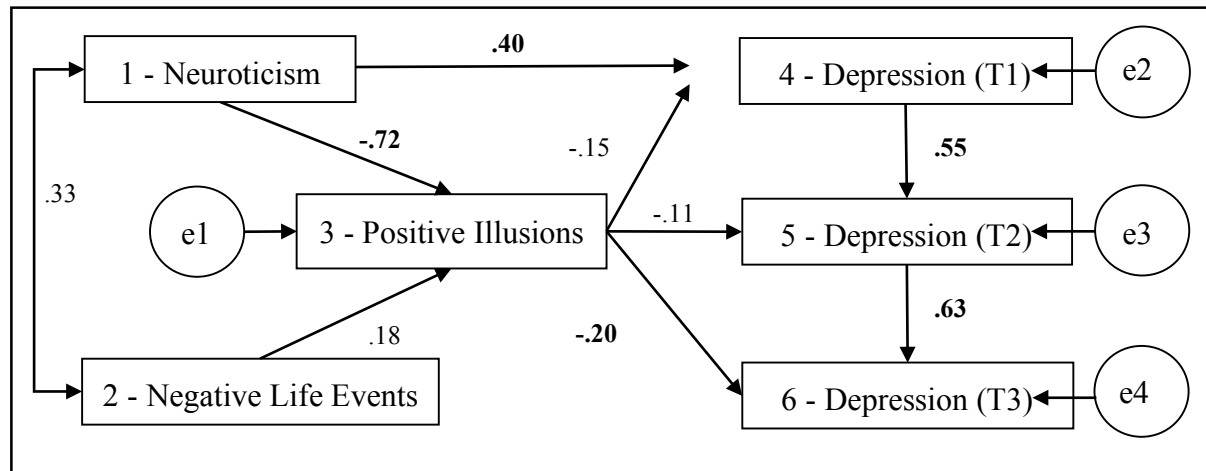
Term	Explanation
An endogenous variable	a dependent variable that is influenced by other variables in the model
An exogenous variable	an independent variable that is assumed to be measured without any error
A direct effect	a path coefficient from one variable to another
An indirect effect	a sequence of paths through one or more intermediate variables
An unanalysed effect due to correlated cause	an association due to correlation between predetermined variables
A spurious effect due to common cause	an association due to joint dependence on a prior variable
A total causal effect	the sum of direct and indirect effect between two variables
A total non-causal effect	the sum of unanalysed effect and spurious effect between two variables.

*Note.* See McDonald, 1996; Schumacker & Lomax, 2004; Stage, Carter, & Nora, 2004:

The path diagram for Model 2 is presented in Figure 8, below. The numbers along each path are estimated standardized coefficients obtained on the variables thought to be causes of it. The

numbers are in standard deviation units. For example, the path coefficient from neuroticism to positive illusions suggests that PIS score decreases  $-.72^*$  SD for each standard deviation increase in neuroticism.

**Figure 8.** Depression Path Model



*Note.* Bolded coefficients are statistically significant at  $p < 0.05$ ; Fit index RMSEA = 0.08. The diagram demonstrates that neuroticism and negative life events are exogenous variables while PIS and the square root of depression measured at three time points are endogenous variables. The error terms are represented by e1 to e4.

Figure 8 shows that Neuroticism has a direct effect on positive illusion scores and depression measured at Time 1. Negative life events scores do not have significant effects on positive illusion scores. Positive illusion scores have a direct effect on depression measured at Time 3, with higher positive illusions scores related to lower levels of depression. Depression measured at Time 1 has a direct effect on the measure of depression at Time 2, which, in turn, has a direct effect on the measure of depression at Time 3. In this model, neuroticism has an indirect effect on the depression scores at Time 2 through the depression measure at Time 1, and at Time 3 through the depression scores at Times 1 and 2. Neuroticism also has an indirect effect on depression scores at Time 3 via positive illusions (see Table 18 below). These results were predicted by the study's Hypotheses 1, 2, and 4a. Hypotheses 3 and 4b were not supported.

Similar decomposition can be done for each of the dependent variables.

Table 18 represents the path model estimates (direct effects) corresponding to the path diagram presented in Figure 2. The first column represents unstandardized path coefficients. Next to this, in the 'SE' column, is an estimate of the standard error of the path coefficient. The third column represents standardized path coefficients. Next to the standardized coefficient, in the 'CR' column, is the critical ratio (CR) obtained by dividing the path estimates by its standard error. This ratio is

relevant to the null hypothesis that, in the population from which the observed sample is drawn, there is no relationship between two variables (under the path model assumptions); i.e., the path coefficient is zero. Thus, using a significance level of 0.05, any critical ratio that exceeds 1.96 in magnitude would be deemed significant (Bentler & Bonett, 1980).

For example, consider the relationship between neuroticism and BDI at Time 1: since -7.60 is greater than 1.96, the covariance between these two variables is significantly different from 0 at the 0.05 level. The 'P' column, to the right of 'CR', gives an approximate two-tailed *p* value for testing the null hypothesis that the parameter value (path coefficient) = 0 in the population. For example, Table 18 shows that the covariance between neuroticism and PIS is significantly different from 0 with *p* = .00. The calculation of *P* assumes that the parameter estimates are normally distributed, and that the sample size is adequate. The next column presents the *R*<sup>2</sup> value that reflects the proportion of variance accounted by the equation.

Inspection of Table 18 and of Figure 8 reveals that the pathway from LEI to PIS is nonsignificant; from PIS to BDI, Times 1 and 2 are also nonsignificant. The pathways from neuroticism to depression at Time 1 and to PIS are significant; the pathway from PIS to depression at Time 3 is significant. It can be seen that neuroticism and life events accounted for 47% of the variance in the positive illusion scale (*R*<sup>2</sup> = .47) and that PIS and neuroticism accounted for 26% of the variance in depression at Time 1. PIS and BDI (Time 1) accounted for 36% of the variance of BDI at Time 2. Although the model was statistically significant and explained more than 50% of the variance in the depression at Time 3, there is still a proportion of variance that is not properly explained by the model. Other factors not included in the model may have a significant effect on depression at Time 3 and on any other endogenous variables.

Table 18.

*Path Model estimates for Model 2*

	Effect	Unstandardised coefficient	SE	Standardized Coefficient	CR	P	<i>R</i> <sup>2</sup>
Neuroticism	on PIS	-.30	.04	-.72	<b>-7.60</b>	***	.47
Negative Life Events		.47	.25	.18	1.90	.06	
PIS	on sqrt_BDI at Time 1	-.02	.02	-.15	-1.02	.31	.26
Neuroticism		.02	.01	.40	<b>2.81</b>	.01	
PIS	on sqrt_BDI at Time 2	-.01	.01	-.11	-.98	.33	.36
sqrt_BDI at Time 1		.53	.10	.55	<b>5.03</b>	***	
PIS	on sqrt_BDI at Time 3	-.03	.01	-.20	-2.14	.03	.52
sqrt_BDI at Time 2		.75	.11	.63	<b>6.86</b>	***	

Notes. PIS = Positive Illusion scale; sqrt\_BDI = Beck Depression Inventory \*\*\*+ *p* < .001.

Table 19 represents the decomposition of causal and non-causal paths in Model 2. The standardized estimates are presented to allow the assessment of relative importance of each variable. Table 18 shows effects for each dependent variable separately (i.e., PIS and sqrt BDI at Time 1, sqrt BDI at Time 2, sqrt BDI at Time 3). The first column refers to exogenous variables and the next column presents the total associations between variables; i.e., first-order correlation coefficients between two variables (in this case endogenous and exogenous variables) according to the model. Then the third and fourth columns refer to direct and indirect causal effects, respectively. The total causal effect is shown in column five. Effects caused due to correlation with other variables are presented in column six, while spurious effects are shown in column seven. The total non-causal effect is presented in the last column.

Table 19.

*Decomposition of Standardized Effects from the Path Analysis for Model 2*

Variables	Total Association	Causal Effects (CE)			Non-Causal Effects (NCE)		
		Direct Effects	Indirect Effects	Total	Unanalysed Effects	Spurious Effects	Total
<b><i>PIS</i></b>							
Negative Life Events	-.06	.18	na	-.18	-.24	na	-.24
Neuroticism	-.67	-.72	na	-.72	.06	na	.06
<b><i>Sqrt_BDI at Time 1</i></b>							
Negative Life Events	.14	.00	-.03	.03	.17	na	.17
Neuroticism	.50	.40	.11	.51	-.01	na	-.01
PIS	-.41	-.15	na	-.15	.02	-.29	-.29
<b><i>Sqrt_BDI at Time 2</i></b>							
Negative Life Events	.08	na	-.03	.03	.12	na	.12
Neuroticism	.34	na	.36	.36	-.01	na	-.01
PIS	-.33	-.11	-.08	-.19	.01	-.16	-.15
Sqrt_BDI at Time 1	.59	.55	na	.55	-.00	.05	.04
<b><i>Sqrt_BDI at Time 3</i></b>							
Negative Life Events	.06	na	-.06	.06	.12	na	.12
Neuroticism	.35	na	.37	.37	-.01	na	-.01
PIS	-.41	-.20	-.12	-.31	.01	-.10	-.09
Sqrt_BDI at Time 1	.45	.00	.34	.34	-.01	.11	.11
Sqrt_BDI at Time 2	.69	.63	Na	.63	.00	.07	.07

*Notes.* na = effects that were not present in the model and, therefore, were not calculated; PIS = Positive Illusion scale; sqrt\_BDI = Beck Depression Inventory.

As shown in Table 19 the negative life events variable has a modest negative direct effect on PIS, suggesting that the greater the number of negative events, the lower the PIS score. This is not

quite as envisioned in Hypothesis 3, which predicted that PIS scores would mediate the impact of life-event scores. In regard to the relationship between NLE and PIS at Time 1, although the total effect of NLE on PIS as shown in Table 19 is small (-.06), the casual total effect and non-casual total effects are moderate. The substantive interpretation of this result is interesting. In many analytical situations, the components yielded through decomposition are either positive or negative. In sum, the zero-order relationship of PIS and NLE is negligible, but is composed of counterbalancing effects that would go unrecognised in the absence of present decomposition. As can be seen in Table 19, there is a strong negative direct effect between PIS and Neuroticism at Time 1, indicating that the higher the neuroticism score, the lower the scores on PIS. This was as expected in the construction of the study, with Neuroticism scores showing a strong effect on PIS levels.

There is a moderate positive direct effect of Neuroticism on BDI at Time 1, along with a negligible non-casual effect. There is also a smaller negative direct effect of PIS on BDI at Time 1, suggesting that people with higher PIS scores had lower depression scores. This is as predicted by Hypothesis 2. It can be seen that, at different time points, the total causal effect of neuroticism on BDI is larger than that of the total non-causal effect, while a different pattern is observed for the relationship between PIS and BDI: at each consequent time point the total non-casual effect of PIS on BDI is decreasing and the total casual effect is increasing.

Looking at the relationship between PIS and BDI at Time 2, the total causal effect of PIS on BDI at Time 2 is negative while small, the separate direct and indirect effects are negative and quite small however, while the spurious effect is also small. At the same time, the indirect effect between neuroticism and BDI at Time 2 is very similar to that between neuroticism and BDI at Time 3.

One of the relationships of substantive interest was the relationship between PIS scores and depression scores at Time 3. As can be seen in Table 19, the total association between these variables is -.41. Decomposing this correlation reveals that the direct and indirect effects of PIS on BDI at Time 3 are both small and negative (i.e., DE = -.20 and IDE = .12, respectively). In sum, the total causal effect is moderate and negative, suggesting that the larger the PIS score at Time 1, the lower the depression level at Time 3. To assess the extent to which neuroticism accounts for the relationship between PIS and BDI at Time 3, we examined the spurious effect, but none was found. This suggests that, even when accounting for neuroticism, PIS plays a small but significant 'preventive role' on BDI scores at Time 3 in line with Hypothesis 1.

## Path Models for Anxiety

Path models were also constructed with anxiety as the dependent variable. This exercise was performed to test whether the relationships of interest were specific to depression as hypothesised, or whether they are non-specific and related only to general types of stress or psychopathology. Hence, the same pathways were employed to examine the relationship between PIS, neuroticism, negative life events, self-esteem and level of anxiety at different time points; though as mentioned, the effect was predicted to be weaker or non-significant.

Table 20.

### *Path Analysis Model Summary*

Measure	Model 1	Model 2	Model 3	Model 4	Model 5
BAI at time 1					
BAI at time 2					
BAI at time 3					
Neuroticism					
PIS					
Negative life events					
Self-esteem Time 1					
Self-critical Cognition					

In Table 20, the grey blocks mark the variables that were used. Hence, self-esteem at Time 1 is present in both Models 3 and 5, and self-critical cognitions are present in Models 4 and 5.

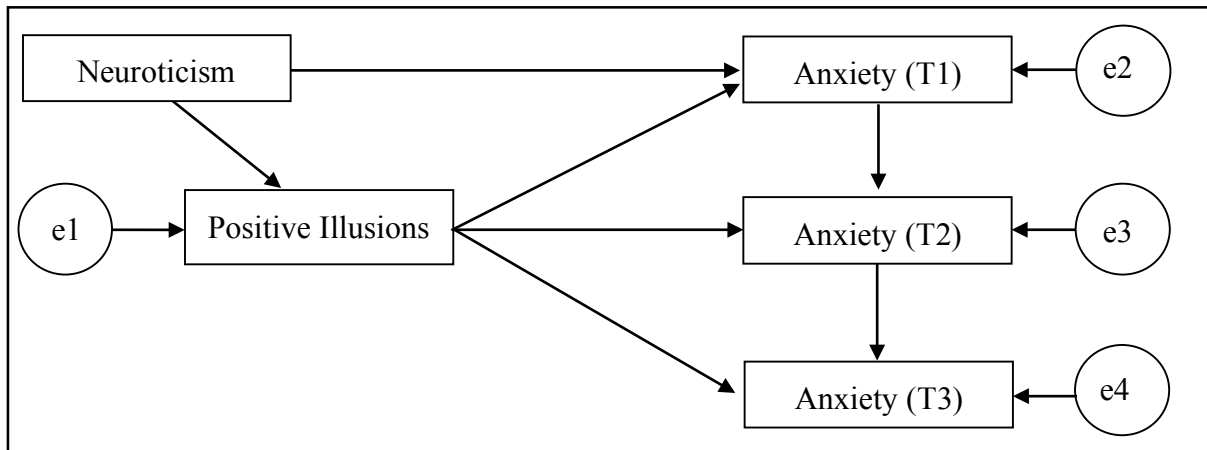
## Path Analysis – Anxiety

Five models of increasing complexity were developed, to provide the opportunity to test that the hypotheses presented, were specific to depression and not replicated for anxiety outcomes. The complexity of the data lent itself to this many proposals. The path models roughly correspond to those in the depression section above, for clear comparison.

Path diagrams corresponding to each model are presented below (Figures 9-13).

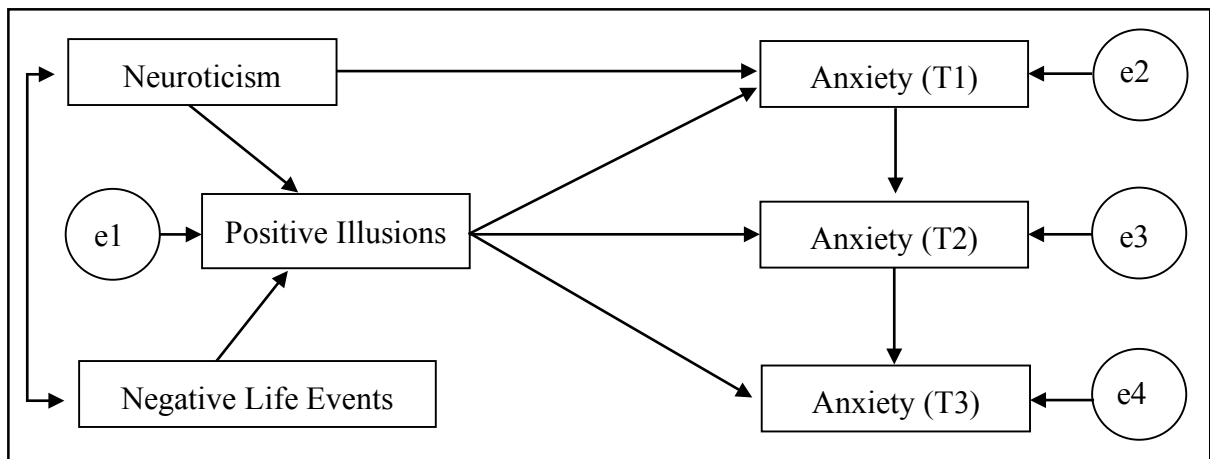
**Model 1.** Here, in Figure 9 as in Model 1 for depression, neuroticism (N) is a setting variable which partly determines the level of positive illusions (PIS). It is predicted that low N will result in higher PIS and hence, lower anxiety at all three time points (see Hypotheses 5, 6, and 8a).

**Figure 9.** Path Analysis Model 1



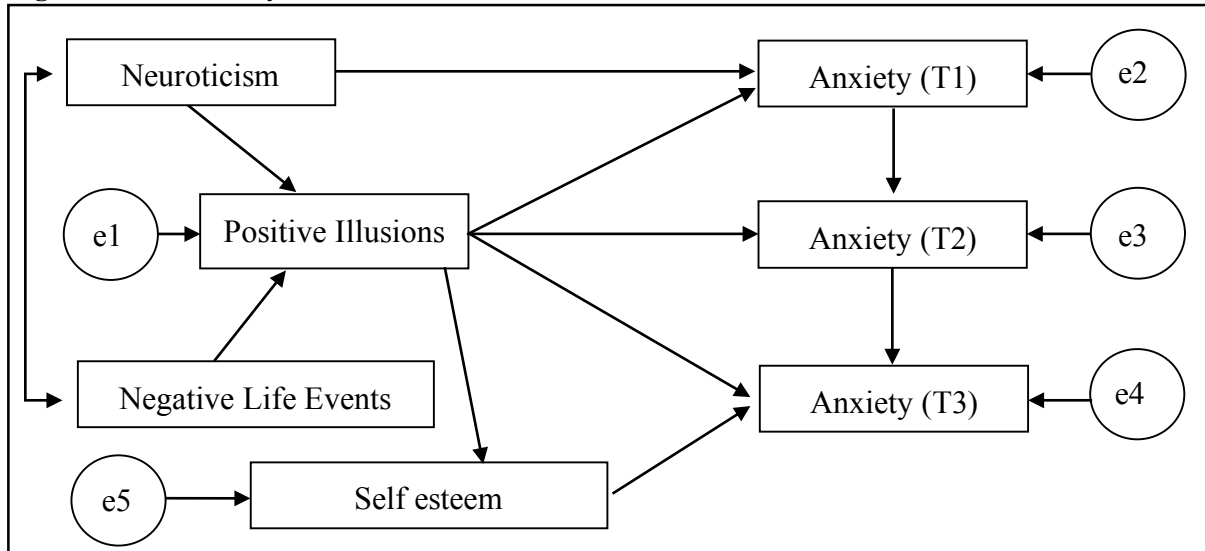
**Model 2.** Here in Figure 10, while neuroticism influences PIS, PIS mediates the effect of life events upon scores for anxiety at each time point (see Hypotheses 5, 6, 7, 8a and 8b).

**Figure 10.** Path Analysis Model 2



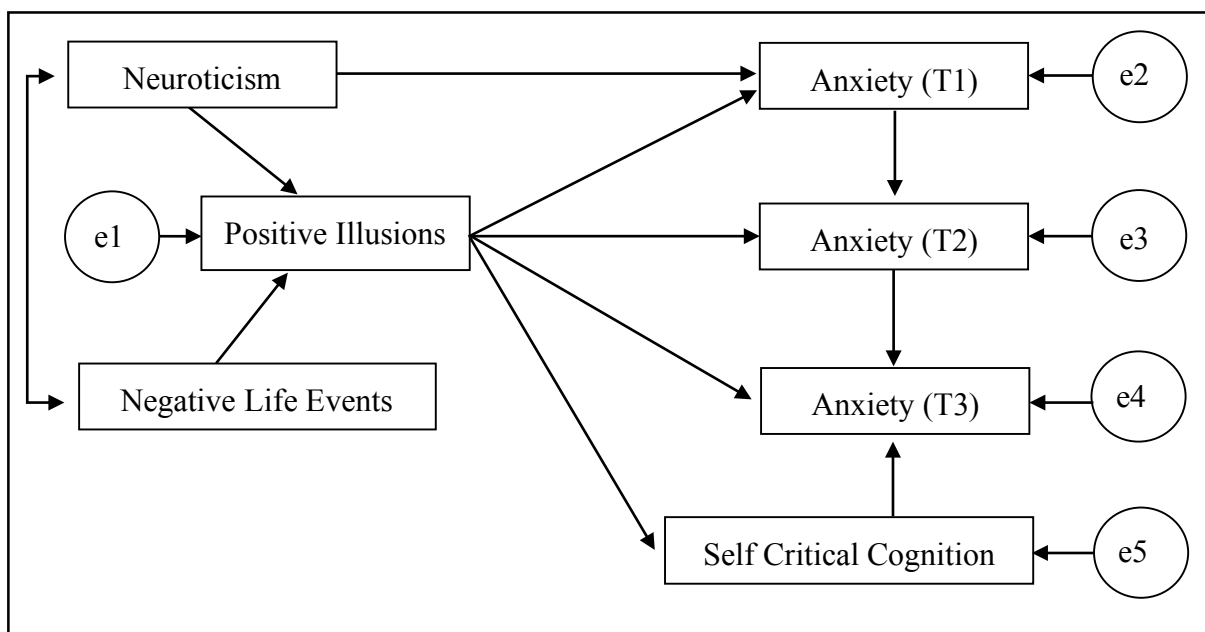
**Model 3.** Following on from the model above and as shown in Figure 11, neuroticism influences PIS scores, PIS mediates the effect of life events, and PIS also has an impact upon self-esteem, which in turn affects anxiety scores along with PIS and N (see Hypotheses 5, 6, 7, 8a, 8b and 8c).

**Figure 11.** Path Analysis Model 3



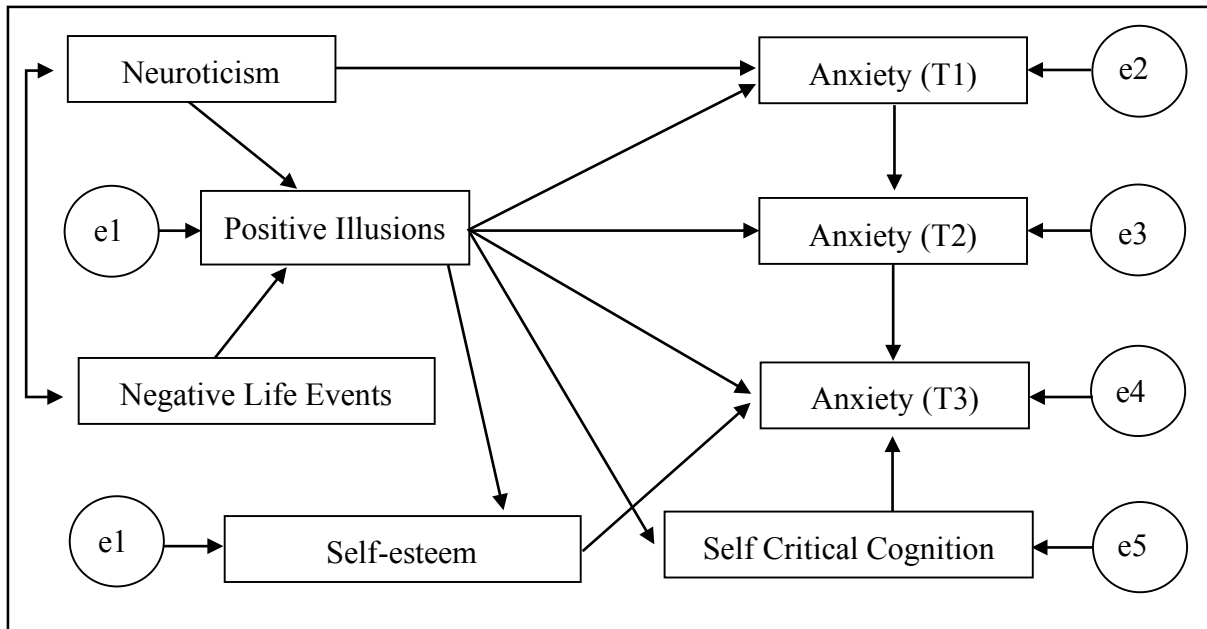
**Model 4.** Here and as shown in Figure 12, in addition to neuroticism affecting PIS scores and PIS mediating the effect of life events, the influence of PIS upon self-critical cognition is examined at Time 3. SCC also influences scores for anxiety (see also Model 2 above). (see Hypotheses 5, 6, 7, 8a, 8b, and 8d).

**Figure 12.** Path Analysis Model 4



**Model 5.** As shown in Figure 13, in addition to neuroticism influencing PIS scores and PIS mediating the impact of life events, PIS affects self-esteem levels and self-critical cognitions – the both of which latter variables impact upon the outcomes for anxiety (see Hypotheses 5, 6, 7, 8a, 8b, 8c, 8d and 8e).

**Figure 13.** Path Analysis Model 5



In analysing the validity of the models, the first step was to examine the model fit. A good-fitting model is the one that can reproduce the correlation (variance/covariance) matrix with little error from the path coefficients. (Kaplan, 2000; Raykov & Marcoulides, 2006; Schumacker & Lomax, 2004). Goodness-of-fit statistics were once more used and shown in Table 21.

Table 21.

*Summary of Fit Statistics for Anxiety*

	Model 1			Model 2			Model 3			Model 4			Model 5		
	DM	SM	IM	DM	SM	IM	DM	SM	IM	DM	SM	IM	DM	SM	IM
CMIN	13.14**	.00	144.90**	17.88**	.00	160.42**	63.32*	.00	246.10**	36.57**	.00	207.10**	84.51**	.00	295.28**
(DF)	(3, 17)	(0, 20)	(10, 10)	(6, 21)	(0, 27)	(15, 12)	(10, 25)	(0, 35)	(21, 14)	(10, 25)	(0, 35)	(7, 28)	(15, 29)	(0, 44)	(8, 36)
NFI	.91	1.00	.00	.90	1.00	.00	.74	1.00	.00	.82	1.00	.00	.71	1.00	.00
CFI	.93	1.00	.00	.92	1.00	.00	.76	1.00	.00	.85	1.00	.00	.73	1.00	.00
RMSEA	.23	-	.46	.18	-	.39	.29	-	.41	.20	-	.31	.27	-	.33
AIC	47.14	40.00	164.90	59.90	54.00	184.42	113.32	70.00	274.10	86.57	70.00	221.10	142.51	88.00	311.28

Notes. \* = significant at  $p < .05$ ; \*\* = significant at  $p < .01$ ; DM = default model; SM = saturated model; IM = independence model; CMIN = the likelihood ratio Chi Square; NFI and CFI = the normed and comparative fit indices, respectively; RMSEA = the root mean square error of approximation; AIC = Akaike's information criterion.

It can be seen from the summary of fit statistics outlined in Table 21 that none of the models represented the data well in the path models for Anxiety. For all models, the CMIN and RMSEA indices were very poor. With an AIC index of 47.14, Model 1 probably fits the data best, but due to the poor key fit statistics, this was unlikely to be a significant finding.

*Therefore, all of the proposed models for anxiety can be rejected.* There are two possible reasons for these results. First, the models may be poorly specified: it might be that the mechanism of anxiety is different from the mechanism of depression and the same theoretical models cannot be applied. A solution may be to re-think the theoretical model. Secondly, the large standard errors of estimates suggest that results are highly driven by sample size and the small sample sizes make it difficult to detect effects, causing low statistical power and poor model fit. A solution may be to survey a larger number of people.

## **Conclusion**

This final study shows that PIS and Neuroticism scores at one time point influence subsequent scores on depression, and that to some extent the impact of positive illusions is independent of the impact of the Neuroticism construct. As predicted in the Introduction to these studies, whilst positive illusions have an impact upon depression scores, this is a specific effect and does not seem to extend to anxiety.

## CHAPTER 9: Discussion

This series of three studies aimed to test the positive illusions construct, as initially proposed by Taylor and Brown (1988). The studies asked whether a reliable positive illusions scale could be developed which was an accurate representation of Taylor and Brown's (1988) ideas; whether the positive illusions construct itself would be a valid entity which related to other existing psychological constructs as had been predicted, and whether it would be independently predictive of depression, in particular.

In this Chapter, the overall results of the three linked studies are briefly reviewed, and conclusions are drawn about the validity of positive illusions both as an entity and as measured by the specific scales produced. The concept's relevance to buffering mechanisms against depression as well as its potential contribution to future psychological interventions and conceptualisation are explored.

Depression is a highly prevalent disorder (American Psychiatric Association, 2013; World Health Organisation, 2012) that causes highly disruptive impacts in the arenas of health, personal safety, family functioning and productivity (Stephens & Joubert 2001; World Health Organisation 2010). This study did not examine aetiological questions in relation to depression – but positive illusions - a factor which may aid in prevention, and in the maintenance of wellbeing. Taylor and Brown (1988) proposed that robust people use several types of strategies to maintain a positive mood and avoid lowered mood as a result of everyday negative events. However, even though the positive illusions concept has been cited and mentioned many times as a key psychological element in this process in the literature, it has never been adequately operationalised.

A new study which has recently come to light and close to the submission of this thesis, is that of Collard, Cummins, and Fuller-Tyskiewicz (2016) who developed a measure of “positive irrational beliefs” which they also termed positive cognitive illusions, after Taylor and Brown's (1988) construct. The Collard et al. (2016) study examined the relationship of positive illusions to subjective wellbeing; however the present author preferred to follow more closely the streams of literature concerned with vulnerability towards depression, and factors found relevant to robustness. Negative automatic thoughts and a predisposition to negative affect are accepted vulnerability factors for depression (Kendall et al., 1989), and so positive illusions (which deflect

attention away from these) were proposed in this study as both protective factors against depression and also as likely to be inversely related to depressive symptoms. Longstanding constructs such as defensiveness and denial (Freud, 1945; Lewin, 1950) seemed likely to be closely related to the concept of positive illusions, and so it was important to examine the pattern of relationships between these, depression, and the positive illusions concept. Similarly, parallels to hypermania needed to be explored in case this important construct overlapped with positive illusions, or, that positive illusions may be just a part of the “manic defence” (Winnicott, 1965). Deflecting negative feedback from the environment over minor events and hence avoiding negative rumination, seems likely to be supportive of self-esteem. Hence, the relationship between self-esteem and positive illusions was also explored.

Neuroticism is now known to be a very large “setting factor” in many disorders (Jacobs et al., 2011), and so close attention was also paid to the degree of overlap positive illusions displayed with this construct. While depression is the major area where diversion, deflection, and positive re-explaining is likely to be of benefit, it was necessary to check that illusions did not just have a diffuse and non-specific impact upon general types of psychopathology. Finally, it was important to test not only the PIS construct, but the way it related to other psychological entities over time, to see whether it was a stable phenomenon and if it showed unique predictive influence over outcome variables.

## **Overview of Main Results**

The group of studies appeared to be largely successful: a reliable positive illusions scale was devised; the construct related as had been predicted with key constructs such as self-esteem, denial, and defensiveness. Positive illusions were independent at least in part from Neuroticism, and showed some independent predictive power over outcomes for depression. There were some surprises however in relation to the role of attributional style, the role of life events, and the predicted interactions between positive illusion scores, self-esteem scores, and Life Event Distress scores in the prediction of depression. (See the “Analysis of Results with Reference to Hypotheses” below).

In the first of three empirical studies, an initial attempt to construct a measure of PIS produced an initially poor and loosely constructed scale. In Study 2, a second more refined attempt resulted in a PIS measure that showed good reliability and stability (i.e., no significant differences in PIS scores between varying time points). In Study 2 as in Study 1, positive

illusions as measured correlated positively with self-esteem, denial and defensiveness, and negatively with depression.

In Study 2 a 2-factor structure was observed, with the first factor indicating personal agency and connection to positive outcomes and the second a positive response to adversity. Concurrent validity was good (with the Defensive Positive subscale of the Tennessee Self-Concept Scale). In the second study, the PIS measure also correlated negatively with anxiety – though the relationship was not as strong as that with depression. Defensiveness correlated positively with self-esteem and denial, and denial, defensiveness, and self-esteem all correlated positively with PIS. The PIS measure appeared reliable, stable over time and correlated with other constructs in the way predicted by the major hypotheses. It was internally consistent and using this scale, positive illusions could be differentiated from other related constructs. Positive illusions also acted as an independent predictor of depression scores in a hierarchical regression analysis.

In Study 3A, the PIS scale shared 20% of the score variance with the BDI and 39% of the score variance with self-esteem scores. PIS scores at Time 1 predicted a significant proportion of self-esteem and depression scores. Participants' outcomes were poorer if they had experienced negative life events and did not show high PIS score levels and the higher the PIS scores, the lower the scores for depression and anxiety. Hence, the strongest relationships for positive illusions were with depression and self-esteem, as had been predicted. In Study 3A, the factor structure for the PIS scale was consistent with that for Study 2 – representing the same two constructs, and with largely the same items loading onto the two factors.

In Study 3A, some results were equivocal, with Neuroticism scores washing out the correlations between PIS and depression. However, the Path Analysis in Study 3B indicated that while Neuroticism had a direct effect on PIS and depression scores at Time 1, PIS scores also had a direct effect on depression at Times 1, 2, and 3 with higher PIS levels related to lower depression scores. Neuroticism did influence positive illusions as had been expected, showing an indirect effect on depression scores at all time points through PIS scores. This indicates that the positive illusions construct is a mediating variable for the effect of Neuroticism upon depression at all time points measured.

## **Analysis of Results with Reference to Hypotheses**

Study 1 sought to explore one of the most basic questions about the positive illusions construct - could a reliable measure be constructed which accurately represented the construct? Furthermore, did the construct, as measured, relate as predicted to the key criterion measures of depression and anxiety, defensiveness, denial and self-esteem? It transpired that Factor 1 in the first version of the Positive Illusion Scale appeared to be relatively reliable, while Factor 2 demonstrated poor reliability and internal consistency. Hence, the next study (Study 2) focused on making a number of improvements to the psychometric operationalisation of the positive illusions construct.

While the first draft of the positive illusion scale showed low reliability and an unclear factor structure, in Study 1's correlational analysis the positive illusion construct mostly related to other constructs as had been predicted: Hypotheses One to Four - that scores for positive illusions would correlate negatively with scores for depression, and positively with self-esteem, denial, and defensiveness, were all supported – in both Study 1 and Study 2.

Hypothesis Five, which predicted that scores for depression would correlate negatively with scores for self-esteem, was also supported. The correlation between denial and higher self-esteem, which was predicted by Hypothesis Six also performed as expected; however, the negative correlation between denial and depression scores, proposed by Hypothesis Seven, showed a very small effect size, possibly indicating that denial did not play a key role in protecting against depression.

Study 2 sought to improve the measurement of the positive illusions measure and indeed the reliability of the refined scale (PIS 17) did improve. Test-retest correlations showed that there was no significant difference between scores taken at Time 1, and those for Time 3, suggesting some degree of stability at the group level. A 2-factor structure was again the best representation of the data. The two factors appeared to represent logical groups of items reflective of the Positive Illusions construct. The first factor, termed “Optimistic Internal Locus of Control” - indicated personal agency and connection to positive outcomes, and the second “Positive Response to Adversity” reflected the “Downgrading of the Negative” concept. Factor analysis for this scale showed two clear factors with no overlapping items. This appeared to indicate that Taylor and Brown's (1988) concept of positive illusions could be fairly well represented in a

scale, and that this scale showed good reliability and appropriate relationships with important constructs.

A further hypothesis (Hypothesis 3) predicted that positive illusions would be related to not only the level, but also to the stability of self-esteem. The indications for this were equivocal, leading to a lack of clarity at this stage about the inter-relationship between self-esteem, illusions and the pathway to depression. The fourth hypothesis related to the role of life events. For positive illusions to be an effective factor in maintaining mood through distressing times, positive illusions were predicted to moderate the impact of distressing life events, producing lower depression scores as a result (See Chapter 3). No such moderation effect was found.

In the third Study (Part A), a two-factor structure remained the best representation of the data. These two scales again represented “Optimistic Internal Locus of Control” and “Positive Response to Adversity” reflected the “Downgrading of the Negative” concept. While the total PIS (this time 19-item) scale again correlated with the BDI at Time 1 (consistent with Hypothesis One), the regression analysis appeared to indicate that positive illusions did not contribute to the variance in depression scores independently of other predictor variables. Thus, this hypothesis (Hypothesis 2) was not supported. However, this was at variance with the findings for PIS and depression in Studies 1 and 2. It seems likely that in this phase of the studies, the effect size was small. However, closer examination of the causal pathways in Study 3B re-confirmed that positive illusions do have an impact upon depression scores over time independent of other variables – although the amount of variance accounted for is small. Interactions were predicted among positive illusion scores, self-esteem scores, and Life Event Distress scores; but with the interaction terms being correlated to a degree, further analysis was not pursued. Thus hypotheses 4 and 5 were not supported.

In the final phase of the analyses (Study 3B) path analysis was used to address the questions as to how positive illusions might influence outcome variables over time. The best-fitting model (Model 2) indicated that Positive illusion scores did have a direct effect on depression measured at Time 1, Time 2, and Time 3, with higher positive illusions scores related to lower levels of depression. Hence, the three major questions raised for these studies were answered with confirmatory results.

## **Experimental Questions and the Extant Literature**

This section considers the main issues in the thesis and their relevance to the literature. These issues are the reliability and validity of the positive illusion scale; its performance in predicting depression, its relationships with other psychological constructs, its relationship to neuroticism, self-esteem, and life events in particular; and how Taylor and Brown's (1988) outline of positive illusions links into the field of positive psychology, and how this positive illusion scale and its vision of the construct contributes to positive psychology.

The recent study of Collard, Cummins, and Fuller-Tyskiewicz (2016) developed a measure of "positive irrational beliefs" (also termed positive cognitive illusions, after Taylor and Brown's (1988) construct). Somewhat like the present thesis, these authors used two linked studies to develop a scale and check the factor structure; and then re-check the factor structure and examine the predictive power over an outcome variable. Similarly to the present scale's development these authors proposed four categories of positive illusions (as compared to Taylor and Brown's (1988) three categories) – with the additional one also being a variant of our "downgrading of the negative". However, this is where the similarities appear to end. Collard et al.'s (2016) initial 21 items excluded the illusion of personal control types of operation described by Taylor and Brown (1988). The items in the scale were not checked or rated by clinicians or academics and their wording appears to be rather broad (e.g. "I am perfect" and "I never misjudge situations") thus rendering them less precise and less easy to identify with, for the participants. The wording of the items also seemed to render them lower in credibility which might lead to hesitation in their endorsement, e.g., "I do not fail at anything I do" – which may be too far from a natural and commonly-occurring self-protection strategy. This is in contrast to the style of the Positive Illusion Scale developed in this thesis, which includes "I'm especially good at the things which matter" and "I make my own good luck" – which are probably easier to identify with and appear more naturally to reflect self-talk styles. Additionally, there were no reverse-anchor items, which risks the soundness of the scale in terms of response style.

The Collard et al. (2016) study may have had more limited aims as it set out to examine the relationship of positive illusions to subjective wellbeing. However, this more simple study structure failed to test its construct against other related and well researched psychological constructs (such as denial and defensiveness) and also failed to test its utility as a predictor over important psychological phenomena such as anxiety and depression. In not doing so, few conclusions can be drawn over whether it has any specificity over its one outcome measure – or

whether (if other outcome variables had been included in the study) it could have been just as closely related to something completely non-specific such as music preferences. Their study also did not check the new construct against other constructs which could have subsumed it (such as Neuroticism or Attributional Style). The Collard et al. (2016) study whilst tapping into a broader demographic by randomly approaching adults, completely failed to screen them for their current mental state. Hence, unknown factors were likely to be influencing the response set (such as recent negative life events, existing depression and anxiety, and even hypermanic states) and these issues would also be likely to affect the relationship between the new construct and the outcome measure (subjective wellbeing) and this was not controlled for. The study by Collard et al. (2016) conceptualised positive illusions in a similar way to the present study; as in our study, there was a predictive relationship, though this was a modest one (and their study did not link the operation of positive illusions to similar constructs such as defensiveness). Their study found one over-arching factor, similar to our current Factor 1. However, since no reliability analysis was published for Collard et al. (2016) it is harder to see what their items and factors actually mean.

As can be seen, in this thesis the adjustments made between Study 1 and Study 2 did appear to result in a measure which demonstrated construct validity, reliability and consistency of performance over time. A 2-factor structure was clearly the best representation of the data.

The two factors appeared to represent logical groups of items reflective of the Positive Illusions construct – and the factor loadings were very consistent across Studies 2 and 3. The first factor, termed “Optimistic Internal Locus of Control” indicated personal agency and connection to positive outcomes, and the second “Positive Response to Adversity” reflected the “Downgrading of the Negative” concept. Factor analysis for the PIS scale showed two clear factors with no overlapping items.

Table 1.

*Items in Factors 1 and 2*

<p>Factor 1 Items: in both Study 2 and Study 3</p> <p><i>Factor 1:</i></p> <p>Item 10: If I fail, I'll forget it quickly</p> <p>Item 15: I make my own "good luck"</p> <p>Item 16: I have control over what goes right and wrong</p> <p>Item 17: I am the master of my destiny</p> <p>Item 25: There are mostly good things to look forward to</p> <p>Item 26: I spend a lot of time having daydreams about pleasant events in my future</p> <p>Item 27: I think things will improve for me, in the future</p> <p>Item 28: I think I'm more likely than my friends, to have the things I want in the future</p>	<p>Factor 2 items: in both Study 2 and Study 3</p> <p><i>Factor 2:</i></p> <p>Item 1: I keep up my standards of behaviour consistently</p> <p>Item 2: I'm happy with my moral standards</p> <p>Item 4: I have more good qualities than people around me might realize</p> <p>Item 5: I'm especially good at the things that matter</p> <p>Item 7: Considering what's going on in my life, my coping is above average</p> <p>Item 8: I do not let the things I am no good at, get me down</p> <p>Item 14: When someone I know criticizes me, I do not take it to heart</p>
<p><i>Factor 1:</i></p> <p>Study 3 only</p> <p>Item 11: I write off my bad behaviours to experience</p> <p>Item 23: I think I am more likely than most people, to achieve what I want in the future</p>	<p><i>Factor 2:</i></p> <p>Study 3 only</p> <p>Item 13: I do not spend much time thinking about the negative aspects of my personality</p>
	<p><i>Factor 2</i></p> <p>Study 2 only</p> <p>Item 19: I can control most of the outcomes in my life</p>

These factors, as well as fitting closely with Taylor and Brown's (1988) original concepts also relate to the literature on emotion regulation. Gross and Thompson (2009) for example, proposed a model where a situation is identified, then attention is applied to salient aspects of the situation, and finally appraisal is applied in the checking and regulating of a subsequent emotional

response. According to these authors, this process can range from being entirely implicit to completely explicit within the person's cognitive processing. This continuum mimics responses in other areas which can either be so well-learned that they need little overt cognitive processing or attention, or alternatively, can be carefully worked through if the situation is more complex. A shifting skills-based process such as this can be seen in people handling everything from social situations to mustering cattle or racing dirt bikes; in any of these situations, well-practised and implicit routines can be applied where the series of events is highly familiar. Where it becomes unfamiliar, overt analysis can be applied to the situation to assist in devising the appropriate response set. In relation to positive illusions, responses could be generated almost automatically to "Downgrade the Negative" if a person is well-practised, or else the person could use a deliberate strategy set (e.g., the use of optimistic locus of control and a future-based set of cognitions) where events become challenging.

However, Taylor and Brown's (1988) focus was not so much upon emotion regulation per se, but in exploring possible positive biases in processing. Their achievement was to collect, conceptualise and collate diverse phenomena, suggesting that these strategies are used by people to protect themselves and assist in motivation. In describing what they were proposing, they were inclusive, and needed to list each type of stratagem or operation proposed. For example, Taylor and Brown (1988) described illusions of control, and unrealistic optimism for the future. These two groups of strategy seem quite distinct and can be separately described – and they are probably worth studying in their own right. However, these two entities merged statistically within the present studies' first factor. As was seen in Study 1, merely collecting as wide as possible a set of positive illusion-like items does not make for a cohesive measure.

As mentioned in the Introduction (Chapter One) the second hypothesis in Study 2 predicted that scores for positive illusions would make a significant and independent contribution to the scores for depression. This is really the crux of the predictions for positive illusions: Taylor and Brown's (1988) main arguments were that positive illusions would be both strengthening and able to avert potential negative states. Hierarchical regression analyses showed that PIS scores alone, only accounted for 1% of additional variance over and above other predictive variables (i.e., the MMPI Dn scale and self-esteem), but nevertheless that this was a statistically significant addition to the model. This begins to indicate that positive illusions may indeed show some very limited utility in helping to prevent significant symptoms, although obviously this idea will need testing using rigorous designs such as longitudinal studies and standardisation in measures. One of the

aims of the current study was to test this concept as thoroughly and empirically as possible at this beginning stage and especially in relation to depression: in the mass of theory building which has characterised positive psychology, empirical rigour has sometimes apparently not been the highest priority. For example, while Mak, Ng, and Wong (2011) found that positive views of the self, the world and the future (termed the “positive triad” in positive psychology literature) indicated resilience and that the latter was negatively related to depression, it is obvious that such positive cognitions are likely to be inversely related to depression and so an experimental design needs to control for this; however the Mak, Ng and Wong (2011) study failed to do so. The methodology used in testing out new concepts is important, and has often been weaker in the area of positive psychology research, which makes it harder to draw clear conclusions. For example, the concept of happiness is a central one in positive psychology, but it is far from clear that a reliable measure of happiness has been developed. Some studies have found that having children is linked to happiness (Angeles, 2009) but this is contradicted when specific measures of depression and anxiety are introduced: here, parents of children are found to have elevated levels of these problems (Evenson & Simon, 2005; McLanahan & Adams, 1987). Other authors have used meta-analysis techniques such as in the Sin and Lyubomirsky (2009) study which reviewed 51 studies of positive psychology interventions and found them to be predictive of reduced scores for depression. However, with positive psychology interventions singularly lacking in standardisation and with outcome measures also varying (Layous et al., 2011; Mak et al., 2011) methods need to be more controlled in order to draw clear links about the utility of specific interventions and their clinical outcomes.

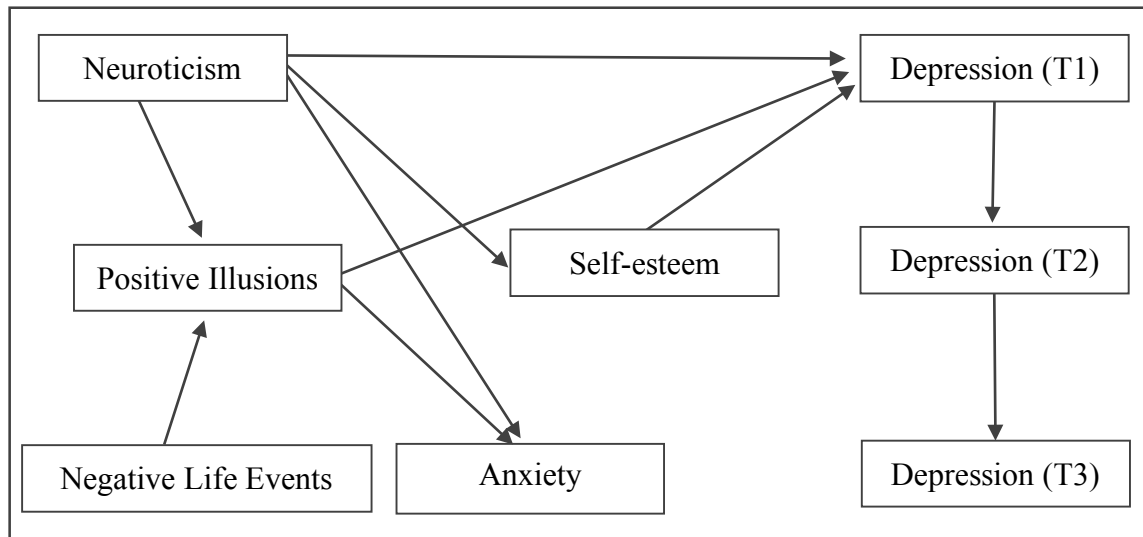
Testing the relationship between positive illusions and depression was central to this group of studies. Study 2 (which used a measure with improved reliability) showed that the PIS correlated negatively with depression, and that the PIS and the BDI shared a significant amount of score variance, indicating a significant association between the constructs. In fact, in this study the closest associations were between the PIS, depression and self-esteem. Higher self-esteem and higher overall PIS predicted significantly lower depression. In Study 2’s correlation analysis positive illusions, denial and defensiveness showed very similar levels of correlation to depression – and to each other, implying that there may be a grouping of phenomena which act similarly or together to influence depression outcomes. The PIS related consistently to other constructs, and at this phase of testing it showed independent prediction of depression scores though as an entity it only explained an additional 1% of the variance for depression. More will be discussed about this later. Positive illusions were associated with lower depression, and major

life events with higher depression. In contrast to expectations though, no moderation effects were found.

The basic formulation of this group of studies is that positive illusions are a self-protective human mechanism which, whether innate or taught/modelled, are used as a buffering technique when mild to moderately threatening or ambiguous self-relevant information confronts the person. Given that this set of operations is deflecting of negative feedback, supportive of continued motivation, and ego self-supporting (Taylor & Brown, 1988), it is likely to be related (and co-existing within the person) to well-known constructs such as denial, defensiveness, positive attributional style, and possibly a manic defensive style. Since this group of processes is protective and would tend to avert negative affect, it should theoretically also be related to low Neuroticism, as optimism, self-esteem, and mastery are all highly correlated (Judge, Erez, Bono, & Thoresen, 2002). The main aim of this group of operations is at averting self-doubt, self-critical cognitions, rumination, self-esteem damage, and hence, lowered mood. Such a set of operations may have the secondary effect of lowering anxiety processes but this would be a generalised impact and not the ‘target’ which is depression – since self-doubt, self-critical cognitions, rumination and low self-esteem are characteristic of depression (Charney et al., 2003; Coyne & Wiffen, 1995; Eisenbarth, 2012; Orth, Robins, & Meier, 2009). Our contention was that the positive illusion process especially, would tend to be supportive of self-esteem over time – and hence, be related to both higher self-esteem levels and more stability in self-esteem.

Within a single timeframe, we would expect that a person showing high levels of positive illusions would also show higher levels of denial and defensiveness, and of positive attributions. Depression would be lower. Over time, the self-protection mechanisms would mean that depression would continue to be lower (with the possibility of some intervening stressors) and self-esteem would be higher and show greater stability. Anxiety levels would be lower but this effect would be weaker than for depression. In the event of a stressor, we expected that positive illusions use would increase to assist coping – and that this would moderate the impact upon depression.

**Figure 1.** Impact of Positive Illusions upon Outcome Measures



The diagram shown in Figure 1 illustrates that Neuroticism was expected to operate as a setting factor for positive illusions to some degree. In the event of negative life events, positive illusions would be activated and become a mediating factor between the life event and subsequent depression. Positive illusions would also affect the level of anxiety, and self-esteem would be influenced via Neuroticism. In Study 3B, path analysis did indeed show that the total causal effect is moderate and negative (suggesting that the larger the PIS score at Time 1, the lower the depression level at Time 3). Even when accounting for neuroticism, PIS plays a significant ‘preventive role’ on depression level scores at Time 3.

In line with what the theory indicated, the relationship between PIS and anxiety was weaker and less specific than that for PIS and depression. In Study 2 and Study 3A the correlation coefficients between PIS and anxiety were lower than for depression.

In the hierarchical regression, predicting anxiety scores and positive illusion scores did not add significant variance over and above self-esteem and the MMPI Dn scale in accounting for Anxiety levels, in contrast to the results for PIS and depression. In Study 3B none of the models represented the data well in the path models for Anxiety. The core of these results is the demonstration that across the studies where the PIS measure had been refined, relationships between PIS and depression were strong, consistent and showed predictive power independent

from that of other constructs used in the studies, and that positive illusions related to anxiety more weakly and with less specific effect.

Within the framework described above, the role of self-esteem appeared to be an important one. Our review of the literature seemed to indicate that self-esteem and positive illusions would influence each other (Paulhus et al., 2003). We predicted that both the 2-way interactions between positive illusion scores and self-esteem scores and the 3-way interactions between positive illusion scores, self-esteem scores, and Life Event Distress scores would predict scores for depression at Time 1. It turned out though, that the interaction terms were correlated too highly to proceed with a valid analysis. For an interaction to be clearly understood, the factors at hand need to be clearly distinct from one another. If not, potential interactions are open to misinterpretation and the wrong conclusions can be drawn where the actions of different factors cannot be properly separated out. In this case, positive illusions and self-esteem may be too closely related for us to examine interaction effects. Two independent constructs can be highly correlated yet still be independent of each other – while they are measures with convergent and divergent validity they can be related without causality. Hence, there are statistical reasons influencing whether an interaction analysis is feasible – for example, in cases of high collinearity. While they are measures with a degree of convergent validity, they may still represent independent constructs (Everitt & Dunn, 1991).

We predicted that scores for depression would correlate negatively with scores for self-esteem, and this was clearly supported. This has been widely observed in the depression literature (e.g., Brown & Harris, 1978; Eisenbarth, 2012), which of recent times has almost taken it as read that depression and self-esteem (especially when depression is at a symptomatic stage) will be inversely related (Roberts, 2006). However, in Chapter 2 of this study it was predicted that positive illusions would be related to not only the level, but also to the stability of self-esteem. Hence, we asked, would participants with stable self-esteem show significantly higher levels of positive illusions than those with unstable self-esteem (Hypothesis Three)? The indications for this were equivocal, leading to a lack of clarity at this stage, about the inter-relationship between self-esteem, illusions and the pathway to depression. The literature on the topic of self-esteem stability is still unclear though: while Butler, Hokanson, and Flynn (1994) using a prospective design, had found that labile self-esteem affected the impact of life events upon depression, Roberts and Gotlib (1997) also utilised a 6-week prospective design to examine the interaction between life events and self-esteem lability in predicting depression. The latter's

study found that self-esteem lability was mainly a predictor of depression in people who: a) had a prior history of significant depression and b) who only experienced low depression levels before the life event.

Since the death of the major researcher Michael Kernis in 2009, many articles on self-esteem stability have been theory-building or speculative. Orth, Robins, and Roberts (2008) for example, proposed that unstable self-esteem was more likely to play a role in the *development* of depression rather than underpinning depressive symptoms once the disorder has developed. He speculated that people with unpredictable self-esteem might either struggle to utilise reliable proactive responses, or may experience a spread of negative self-appraisals during a negative event. Although our study supported the notion of self-esteem stability as a separate entity (self-esteem instability showed low correlations with the absolute level of self-esteem at the three time points), we found that in this participant group there was very little instability in self-esteem; individual differences in self-esteem were highly stable over the three time points. It is possible that this could be an artefact of the participant group – either by reason of young age, life stage, socioeconomic status, education levels, or the relative lack of multiple life issues co-occurring (e.g., work/partnerships, children, home duties) that tend to characterise other life stages.

It is rather frustrating to note that with regard to self-esteem as a variable in Study 3, as an interaction term it was found to be highly correlated with other variables and in the path analysis, the model with the best fit (Model 2) did not incorporate self-esteem. It seems that the influences of self-esteem upon and by other variables may be complex and simple correlations in this context, will not be adequate to shine a light upon the relationships it has with other factors and with environmental influences. For example, Sowislo and Orth (2012) found indications that while self-esteem predicts depression and depression is not predictive of self-esteem, self-esteem and anxiety seem to influence each other mutually (Simpson et al., 2010) examined other variables and found that alongside self-esteem, self-disgust was a second mediating factor influencing the relationship between potentially dysfunctional cognitions and the outcome of depression.

Roberts (2006) proposed that unstable self-esteem may have negative impacts by either interfering with the clear internal modelling of coping responses, may predispose to anger, or may lead to a pattern of primarily seeking reassurance, so greatly increasing stress generation at critical junctures. Hence, under difficult circumstances, we would expect that stable and high

self-esteem would act as a protective factor for depression, optimising help-seeking, promoting clear internal models of coping through a sense of agency, and supporting action-based coping strategies.

Since the mechanisms around self-esteem appear potentially complex, studies such as that from Eisenbarth (2012), would benefit from multiple types of statistical analysis to compare the performance of self-esteem under differing types of modelling. However, there are sufficient data in the literature to suspect that self-esteem has a more strongly predictive effect upon depression than the other way around. Sowislo's (2012) meta-analysis used 95 longitudinal studies to examine whether low self-esteem predicted depression, or whether depressive symptoms would have a "scarring" effect upon self-esteem, damaging it. Results showed that self-esteem was more predictive of depression ( $\beta = .16$ ) while the impact of depression levels upon self-esteem was lower ( $\beta = .08$ ). This is supportive of the longitudinal "vulnerability" model for self-esteem and depression, rather than the "scar" model where depression damages self-esteem. Orth, Robins, and Meier (2009) had predicted this, using data from three prospective studies to look at how self-esteem and depression develop. In this study, as in the present study, an interaction model was expected whereby (in this case) self-esteem levels would interact with life events to predict depression levels. The theory would predict that people with lower self-esteem flounder when they encounter challenging life events due to poor self-image which can produce lack of active coping strategies and hence, vulnerability to low mood. However, no interaction was found – rather, it appeared that negative events were related to the development of depression, as was existing low self-esteem, but the two did not show an interaction effect. Eisenbarth (2012) looked more closely at these questions and found that although self-esteem showed consistent relationships with depression, it did not predict depression levels. This study looked at two new elements: *perceived stress*, and resultant coping style. The results indicated that self-esteem interacted with perceived stress in predicting depression – and that high self-esteem was positively related to active coping styles such as help-seeking and analysis of problems; and negatively related to avoidant styles of coping. The mechanisms appear to reside in the subtle detail of a person's experience, with the *perception* of stress being more important than a standardised stressful event, and with coping styles possibly mediating the experience to influence subsequent depression levels.

Another construct that the author wanted to examine in relation to positive illusions also proved hard to analyse. At first glance, it may appear that positive illusions could be closely

related to attributions (Seligman et al., 1979). We needed to examine the unique and overlapping role that attributions and positive illusions might play in predicting depression level: are they really distinct concepts? We predicted that positive illusion scores would act as a more powerful predictor of depression scores than scores for the Attributional Style Questionnaire within a single timeframe (Time 1). However, while the ASQ “Good” and “Bad” measures showed a moderate correlation with the PIS-total scores at Time 1, these two ASQ measures correlated only weakly with depression, anxiety and neuroticism. The ASQ measures did not show any significant effects in the regression analysis. The Attributional Style Questionnaire performed unexpectedly poorly, and so it was hard to draw clear conclusions. Tennen and Herzberger (1987) found the reliability of the three attribution dimensions of the ASQ to be inadequate, and in response an expanded version of the scale was developed (Peterson & Villanova, 1988). However, the Expanded ASQ is somewhat time-consuming and so in many experimental studies, the original ASQ is used. The Expanded ASQ was examined by Joiner, Metalsky, Lew and Klocek (1999) and Stability and Globality performed well though Internality showed lower reliability. Whilst both the ASQ and Expanded ASQ have been widely used since this time, the attributional style profiles as measured by the ASQ do not always relate to depression as has been predicted by Seligman (Chamberlain, Haaga, Thorndike, & Ahrens, 2004).

The relationship between denial and self-esteem was also of interest in understanding the role of positive illusions. The predicted positive correlation between denial and high self-esteem performed as expected; the negative correlation between denial and depression scores, proposed by Hypothesis Seven in Study 1, showed a small effect size in Study 1 ( $r = -.17$ ) but a robust correlation in Study 2 ( $r = -.45$ ). In studies of illness coping Eller et al., (2010) and Gould, Brown, and Bramwell (2010) characterised denial as a form of avoidant coping. In an oncology study, Deimling et al., (2006) found denial to be associated with higher levels of anxiety and depression on patients. Cramer (2007) found that the use of denial decreased during the years from age 11 to 18 in participants, implying that denial is indeed an immature defence mechanism. These studies taken together with our results, imply that denial is not a reliable buffer against depression.

Neuroticism was not addressed by Taylor and Brown (1988). It is the broad “setting factor” now thought to influence many psychological processes and to be a component of the long-term make-up of a person (Kotov et al., 2010). Where Neuroticism is low in a person, this is expected to be reflected in greater emotional stability and robustness, and lower reactivity (Jacobs

et al., 2011). One of our experimental hypotheses predicted that positive illusion scores would predict depression levels independently of neuroticism – i.e., that while we expected that such a large trait factor would promote a high level of illusions, positive illusions would in fact be an independent process within people. It was evident that the pathways from neuroticism to depression at Time 1 and to PIS were significant; the pathway from PIS to depression at Time 3 was significant. The results indicated that neuroticism and life events accounted for just under half of the variance in the positive illusion scale and that PIS and neuroticism together, accounted for a significant proportion of the variance in depression at Time 1. However, PIS still made an independent contribution to the depression scores at Time 3. This too is an important finding as it: a) demonstrates that PIS is not totally subsumed by Neuroticism and also has an independent component; and b) it starts to reflect the importance that Jacobs et al., (2011) have proposed for the demonstration of how large concepts like Neuroticism filter down into the actions and reactions of everyday life.

Therefore, while Neuroticism is likely to ‘set the tone’ for tendencies in human response sets, it may not inform them directly. This fits with the new area of examining not only the influence of Neuroticism but its areas of specificity in person-environment reactions - where its influence may be moderated by stressors (Brown & Rosellini, 2011), where its influence is unclear after correcting for baseline severity of disorders (Spinhoven et al., 2011), and where its mechanisms in daily life circumstances warrant a great deal more explanation (Jacobs et al., 2011). Jacobs et al., (2011) for example, began to look at actual processes and behaviours which may be related to Neuroticism using SEM to parcel out factors operating over time. These researchers argued that “decomposing” Neuroticism (p.19) helps to understand mechanisms in psychopathology. Their fascinating study used 416 adult women who were twins, to look at which aspects of neuroticism may be inherited and which are influenced by environment. The researchers examined factors which they proposed are important ingredients in neuroticism: positive affect, negative affect, the variability of positive and negative affect, sensitivity to stress, and the experience of reward. High N scores were most closely associated with low levels of positive affect and the fluctuation in negative affect. Path analysis indicated that environmental factors mediated the relationship between neuroticism and positive affect; but that high variability in negative affect was related to genetic factors. It is clear that neuroticism influences the level of dysregulation in emotions (Brown & Rosellini, 2011; Spinhoven et al., 2011) and the lack of emotion regulation and of the inhibition of negative self-relevant information is an important factor in the genesis of depression (Goeleven et al., 2006), going some way to explain the link

between high neuroticism and risk of depression. Hettema et al. (2006) explored this link specifically, and using 9,000 twins they found indications that genetic factors relating to neuroticism predicted over one half of the risk for internalising disorders (major depression, GAD, panic disorder and specific phobias). Neuroticism appears indeed to be an enormously influential setting factor for the emotional disorders.

Life events are another major theoretical issue and they have often been noted to play a key role in the genesis and exacerbation of depression (Spinhoven et al., 2011). We predicted that PIS scores would act to mediate the effects of life events scores upon Depression at Time 3. This was not shown by the Model; rather, it appeared that negative life events themselves had a modest direct effect upon PIS scores (i.e., the greater the number of negative life events, the lower participants' PIS scores). In the conceptualisation of the positive illusion concept and its measurement, this is not what we expected. The notion of illusions as a set of strategies that are called upon at times of challenge, naturally lends itself to the idea that a negative life event would be likely to trigger self-supporting and distancing strategies. It may be that for significant events (as opposed to minor everyday ambiguities) this is not a level at which positive illusions are used; or else, there may be a considerable time delay between a major challenging event and the eventual return to the everyday use of illusions. Anecdotally this can be observed: at a time of significant challenge, a person's relatives and friends often give advice such as "maybe it wasn't in your best interests to join the Army" or "he was never good enough for you anyway" – which are very hard for the person to accept at the time - but which may be taken into the self-concept much later on.

The role of life events in the exacerbation of disorders is of interest as in the present study, life events did not perform as had been expected. In Spinhoven et al.'s (2011) study of 1209 participants, negative life events were analysed as having a significant effect upon the course of depressive and anxiety disorders. However, care is needed in the design of studies as these authors measured participants at baseline and retrospectively at completion, thus perhaps introducing the sort of inaccuracies that may lead to over-generalised assumptions about the simplicity about the role of life event. Repeated sampling over time and SEM tend to introduce more accurate and complex modelling, which can point to further questions. Brown and Rosellini (2011) noted that chronic stress has a different impact upon disorders to episodic stress. Our study did not have the capacity to accurately measure or model chronic (as opposed to acute or episodic) stressors.

We had expected that a negative life event would activate an increase in positive illusions in a classic diathesis-stress model. That is, positive illusions would be the person's attempt to avoid the risks of a negative life event which could easily bring on emotional difficulties or depressive cognitions. However, the results indicated that life events are closely related to depression, with positive illusions also having an impact upon depression, but there is no interaction as such between the two predictor variables. For there to be an interaction, the strength of the impact of one variable (e.g., life events) would have to decrease as the other predictor variable (positive illusions) increased. It appears that positive illusion use is not necessarily increased under marked stressors; either PIS is a moderately stable entity like Neuroticism, which also has an impact in buffering against depression (Brown & Rosellini, 2011; Hettema et al., 2006; Kotov et al., 2010) or alternatively the onset of PIS use may be delayed and integrated later, almost with hindsight, as part of a process of adjustment. This is a slightly different mode of operation to the classic diathesis-stress model.

Patten (2013) in fact argued that the modelling of diathesis-stress in depression has become unsatisfactory and that further detailed empirical explorations are needed to place it properly within a theoretical framework for the understanding of depression. For instance, stress-generation within the person is now considered an important alternative pathway in the genesis of depression (Eberhart et al., 2011) and it needs no acute external stressor to develop. Social support is a known factor mediating the development of depressive symptoms (Brown et al., 2012) and Tse, Rochelle, and Cheung (2011) propose that in light of current information structural equation modelling is necessary to examine the complex role that this and other factors play in depression.

The key construct in our study – positive illusions – has been referred to almost routinely in the positive psychology literature (see Chapter 3 above). At a time when the mechanics of depression, cognitive behavioural treatments, and the identification of diverse processing-phenomena dominated psychological research, Taylor and Brown (1988) explored an issue somewhat neglected at the time – factors in human resilience. Taking a bird's eye view (one which seems obvious in retrospect) they were able to pull together an apparently motley collection of human tendencies to question what greater purpose might be served by all of these. Sitting as oddly as this exploration did at the time alongside other types of research and theory building, it attracted a) a great deal of interest and quick acceptance in social psychology (see

Chapter 3, p.12) – and b) a storm of criticism from other social psychology theorists and those with an empirical background (Colvin & Block, 1994). The overall result up until now, has been that the construct has been uncritically submerged into an accepted entity in some arenas of social and positive psychology (e.g., Nicholson, 2011) – yet been entirely ignored in the more empirical realms of cognitive psychology which is skilled at exploring the mechanics of mood and preventive factors. One of the aims of this study was to challenge the uncritical acceptance in the former, and examine the worthiness of the construct for examination in the latter.

It transpires from our study that positive illusions is clearly an entity which can be expressed and operationalised in an adequate, cohesive and reliable way. Hence, there may after all, be justification for it being referred to and quoted against. Yet – with the very small amount of variance it accounted for in the present study – is it worth taking seriously? Does it contribute anything to our understanding of how people may be able to mobilise important strategies for resilience?

Our contention would be that it does. One issue worth noting is that with the relatively small sample size used in the path analysis the fact that some meaningful relationships emerged for the prediction of depression over time may in fact indicate very robust effects. But of significant interest is the possible role of positive illusion operations in conjunction with a cluster of similar operations within individuals. Our proposal is that under the banner of the favourable setting factor of stability (i.e., the opposite of Neuroticism, which is labelled Surgency) lie self-regulation mechanisms which promote self-esteem stability and the deflection of negative affect.

Denial is one well-known and primitive, perhaps unreasoned strategy, which is widespread and best used temporarily and without too much depth, to avert potentially damaging rumination and over-examination of threatening information. We know that if used persistently or over a long period, denial is a rigid strategy which is not optimally adaptable and which does not produce favourable outcomes for the person (see Alberquerque et al., 2011). Defensiveness is similarly a mechanism which can be used in some circumstances for self-esteem protection (Buetow, Goodyear-Smith, & Coster, 2001). However, people who score highly on the K scale are seen as being *unnecessarily* defensive and *overly* positive in their self-presentation (Meehl & Hathaway, 1946).

The high correlation of scores on the Dn and K scales in our study and the two constructs' similar pattern of correlation with other constructs (see Study 1 and 2 above) indicate that these two entities are highly related and the processes are probably used alongside one another. We had conceptualised attributional style as an obvious adjunct to both denial and defensiveness. A positive attributional style locates events as outside of the self and temporary if they are negative: it is a simple, useful and swift type of operation which could act to again, allay worry and avoid the risk of dwelling on reasons pertaining to negative events which may link directly to the person. Attributions are a simple operation and do not cover a wide range of situations or triggers, however. For example, they can only relate to events, and do not address generalised beliefs about the self, or incorporate a future bias, as positive illusions do. A negative attributional style has been demonstrated to correlate positively with Neuroticism, however (Corr & Jeffrey, 1996; Heene, Buysse, & Van Oost, 2003).

In the present study, there was clearly a significant association between the positive illusions measures and the measure of neuroticism. Yet the distinction between what may overlap between positive illusions and Neuroticism and what may not, can even be seen at the level of the items in the PIS scale. For example, PIS item number 1: "I don't let the things I am no good at, get me down" and item 2: "I become upset over my mistakes" (reverse anchor)", look very much like the opposite of neurotic reactions, as does number 7: "If someone I know ignores me, I will get worried about what I have done" (reverse anchor). However, other PIS items such as number 3: "I keep up my standards of behaviour consistently" and number 6: "I am happy with my moral standards" have the appearance of another process altogether. Some items on the Neo-Pi scale are: 5. It takes a lot to get me mad; 11. There are some people I really hate; 38. I am always able to keep my feelings under control; and 39. I seldom give in to my impulses. These denote a different type of process: that of emotional volatility – or its opposite – emotional stability.

In examining the similarities and differences between the items making up the scales of N, PIS, Dn, and K, items can look quite similar. This appears to be for two reasons: first, that the items are using mostly first-person statements to describe an opinion or a personal habit; and second, these constructs consistently show positive correlations with each other which shows that the constructs are related. However, since all of these constructs stand up well in terms of reliability and validity, they do each have some integrity. For example, the denial (Dn) subscale of the MMPI reveals strategies designed to forestall fear and anxiety (Soloff, 1980); its items show whether the person hides fears about interpersonal relations, and feelings of hostility, failure

and suspicion. The K subscale however (defensiveness) measure the extent to which a person can readily describe psychological symptoms which they experience – the defensive person being one who is too threatened by these phenomena to admit them.

So with the related constructs of N, PIS, Dn, and K, we have a scale which describes a temperamental tendency toward either robustness or over-reactivity; a set of buffering strategies which seek to increase the ties between the self and positive outcomes, and respond positively to negative events; a propensity to hide negativity and fear from oneself; and the tendency to deny the existence of concerning psychological phenomena.

Where untaught, optimism is closely related to stability (Neuroticism) as a trait-like phenomenon (Lightsey, 1994). In fact, self-esteem, optimism and Neuroticism are so inter-correlated that it is speculated they may reflect one large personality factor (Judge, Erez, Bono, & Thoresen, 2002). However, Seligman proposes that optimism can be taught (1990, 1998) and this is a major platform for his wider work in positive psychology. While positive illusions incorporate elements of optimism, they include strategies that are more diverse and so could encompass more flexibility in the array of possible responses which may be mobilised in a range of situations.

If all of the operations described above, sit in a grouping as proposed by some of the patterns of correlations observed in the above study, then taking into account their apparent similarity, they are likely to co-occur in the same person. The opposite of Neuroticism (i.e., Surgency) is likely to be the factor which allows the possibility of these types of operation to take place (Surgency is positively related to denial, defensiveness, high self-esteem and positive illusions and negatively related to anxiety, depression, and self-critical cognitions [Uliaszek et al., 2012]). Optimism is a trait-like tendency to process events in a positive and future-oriented way (Seligman, 1998), and positive illusions are designed to shed negative self-relevant information, positively bias ambiguous stimuli, and avoid rumination (Taylor & Brown, 1988). People engaged in these types of elevating operations are also statistically more likely to evidence degrees of denial and defensiveness (see Study 1 and Study 2). In this view, whilst positive illusions have demonstrated utility and independence in assisting robustness, the grouping is most powerful as a whole. In this series of linked studies, this group of constructs have consistently shown themselves to be statistically related in the ways in which they influence and relate with other constructs.

## **Strengths of the Studies and Implications for Theory**

The first strength of this study was that the research consisted of three separate studies and three separate samples. These linked studies comprised a thorough attempt to develop, operationalise and test the positive illusions concept, in a way which has not been done to date. Before the research commenced a professional group scrutinised the items initially generated by this researcher and utilised methods to work on establishing a new and reliable measure. The measure that was developed over the three studies, not only demonstrated adequate reliability and internal consistency but consistency in its relationships with other constructs. The research showed that positive illusions made their own, albeit small, contribution to the variability in depression scores, independently of constructs such as Neuroticism.

A second strength of the research is that the three linked studies took into consideration relationships with other constructs which had been consistently predicted in the empirical literature, and for example, tested positive illusions against the Neuroticism construct to examine whether it was merely an artefact or offshoot of Neuroticism, or an independent entity, as had been claimed. It was striking that although the measure in its initial phase (Study 1) was internally inconsistent and not of adequate reliability – its pattern of correlations to other constructs was very similar to those of Study 2 (where the measure was much improved). This would seem to indicate that positive illusions as modelled in this group of studies, is a meaningful construct.

Thirdly, since several other measures were used both to test the validity of the construct and examine its relationship to depression, anxiety, self-esteem, attributions and self-critical cognitions, both a broad and a deep view was enabled in understanding how the positive illusions construct may be positioned, how it operates over time, and its potential impacts on depression. The use of structural equation modelling was of assistance in modelling effects of positive illusions on depression. Fourthly, the studies enabled repeated sampling and the use of SEM to look at the role of life events in the genesis of depression and in how buffering strategies become active. It appears that this type of more complex modelling is necessary where life events are concerned, and that they may not operate in a classic diathesis-stress configuration. Lastly, a completely new perspective, is how positive illusions appear to act in concert with other processes such as denial and defensiveness, to optimise peoples' ability to buffer themselves against challenging events or experiences.

The results of the three linked studies are quite consistent as regards their implications for theory. These indicate that Taylor and Brown's (1988) original ideas about a construct they termed "positive illusions" can be borne out: a collection of items representing key buffering responses as suggested by these authors, stands up over time and relates to other constructs as their ideas, logic, and subsequent theory has proposed. While frequently mentioned or discussed, it can now be assumed that positive illusions do relate strongly and predictably to depression, self-esteem, denial and defensiveness. It needs to be understood that the present data do not indicate that positive illusions have a highly specific effect upon anxiety, or that they mediate the impact of life events. It is not certain whether they act specifically upon deflecting self-critical cognitions as this could not be verified.

One difference that the reliable operationalisation of this construct makes, is that positive illusions, rather than staying within the confines of positive and social psychology, can now also be incorporated into discussions and studies relating to cognitive theories of depression, and resilience towards depression. There is now a relatively reliable instrument for positive illusions. This means that researchers and theorists can select whether they are referring to the positive illusions construct as measured by the present scale; whether a more specific measure, for example in the field of chronic illness resilience, is to be used; or whether they are discussing a general view of positive illusions. Positive psychology is short of measures and empirically-based findings which relate directly to its tenets (Hart & Sasso, 2011; Quoidbach, Mikolajcak, & Gross, 2015). However, the results from this study show that a set of buffering strategies which can be measured and clearly described, have utility in creating resilience. To an extent, this endorses some of the theory building which is taking place. It has a place in the area of Fredrickson's (2011) theory building, which proposes that a slightly positive bias in a person's emotional "set-point" is helpful in avoiding negative emotions and anxiety, which are termed unhelpful and unnecessary in minor everyday situations; and which disrupt resilience and motivation. Fredrickson (2011) notes that in genuine situations of emergency or threat, negative types of response (such as avoidance, hiding) are necessary – but that where the threat is not acute, emotions of fear or hopelessness are likely to result in similar behaviours when in actual fact, there are choices to be made: and a positive, active behavioural set may well advantage the individual more. Where a buffer (such as positive illusions) can be used in ambiguous or challenging situations (and no such buffer was specifically mentioned by Fredrickson) this can enable the individual to escape from the negative emotions which are at risk of triggering, and

move towards a positive outlook and a more adaptive set of actions such as exploring options, reaching out to make new contacts, changing plans, and forging new directions. While Fredrickson (2011) mentioned resilience as a key to shedding negative emotions, no specific mechanisms were proposed and so positive illusions, as measured in this study (and accompanied by attributional style, denial and defensiveness) may be the “missing link” which activates people and forges an entry point into a positive set of thought-action repertoires.

### **Limitations of the Studies**

These studies have tried to operationalise a construct which has been poorly defined and whose description seems almost to have been changed every time it is mentioned in the literature (e.g., Nicholson, 2011). In testing out a new construct, using only a college population may not have been adequate to assume that the findings are generalisable. In testing out a new concept and a new measure however, standardisation and precision were important, as was using the best possible instruments practicable and finding a stable, reliable, and accessible population. Runkel and McGrath (1972) noted that the desirable factors of scope and variation in both test populations and measures, compete directly with precision. Future generalisability will be determined if the positive illusion construct is tested both in larger, more heterogeneous populations (Firestone, 1993) and by using different measures (for the other psychological constructs at issue) to see if relationships illustrated in our study, are replicable in this way, which would be vital to demonstrate a truly robust set of results (Runkel & McGrath, 1972).

One key concept in positive illusions is that of the person using them, rating themselves as “better than” (the average). Most individuals are not necessarily good scientists and so they may have an unclear notion of what ‘the average’ really is. It is probably beyond the scope of this thesis to find out what the average person’s perception of “the average” is – but this issue could potentially produce extra variability in people’s responses.

Participants who are undergraduates may well be atypical even for their age, as to reach University they will have needed to be effective in setting goals, deferring gratification and self-monitoring, all at quite a young age, meaning that they may present with an above average skill set. To maintain a commitment to study through teenaged years and late high school, this group may well have an above average set of self-supportive strategies which has kept them on track with studies and helped them to avoid distractions and limit social pressures; this particular group also came from a University which demands higher than average entry scores. The participants’

low average age also means that some phenomena such as depression, anxiety, and mania profiles – may have different relationships to life events than those presented in an older group. For example, some types of negative life outcomes might present to them as either more threatening (due to their lack of life experience) or less (due to a lack of their sense of mortality and relative feelings of youth-related omnipotence). Their pattern of life events too, may not be typical for a broader range of adults, or relate as reliably to psychological states as occurs in adults with an older average age. In addition, socioeconomically they are not likely to represent a broad and representative cross-section of the community.

No in-depth analysis was made of gender differences in score levels and outcomes, and while recent studies indicate that when confounding factors are controlled for, gender differences are slight in relation to depression phenomena (Hayes et al., 2012) and it would have been an advantage to have a gender balance in this participating group, which featured more female than male participants. These shortcomings in the test population limit the ability to generalise the findings with confidence to the broader population.

In this series of studies, a decision had to be made about how many tests to use. There is a potential problem with the sheer number of statistical tests conducted within the three studies. Essentially, the more tests that are used, the greater the likelihood that some results will be false positives due to chance (type I error – Sheskin, 2004). In addition, for path analysis, there was a relatively modest number of participants for the number of factors used in the modelling, which can impact upon effect size and replicability. In Study 3B, inspection of Table 18 and of Figure 8 reveals that the pathway from LEI to PIS is nonsignificant; from PIS to BDI, Times 1 and 2 are also nonsignificant. The pathways from neuroticism to depression at Time 1 and to PIS are significant; the pathway from PIS to depression at Time 3 is significant. It can be seen that neuroticism and life events accounted for 47% of the variance in the positive illusion scale ( $R^2 = .47$ ) and that PIS and neuroticism accounted for 26% of the variance in depression at Time 1. PIS and BDI (Time 1) accounted for 36% of the variance of BDI at Time 2. Although the model was statistically significant and explained more than 50% of the variance in the depression at Time 3, there is still a proportion of variance that is not properly explained by the model. Other factors not included in the model may have a significant effect on depression at Time 3 and on any other endogenous variables. With reference to the development of the Models, as more variables were progressively added, this may have strained the ability of the models to demonstrate adequate fit: this is also an issue related to the smaller sample size used.

In this research, the number of tests per phase of the study were limited to essential questions, and we looked for patterns and consistency in the results – rather than focussing on any one significant finding. For Study 3B, although a number of models were proposed and one deemed to the best fit the data, we need to be cautious in interpreting the results. First the numbers were relatively small for this particular statistical method. Second, although we did compare a number of models and selected the one with the best fit, we cannot be sure that that other untested models might prove to have a superior fit to the data. Indeed, with larger numbers of participants and the inclusion of additional variables, a different model may have proved superior. The best we can state is that we selected a viable model with the current sample size and the various proposed models and variables.

In these studies, self-report measures were used. Self-report measures could possibly produce a response bias towards certain items. Ideally, a mix of self-report, semi-structured interview and physiological measurement would have been used. However, the utility of such a mix of instruments is highly problematic when attempting reasonably high throughput of participants in order to achieve adequate statistical power. Overall, the studies used the best instruments usable in an invigilated participant group.

In the studies, at some time points the participants had invigilators present and at others not, and the impact of this upon scoring patterns is not known. The role of the naturalistic stressor appears to have been miscalculated. The incorporation of a stressor which was both naturalistic and standardised for the test population, was designed to examine the claims for positive illusions (Taylor & Brown, 1988) - that they work as a buffering mechanism when self-concept and mood are challenged by external events. It was expected that depression levels would increase just before the exams (i.e., just after Time 2) and remain increased at Time 3 (immediately after the exams) as participants would not yet have received their results. However, it was clear that depression (and anxiety) scores decreased successively through the time points. This would seem to show that students' engagement with study and moving through the exam process, provided relief to depression and anxiety which had been higher, prior to that process. In this light, the stressor was not usable as an experimental variable as it was not having the deleterious impact that was thought to activate (or not activate) protective positive illusion mechanisms. A stressor where the participant could not engage with familiar material in the process leading up to it, and where the outcome was very important, might be a better substitute.

Examples could be studying for the GRE examination (entry to postgraduate study in the USA); the GAMSAT for entry into medical school, mass intake for jobs in large corporations, and citizenship tests for spousal or family applicants, might better reflect an experience where an outcome is important and the applicant is less empowered by prior knowledge.

The significant presence of elevated mania scores in this population group may have destabilised some of the outcomes as this phenomenon did not present in an anticipated pattern. It is not known whether other populations of young adults under some different form of stress, might present similarly, thus indicating that it may be a problem particularly for young adults under stress. It is also unknown as to whether older adults more established in their lives, would present with similar mania score profiles under episodic stressor conditions, thus indicating that it is episodic stressors (rather than chronic ones) which produces this sort of pattern in mania scores.

The role of anxiety (while always predicted to be less specifically impacted upon by PIS than depression) may have been incorrectly modelled in the Models devised (see Study 3B), as none produced adequate fit indices in the pathways modelled for anxiety outcomes. It is possible that anxiety should have been modelled in a qualitatively different way as modelling it as following similar but weaker performing relationships to those involved in depression, did not seem to represent the construct's position adequately. There are two possible reasons for these results. First, the models may be poorly specified: it might be that the mechanism of anxiety is different from the mechanism of depression and the same theoretical models cannot be applied. A solution may be to re-think the theoretical model. Second, the large standard errors of estimates suggest that results are highly driven by sample size and the small sample sizes make it difficult to detect effects, causing low statistical power and poor model fit. A solution may be to survey a larger number of people.

The author used structural equation modelling in these studies, as it provides an ability to test complex relationships between constructs in medium-sized groups, over time points. It should be noted that SEM can only be as good as the models which are devised, and so if quality is poor in the conceptualisation, unusual or un-replicable results may occur. It is always a possibility that if another variable had been added in (for example, Extraversion) this would have completely changed the relationships and cancelled out any independent influence held by the positive illusions construct.

## **Some Cautions on the Conceptualisation and Testing of Depression**

In the rush to model and test out theories of depression, some shortcomings are evident. While criticism of the cognitive modelling of depression has been thoroughly aired elsewhere (Gotlib & Joorman, 2010; Gotlib & Lewinsohn, 1992; Power, 1987) some mention of the more obvious points is merited here as they relate to the current study.

Coyne and Gotlib (1983) pointed out for instance, that cognitive dysfunction has been described as variously, the cause, symptom, or consequence of depression; a state or a trait. Hence, a reliance on cognitive aspects of the disorder may be less reliable in modelling the disorder and contributors to it, and most especially where this leaves out the other phenomena commonly associated with depressive disorders. For example, it is striking that while the DSM-5 (American Psychiatric Association, 2013) criteria for a Major Depressive Episode mention ‘psychomotor retardation (Criterion number 5, p. 161) and ‘indecisiveness’ (Criterion number 8, p. 161), these have been given little attention in the modelling of vulnerability, onset, or maintenance factors for depression.

Depression actually appears to involve very significant heterogeneity in presentation. The Black Dog Institute is a major Australian research, training and resource agency whose Board members include senior psychiatrists, psychologists, medical scientists and a physicist. The Black Dog Institute has stated that its own research and meta-reviews have led to a three- subtype model of depression (Black Dog Institute, 2013). Here, melancholic and psychotic depression are viewed as largely biological in their determination (melancholic being characterised by significant psychomotor disturbance and noticeable general processing and concentration difficulties) while a residual group features quite wide variations but is striking for its contributions of life events and personality style. This clarity of statement highlights the observation that virtually nowhere in the research modelling of cognitive vulnerability to depression, is depression featuring psychomotor retardation or psychotic phenomena, given attention. Perhaps one of the apparent limitations of cognitive models for depression should be recognised: that it may be dealing in the main, with one of its more diffuse subtypes.

Gotlib and Joorman (2010) note that the terms depression and dysphoria are often used almost interchangeably in the literature – and that milder types of depression are often the presentations used in research studies. However, using mild (subclinical) depression based on

student populations to extrapolate to phenomena in clinical levels of depression may involve qualitative as well as quantitative differences and so experimental conclusions should be drawn with caution.

There are also some problematic issues associated with the measurement of depression. Scales such as the Beck Depression Inventory (Beck, Ward, Mendelson, Mock, & Erbaugh, 1962) have been designed to tap the negative expressions common in depression and this and other scales tend to be 'blunt instruments'. Although overall, elevated scores on the commonly-used short measures for depression correlate well with a diagnosis of depression, the measures do not always perform well at different levels of severity (Olino et al., 2012) or in correlating with clinical ratings of severity or other measure for depression (Ferentinos et al., 2011; Hammen, 1980; Lewinsohn & Teri, 1982). Short scales such as the BDI often offer only a single item per symptom type. This prevents, for instance, an examination of a profile where only one or two types of symptoms dominate, but are profound and seem to relate to many aspects of the person's life. While the BDI has a high level of concurrent validity, these limitations mean that its use does not permit in-depth examination of different facets in depression.

Gotlib (1984) pointed out that the setting for experiments in depression is of great importance: the less laboratory-based the experimental design, the more likely that impacts of individual processing styles would be seen in the participants. For example, Wener and Rehm (1975) and Kuiper (1978) found ambiguous results for depressed and nondepressed groups' recall on laboratory-based word association tasks that lacked 'real life' validity. But in a study investigating recall where actual punishments and rewards were used that utilized financial credits and deductions (Nelson & Craighead, 1977), depressed individuals recalled a lower rate of reward than had been the case, and a higher level of punishment than they had actually received. These early studies have pointed to the need for more naturalistic settings in examining mood vulnerability.

The problems outlined briefly above, are similar to those found in other areas of psychological study. However, these methodological weaknesses are significant enough to warrant some caution in the interpretation of experimental data.

## **Conclusions and Future Directions**

Positive illusions, as mentioned casually and un-empirically in a large volume of literature, appears to be a valid construct and now, one with a usable measure. Now that the work of scale development and validation has been undertaken, further tasks would be to look at whether these results are replicable. For further studies, a larger participant group would be helpful to increase statistical power, especially in the structural equation modelling. A far more diverse participant group could answer questions about the universality of positive illusions. A standardised but naturalistic stressor whose influence upon mood and anxiety over time would be clearer, would assist in the understanding of how life events may or may not activate positive illusions. Qualitatively different modelling of the impact of the group of buffering strategies' influence upon anxiety (as opposed to depression) would help to clarify the specific impact upon depression outcomes, while a different measure to look at the role of attributional style and its real relationships to positive illusions, denial, defensiveness, and depression, would be necessary to understand the apparent group of similar buffering constructs and how they may operate. Positive illusions, attributional style, denial, defensiveness, and Neuroticism need to be examined in the same study phase so that multiple regressions and SEM can be used to look at the links and impacts amongst these constructs and their relationships to depression. We need to know for example, how much they stand independently and to what extent they would cancel each other out when entered in blocks as predictive variables. Positive illusions are poised to make an improved contribution to resilience and protective interventions for depression: but further study is definitely indicated.

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## APPENDIX A: STUDY 1

## Appendix A1

### List of Strategies Represented

1. Positive attributes are seen as more characteristic of the self than negative attributes.
2. Positive outcomes are attributed to the self.
3. Negative outcomes are attributed outside the self.
4. Poor abilities are perceived as common, but favoured abilities are seen as rare and distinctive.
5. Things people are not proficient at, are perceived as less important than the things they are proficient at.
6. Positive attributes are seen as more descriptive of the self than of the average person.
7. Negative attributes are seen as less descriptive of the self than of the average person.
8. People see their driving ability as superior to that of other people.
9. Friends are evaluated more positively than the average person.
10. Individuals rate themselves more positively on interaction tasks such as friendliness, more positively than observers.
11. People have unrealistic beliefs of control over environmental situations which are determined by chance.
12. People infer that they have greater control if they personally throw dice than if someone else does it for them.
13. People believe that the present is better than the past.
14. People believe that the future will be better than the present.
15. People expect their future experience of work to be better than that of other people.
16. People underrate the likelihood of having an accident, being a victim of crime or illness, as compared to others.
17. People show unrealistic optimism for future events of the type which are determined by chance.
18. People believe that their personal coping abilities are extraordinary.
19. People disconfirm others' negative impressions of them.
20. Negative feedback is seen as less credible than positive feedback.
21. Personal responsibility for failure tends to be denied.
22. People relegate the importance of acknowledged pockets of incompetence.
23. People use downward comparison to others outside their group of family or friends, to maintain their self-esteem.

## Appendix A2

### Draft Scale Items

1. How do you rate your abilities as a driver?
2. If you were to enter a raffle, how important is it to choose the serial number?
3. How friendly do you think you are?
4. Last time you were blamed during an argument, how fair was this?
5. If throwing dice for money, how important is it to throw your turn yourself?
6. In the future, might you be retrenched from a job?
7. How would you rate your resourcefulness in coping with everyday life?
8. There might be skills you have that you're proud of. How common are these?
9. How often has your behaviour been nasty to people in the past?
10. How common are your best abilities?
11. Will your future be better than the present?
12. How good are you as a friend?
13. How likely is it that you may have a serious accident in the future?
14. If you found a house or flat that you wanted in the past, how much was this due to luck?
15. Is the present better for you than the past?
16. How common are the qualities you most value in yourself?
17. As a teenager, how often did you behave badly towards your parents?
18. Last time someone criticised you, how fair was it?
19. How good are your chances of getting the house that you'd like, in the future?
20. In the future, will there be more good things than bad?
21. How important are your shortcomings?
22. How often have you made bad decisions in the past?
23. When you've failed exams or tests, how much was this your fault?
24. Last time a stranger was unpleasant to you, how fair was this?
25. Last time someone made a hurtful remark about your personality, how fair was this?
26. How would you rate your ability to survive a serious illness?
27. How often have you made mistakes in relationships?
28. How often do you find yourself making plans for the future?
29. How important are negative aspects to your personality?
30. How good are your chances of winning prizes or money in the future?
31. How important are your failings?
32. How often do you have optimistic daydreams about the future?
33. How common are your particular skills?
34. If you didn't get the job you wanted, how much would this be your fault?
35. Are your friends better than most people?
36. How good was your relationship with your siblings, as a child?
37. If you got a job or training place that you wanted, how much would this be down to you?
38. If you were to take up gambling, how good would your chances of success be?
39. How likely is it that you will encounter a bad patch in the future?
40. Last time you had a row with someone, how much was your fault?
41. How important are the things you are no good at?
42. There may be people whose lifestyle or circumstances you don't like.
  - a. Do you have better relationships than they do?
  - b. Do you have a higher IQ than they do?
  - c. Are your morals superior to theirs?
  - d. Do you know more than they do?

### Appendix A3

Table 1

*Item into Category Allocation*

Item	% Allocation and Category	Double/Triple Category	Item	% Allocation and Category	Double/Triple Category
1.		1,2	24.		5,7
2.	80% 6		25.		3,5
3.	100% 1		26.	95% 8	
4.		3,5,7	27.		3,5,7
5.	80% 4		28.	80% 8	
6.	100% 8		29.	100% 3	
7.	Random		30.	100% 3	
8.		1,2	31.	Random	
9.		3,5,7	32.	100% 8	
10.		1,2	33.	100% 2	
11.	100% 8		34.		5,7
12.	95% 1		35.	100% 1	
13.	90% 8		36.	70% 7	
14.	80% 6		37.	100% 4	
15.	100% 7		38.	90% 6	
16.	100% 2		39.	80% 8	
17.		3,7	40.	95% 5	
18.		3,5	41.	90% 3	
19.	100% 8		42.a		1,2
20.	100% 8		42 b.		1,2
21.	80% 2		42 c.		1,2
22.		5,7	42 d.		1,2
23.	100% 3				

## Appendix A4

Table 2

*Further Item-Category Allocation*

Item	% Allocation and Category	Item	% Allocation and Category
1.	90% 1	24.	90% 2
2.	80% 3	25.	100% 2
3.	90% 1	26.	80% 4
4.	90% 2	27.	90% 2
5.	80% 5	28.	80% 4
6.	100% 4	29.	100% 2
7.	DELETED	30.	100% 2
8.	100% 1	31.	DELETED
9.	80% 2	32.	100% 4
10.	100% 1	33.	100% 1
11.	90% 4	34.	80% 2
12.	80% 1	35.	90% 1
13.	90% 4	36.	60% 2
14.	80% 3	37.	80% 5
15.	80% 2	38.	90% 3
16.	100% 1	39.	90% 4
17.	100% 2	40.	90% 2
18.	100% 2	41.	90% 2
19.	100% 4	42.a	100% 1
20.	100% 4	42b.	100% 1
21.	80% 1	42c.	100% 1
22.	80% 2	42d.	100% 1
23.	90% 2		

## Appendix A5

### Self-Rating Manic Inventory

#### SRMI

During the past two weeks, have these things been more noticeable than usual?

- please circle Yes or No.

1. I had more energy	Yes	No
2. I had trouble sitting still	Yes	No
3. I drove faster	Yes	No
4. I drank more alcoholic beverages	Yes	No
5. I changed clothes several times a day	Yes	No
6. I wore brighter clothes/make-up	Yes	No
7. I played music louder	Yes	No
8. I ate faster than usual	Yes	No
9. I ate more than usual	Yes	No
10. I slept fewer hours than usual	Yes	No
11. I started things that I didn't finish	Yes	No
12. I gave away my own possessions	Yes	No
13. I bought gifts for people	Yes	No
14. I spent money more freely	Yes	No
15. I accumulated debts	Yes	No
16. I made unwise business decisions	Yes	No
17. I partied more	Yes	No
18. I enjoyed flirting	Yes	No
19. I masturbated more often	Yes	No
20. I was more interested in sex than usual	Yes	No
21. I had sex with people that I wouldn't usually have sex with	Yes	No
22. I spent more time on the phone	Yes	No
23. I spoke louder than usual	Yes	No

## Appendix A6

### Consent Form

# The University of Melbourne

SCHOOL OF BEHAVIOURAL SCIENCE  
DEPARTMENT OF PSYCHOLOGY

## CONSENT FORM FOR PERSONS PARTICIPATING IN PROJECTS

Person's Name (capitals): \_\_\_\_\_

Project: \_\_\_\_\_

Name of Investigator: \_\_\_\_\_

1. I consent to participate in the above project, the particulars of which – including details of tests or procedures – have been explained to me and are appended hereto.
2. I authorize the investigator or his or her assistant to use with me the tests or procedures referred to under (1) above.
3. I acknowledge that:
  - a) The possible effects of tests or procedures have been explained to me;
  - b) I have been informed that I am free to withdraw from the project at any time and to withdraw any data just supplied;
  - c) The project is for the purpose of research and/or teaching and not for treatment;
  - d) I have been informed that the confidentiality of the information I provide will be safeguarded.

Signed: \_\_\_\_\_ (participant)                      Date: \_\_\_\_\_

Where participant is under 18 years of age:

I consent to the participation of \_\_\_\_\_  
In the above project.

Signed: \_\_\_\_\_ (parent/guardian)                      Date: \_\_\_\_\_

## INSTRUCTIONS FOR PARTICIPANTS

### Introduction

This survey explores peoples' coping styles. It uses up to 9 questionnaires to ask about your recent experiences, thoughts and feelings. While answering the questionnaires, you may be reminded about your feelings. Remember, should you experience feelings that concern you, the University offers a free Counselling Service which is designed to assist students. Everyone gets stressed sometimes!

### Your Rights/Confidentiality

You are free to withdraw from the study at any time, or to request the withdrawal of data supplied. The project is for the purpose of research only: Following collection of the final set, your data will later become anonymous by separation of the sheets from the consent form, which is the only item which carries your name.

### Instructions

Your full name should only go on the consent form: on anything else that requests your name, please enter your INITIALS ONLY along with the other information requested. Fill in the questionnaires **quickly and accurately**: they're not designed for you to give too much thought to each individual question. Please bring the survey forms to the attendant when you have finished. If you have any questions, please ask!

Thank you.

## Appendix A8

### Debriefing Sheet

# Debriefing Information

You have been taking part in a study which looks at how people cope with stressful events, and how they may try and help themselves avoid such states as depression, anxiety and feeling that their self-esteem is under attack. Our information from previous studies conducted here, is that people may have strategies which they use to stop themselves from worrying about the implications of unpleasant events, or negative feedback about themselves or their prospects. When people use these strategies, it appears that this supports their general wellbeing, and helps to buffer against depression or low self-esteem when stressful things happen.

We call these strategies Positive Illusions. Basically, people seem to use them to tell themselves that they are ok and that the future will be bright. This part of the study has looked at how the use (or absence) of the strategies particularly impacts upon the development of negative mood states, in the context of the stress associated with 1st year exams. We have predicted that the use of Positive Illusions will assist people to avoid depression, anxiety and lowered self-esteem, even if they are experiencing stress.

If you have any further questions about the study, please contact Fiona Price (room 705, Redmond Barry building; 9344 8958). Thank you for taking part.

## **Appendix A9**

### **Ethical Issues**

Subjects completed a standard University of Melbourne consent form designed for experiments using human subjects. Consent forms (named) were maintained in a locked filing cabinet, separate from the data sets which were marked by serial numbers only. In accordance with NH & MRC guidelines, the sets will be kept for 5 years, during which time the only access granted to persons other than the investigators, will be for purposes of checking replicability or ethical procedures. There was a particular issue regarding ethical pressure on confidentiality. With the collection of information on depressive symptoms, there was the potential for high scores to be noticed before the separation of identifying information on the consent forms. Concern for an individual may then have meant a breach of the confidentiality promised by the study. This was resolved by adopting a policy of no intervention unless clear indications of suicidality were presented in a data set. The instructions informed the participants that the surveys measured feelings and coping styles, and reminded students of the support services available to those in the University community experiencing stress or feelings that were hard to cope with. In fact, none of the subjects endorsed the cutoff adopted by the study i.e., q. 9. on the BDI “I would like to kill myself” (score 2) or the higher scoring “I would kill myself if I had the chance” (scoring 3).

## Appendix A10

Table 3

*PIS Scale Statistics and Analyses*

	Missing		Missing
PIS1	2	PIS18	3
PIS2	1	PIS19	4
PIS3	0	PIS20	3
PIS4	0	PIS21	3
PIS5	0	PIS22	4
PIS6	0	PIS23	3
PIS7	0	PIS24	3
PIS8	1	PIS25	0
PIS9	1	PIS26	1
PIS10	0	PIS27	1
PIS11	0	PIS28	0
PIS12	0	PIS29	3
PIS13	1	PIS30	0
PIS14	0	PIS31	1
PIS15	0	PIS32	1
PIS16	4	PIS33	1
PIS17	3	PIS34	0

## Appendix A11

Table 4.

*Rotated factor matrix – 34 item PIS*

	Factor				
	1	2	3	4	5
PIS28	.65	.18	.06	-.18	.16
PIS27	.58	.01	.05	-.10	.36
PIS4	-.45	.10	.36	-.14	-.04
PIS25	.44	.01	.10	-.04	.02
PIS6	.39	.16	.10	.03	-.06
PIS1	.37	.11	.13	.10	-.11
PIS21	-.37	.05	.22	.10	.06
PIS3	.33	-.17	.12	-.17	.17
PIS9	-.32	-.13	.15	.17	-.12
PIS18	-.31	.24	.21	-.11	.14
PIS5	.16	1.09	-.02	.16	-.23
PIS15	.10	.40	.22	.08	.25
PIS31	.09	.37	.04	-.07	.01
PIS10	.05	.30	-.10	.29	.09
PIS30	.29	-.12	.65	.10	-.11
PIS20	-.26	.03	.51	-.13	-.14
PIS17	.06	.21	.46	.16	-.01
PIS13	.31	.08	.42	-.11	-.05
PIS12	.06	-.17	.34	-.14	.13
PIS26	.22	.03	.33	.08	.20
PIS11	-.02	-.03	.27	-.05	.04
PIS34	.14	-.10	.22	.13	-.03
PIS7	.01	.08	.21	.05	.03
PIS2	.02	.04	.18	.03	.14
PIS14	-.18	-.03	.09	.60	.51
PIS32	-.21	.30	.05	-.41	.11
PIS22	-.24	.04	-.04	.40	.03
PIS33	-.00	-.01	.14	.40	.00
PIS23	-.02	.00	-.03	.25	.05
PIS16	-.05	.19	-.11	.24	.18
PIS19	-.19	.08	.09	.24	.07
PIS24	-.07	.09	-.05	-.05	.51
PIS8	.14	-.06	.00	.08	.46
PIS29	-.02	-.04	.12	.17	.32

*Notes.* Extraction Method: Maximum Likelihood. Rotation Method: Promax with Kaiser Normalization. a Rotation converged in 36 iterations.

## Appendix A12

Table 5.

*Rotated Factor Matrix – 34 Item PIS*

Item	Factor			
	1	2	3	4
PIS32	.70	.01	-.29	-.03
PIS18	.64	.15	-.03	.04
PIS4	.61	.21	.02	-.17
PIS5	.45	.14	.23	.10
PIS21	.38	.13	.13	.02
PIS24	.37	-.11	-.25	.32
PIS15	.33	.25	-.03	.26
PIS25	-.32	.19	-.12	.07
PIS31	.27	.10	.00	.10
PIS34	-.25	.24	.07	.02
PIS6	-.23	.21	.01	.06
PIS30	-.32	.68	.07	-.06
PIS13	-.09	.49	-.09	-.02
PIS17	.10	.48	.12	.05
PIS20	.36	.44	.06	-.19
PIS26	-.06	.35	-.08	.17
PIS12	-.00	.29	-.22	-.04
PIS11	.09	.24	-.04	-.01
PIS1	-.21	.23	-.08	-.03
PIS7	.08	.22	.05	.07
PIS2	.10	.18	-.02	.12
PIS22	.06	-.06	.37	.14
PIS27	-.22	.10	-.33	.31
PIS28	-.25	.18	-.32	.18
PIS33	-.17	.15	.31	.13
PIS3	-.25	.13	-.31	.06
PIS9	.08	.08	.26	-.10
PIS19	.17	.06	.25	.16
PIS23	-.10	-.04	.13	.10
PIS14	.07	.01	.21	.45
PIS8	-.01	-.02	-.17	.37
PIS16	.15	-.10	.19	.30
PIS10	.07	-.04	.23	.27
PIS29	.06	.07	-.02	.25

*Notes.* Extraction Method: Maximum Likelihood. Rotation Method: Promax with Kaiser Normalization.

<sup>a</sup>Rotation converged in 36 iterations.

## Appendix A13

Table 6.

*PIS Item Exclusion Diagnostics.*

PIS	low ML communality	MSA	skewness	kurtosis	Badness composite
1	.37	.47	-0.49	-0.47	0.02
2	.28	.43	2.13	4.21	0.51
3	.31	.51	-0.64	0.22	0.03
4	.45	.76	-0.19	-0.94	-0.33
5	.50	.55	-0.55	0.64	-0.17
6	.25	.66	-0.25	-0.70	-0.04
7	.26	.44	0.04	-1.45	0.20
8	.27	.39	-0.13	-0.90	0.20
9	.25	.53	-1.02	0.26	0.10
10	.26	.47	-0.63	0.06	0.12
11	.23	.52	-0.01	-0.87	0.11
12	.30	.53	0.06	-0.34	0.00
13	.40	.57	-0.71	-0.32	-0.10
14	.28	.53	-0.16	-0.83	0.06
15	.36	.62	0.34	-0.14	-0.15
16	.30	.49	-0.54	-0.29	0.07
17	.46	.48	-0.84	0.31	-0.06
18	.47	.74	-0.26	-0.11	-0.39
19	.21	.62	1.37	1.50	0.16
20	.49	.58	0.18	-0.45	-0.23
21	.39	.60	-0.03	-0.96	-0.13
22	.26	.45	-0.48	-0.52	0.15
23	.28	.35	0.01	-0.66	0.21
24	.38	.56	-0.51	-0.10	-0.11
25	.27	.67	-1.68	2.73	0.15
26	.27	.51	-0.52	-0.19	0.07
27	.33	.61	-0.61	-0.22	-0.09
28	.32	.59	-0.36	-0.21	-0.08
29	.24	.48	-0.30	-0.47	0.14
30	.45	.65	-1.57	2.51	-0.02
31	.38	.49	-0.44	-0.51	-0.01
32	.54	.69	-0.56	0.70	-0.34
33	.34	.46	-0.36	-0.41	0.05
34	.29	.59	-0.86	0.73	0.02

## Appendix A14

Table 7.

*Parallel Test of PIS factor structure – 21 item PIS*

Root	Mean	95th Percentile	Actual Data
1	1.75	1.89	3.26
2	1.60	1.70	2.30
3	1.50	1.57	1.55
4	1.41	1.48	1.49
5	1.33	1.41	1.40
6	1.26	1.31	1.29
7	1.19	1.24	1.11
8	1.13	1.18	1.05
9	1.07	1.13	0.95
10	1.02	1.07	0.87

## Appendix A15

The factor loadings for a varimax rotation are presented below.

Table 8.

*Rotated factor matrix – 21 item PIS*

Item	Factor	
	1	2
PIS18	.65	.21
PIS4	.65	.12
PIS32	.62	.35
PIS20	.55	-.15
PIS21	.42	.11
PIS5	.42	.06
PIS15	-.41	.04
PIS31	.30	.04
PIS14	-.12	-.02
PIS30	-.07	.76
PIS13	-.14	.51
PIS1	.07	.34
PIS17	-.33	.34
PIS6	.09	.31
PIS34	.04	.29
PIS24	.26	.28
PIS28	.10	.23
PIS12	.12	-.20
PIS27	.15	.19
PIS3	.08	.19
PIS33	.09	.16

## Appendix A16

Table 9.

*Parallel Test of PIS factor structure – 11 item PIS*

Root	Mean	95th Percentile	Actual Data
1	1.47	1.61	6.09
2	1.33	1.42	2.09
3	1.22	1.28	1.66
4	1.14	1.19	1.36
5	1.06	1.10	1.17
6	.98	1.04	0.96
7	.91	.96	0.85
8	.83	.88	0.79
9	.76	.82	0.72
10	.68	.75	0.65
11	.59	.67	0.64

APPENDIX B: Study 2

## Appendix B1

### List of 28 PIS Items

#### **Category 1: Unrealistically positive self-evaluation**

1. I keep up my standards of behaviour consistently.
2. I'm happy with my moral standards.
3. I'm happy with myself as a person.
4. I have more good qualities than the people around me might realise.
5. I'm especially good at the things which matter.
6. I'm doing very well, considering.
7. Considering what's going on in my life, my coping is above average.

#### **Category 2: Downgrading of negative self-relevant information**

8. I don't let the things I'm no good at, get me down.
9. I don't become upset over my mistakes.
10. If I fail, I'll forget it quickly.
11. I write off my bad behaviours to experience.
12. If someone I know ignores me, I don't pay any attention.
13. I don't spend much time thinking about the negative aspects of my personality.
14. When someone I know criticises me, I don't take it to heart.

#### **Category 3: Exaggeration of personal Control.**

15. I make my own "good luck".
16. I have control over what goes right and wrong.
17. I am the master of my own destiny.
18. Wishing for something strongly, helps me get it.
19. I can control most of the outcomes in my life.
20. I am able to change bad situations into good ones.
21. I exert the biggest influence over what happens to me.

#### **Category 4: Unrealistic optimism for the future.**

22. I often engage in making confident plans for my future.
23. I think I'm more likely than most people, to achieve what I want in the future.
24. I don't think it's likely that I'll encounter a bad patch in the future.
25. There are mostly good things to look forward to.
26. I spend a lot of time having daydreams about pleasant events in my future.
27. I think things will improve for me, in the future.
28. I think I'm more likely than my friends, to have the things I want in the future.

## **Appendix B2**

**Ethical Issues.** There was a particular issue regarding ethical pressure on confidentiality. With the collection of information on depressive symptoms, there was the potential for high scores to be noticed before the separation of identifying information on the consent forms. Concern for an individual may then have meant a breach of the confidentiality promised by the study. This was resolved by adopting a policy of no intervention unless clear indications of suicidality were presented in a data set. The instructions informed the participants that the surveys measured feelings and coping styles, and reminded students of the support services available to those in the University community experiencing stress or feelings that were hard to cope with. In the event, one of the subjects endorsed items reflecting the cutoff adopted by the study, i.e., Question 9. on the BDI “I would like to kill myself” (score 2). This individual also had a total BDI score of 32, indicating a severe level of depression. However, this person did not attend the retest session, and was subsequently found to have given a name which was not registered with the indicated faculty. The person thus remained untraceable. The data contributed by this person for the Time 1 test session, was included in the study.

### Appendix B3

**Comparison of the Two Subject Groups.** Tables 1 and 2 show the mean scores for the two subject groups at Time 1. (Use of the subject pool had resulted in inadequate numbers and so a second group was recruited via campus advertising. These comparisons were to check that the two groups were not significantly different in their score patterns).

Table 1.

*Mean Scores for All Clinical Measures, for the First 47 Subjects at Time 1*

Measure	Mean	SD	Skewness	SE	Kurtosis	SE Kurtosis
Dn	13.15	4.42	.16	.40	-.84	.68
K	13.02	5.02	.27	.45	-.76	.68
L	3.51	1.84	.39	.24	.00	.68
BDI	9.19	7.61	.94	.58	.04	.68
SRMI	12.59	7.77	.48	.61	-.11	.68
SEI	64.76	5.47	-.57	-.25	.74	.68
BAI	12.02	10.30	1.20	.86	.48	.68
DP	92.19	11.33	-.52	.95	1.40	.68
LEI Distress	53.04	45.56	1.11	.6.64	.92	.68
LEI Change	82.76	57.93	.47	8.45	-.90	.68
PIS (28)	74.15	11.98	.43	5.05	.25.051.21	.69
PIS (24)	63.87	11.88	.41	5.05	.24	.68

*Notes.* Dn= Denial scale of the MMPI; K = K scale of the MMPI; L= L scale of the MMPI; BDI= Beck Depression Inventory; SRMI= Self-Rating Mania Inventory; SEI = Coopersmith Self-Esteem Inventory; BAI = Beck Anxiety Inventory; DP = DP subscale of the Tennessee Self-Concept Scale; LEI = Life Events' Inventory; PIS (28) = Positive Illusions scale, all items; PIS (24) = Positive Illusions Scale, 24-item version.

Table 2.

*Mean Scores for All Clinical Measures, Second Group of 86 Subjects at Time 1.*

Measure	Mean	SD	Skewness	SE	Kurtosis	SE Kurtosis
Dn	14.70	4.81	0.11	.52	.39	.51
K	14.43	5.91	0.48	.64	-.24	.51
L	3.90	3.40	1.63	.37	2.61	.51
BDI	6.85	6.29	1.33	.68	2.15	.51
SRMI	13.07	7.61	0.27	.82	-.60	.52
SEI	62.46	39.95	-0.05	8.15	.08	.92
BAI	9.64	9.86	1.32	1.06	.72	.51
DP	91.09	11.10	-0.38	1.20	.17	.51
LEI Distress	69.36	65.36	2.58	7.05	10.20	.51
LEI Change	96.10	82.78	3.06	8.93	15.32	.51
PIS (28)	78.20	7.86	-1.17	1.40	2.98	.51
PIS (24)	67.86	11.13	-0.98	1.20	3.19	.51

*Notes.* Dn= Denial scale of the MMPI; K = K scale of the MMPI; L= L scale of the MMPI; BDI= Beck Depression Inventory; SRMI= Self-Rating Mania Inventory; SEI = Coopersmith Self-Esteem Inventory; BAI = Beck Anxiety Inventory; DP = DP subscale of the Tennessee Self-Concept Scale; LEI = Life Events' Inventory; PIS (28) = Positive Illusions scale, all items; PIS (24) = Positive Illusions Scale, 24-item version.

Tables 3 and 4 show the mean scores for the first and second group of subjects at Time 3.

Table 3.

*Mean Scores for Clinical Measures, for the First 47 Subjects at Time 3.*

Measure	N	Mean	SD	SE	Skewness	Kurtosis	SEKurtosis
SEI	19	66.84	5.42	.48	-.47	.56	.58
LEI Distress	19	63.59	59.46	5.16	2.47	1.04	.58
LEI Change	19	87.54	60.76	5.29	.96	-1.10	.59
PIS (28)	19	77.57	11.98	1.04	-.93	.63	.58
PIS (24)	19	67.12	11.27	.99	-.84	.71	.58

*Notes.* SEI = Coopersmith Self-Esteem Inventory; LEI = Life Events' Inventory; PIS (28) = Positive Illusions scale, all items; PIS (24) = Positive Illusions Scale, 24-item version.

Table 4.

*Mean Scores for Clinical Measures, for the Second 86 Subjects at Time 3.*

Measure	N	Mean	SD	SE	Skewness	Kurtosis	SE Kurtosis
SEI	46	66.84	5.42	.48	-.52	.09	.42
LEI Distress	46	63.59	59.46	5.16	1.78	9.40	.42
LEI Change	46	87.54	60.76	5.29	3.46	11.41	.42
PIS (28)	46	77.57	11.98	1.04	-2.04	2.04	.42
PIS (24)	46	67.12	11.27	.99	-.83	2.91	.42

*Notes.* SEI = Coopersmith Self-Esteem Inventory; LEI = Life Events' Inventory; PIS (28) = Positive Illusions scale, all items; PIS (24) = Positive Illusions Scale, 24-item version.

Table 5.

*Mean Scores for Clinical Measures, All Subjects at Time 3.*

Measure	N	Mean	SD	SE	Skewness	Kurtosis	SE Kurtosis
SEI	65	66.84	5.42	.48	-.49	.09	.42
LEI Distress	65	63.59	59.46	5.16	2.13	9.40	.42
LEI Change	65	87.54	60.76	5.29	2.84	11.41	.42
PIS (28)	65	77.57	11.98	1.04	-1.82	2.04	.42
PIS(24)	65	67.12	11.27	.99	-.84	2.91	.42

*Notes.* SEI = Coopersmith Self-Esteem Inventory; LEI = Life Events' Inventory; PIS (28) = Positive Illusions scale, all items; PIS (24) = Positive Illusions Scale, 24-item version.

## Appendix B4

Table 6.

*Total Variance Explained: 28-Item PIS*

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings(a)
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	6.42	22.97	22.97	5.75	20.56	20.56	5.00
2	2.48	8.86	31.84	1.94	6.94	27.50	4.32
3	1.86	6.65	38.49	1.24	4.44	31.95	2.38
4	1.56	5.59	44.09				
5	1.23	4.41	48.52				
6	1.20	4.29	52.80				
7	1.11	3.98	56.78				
8	1.05	3.76	60.54				
9	.98	3.51	64.04				
10	.96	3.46	67.52				
11	.92	3.30	70.82				
12	.76	2.74	73.57				
13	.73	2.63	76.24				
14	.68	2.41	78.63				
15	.66	2.35	80.99				
16	.61	2.21	83.20				
17	.58	2.08	85.29				
18	.53	1.92	87.21				
19	.50	1.80	89.01				
20	.48	1.73	90.75				
21	.46	1.64	92.40				
22	.45	1.61	94.02				
23	.35	1.26	95.28				
24	.35	1.25	96.53				
25	.30	1.07	97.61				
26	.27	.99	98.60				
27	.22	.70	99.39				
28	.17	.60	100.00				

*Notes.* Extraction Method: Maximum Likelihood: When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

## Appendix B5

Table 7.

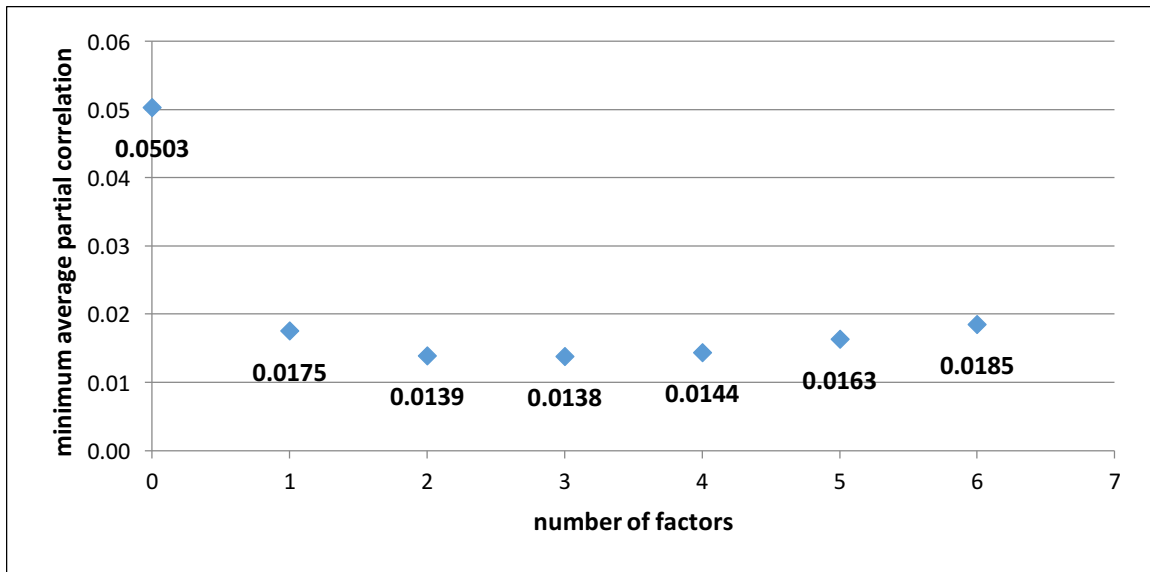
*Parallel test results for factor analysis iteration 1 for 28 variables*

Factor	Means	95 percentile	Actual data
1	2.075	2.231	6.432
2	1.904	2.019	2.483
3	1.780	1.856	1.864
4	1.670	1.759	1.567
5	1.571	1.651	1.237
6	1.485	1.555	1.201
7	1.404	1.471	1.115
8	1.329	1.394	1.053
9	1.256	1.322	.985
10	1.189	1.246	.969
11	1.125	1.182	.924
12	1.064	1.119	.769
13	1.006	1.058	.737
14	0.950	1.003	.681
15	0.897	0.945	.660
16	0.844	0.893	.619
17	0.793	0.841	.585
18	0.743	0.792	.538
19	0.695	0.742	.507
20	0.648	0.694	.487
21	0.601	0.644	.460
22	0.558	0.601	.453
23	0.514	0.555	.354
24	0.470	0.512	.351
25	0.426	0.469	.302
26	0.382	0.421	.278
27	0.337	0.380	.220
28	0.284	0.331	.170

## Appendix B6

Velicer's Minimum Average Partial (MAP) Test: MAP results for factor analysis iteration 1 for 28 variables.

**Figure 1.** Plot of Factors and Average Squared Correlations (MAP Results) for 28 PIS Items



## Appendix B7

Table 8.

*MAP Results for 28 PIS Items*

# Factors	Velicer's average squared correlation
0	0.0503
1	0.0175
2	0.0139
3	0.0138
4	0.0144
5	0.0163
6	0.0185
7	0.0211
8	0.0236
9	0.0261
10	0.0289
11	0.0323
12	0.0364
13	0.0413
14	0.0478
15	0.0543
16	0.0628
17	0.0712
18	0.0824
19	0.0965
20	0.1104
21	0.1274
22	0.1517
23	0.1928
24	0.2427
25	0.3428
26	0.4857
27	1

## Appendix B8

Table 9

Communalities, 28-Item PIS

	Initial	Extraction
PIS1	.40	.37
PIS2	.36	.34
PIS3	.20	.10
PIS4	.56	.44
PIS5	.37	.28
PIS6	.37	.15
PIS7	.26	.20
PIS8	.47	.35
PIS9	.40	.49
PIS10	.46	.36
PIS11	.33	.15
PIS12	.40	.09
PIS13	.47	.32
PIS14	.32	.29
PIS15	.57	.53
PIS16	.45	.43
PIS17	.65	.64
PIS18	.26	.09
PIS19	.45	.28
PIS20	.39	.26
PIS21	.24	.01
PIS22	.47	.41
PIS23	.46	.27
PIS24	.25	.13
PIS25	.54	.47
PIS26	.50	.42
PIS27	.59	.54
PIS28	.51	.39

*Notes.* Items 3, 6, 11, and 24 had extracted communalities below .2 and items 12, 18, and 21 had communalities below .1. These items are all potential candidates for deletion as they are not well reflected in the factor structure.

## Appendix B9

Table 10

28-Item PIS Item Correlation Matrix

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
2	-.4	1.0	-.2	-.4	-.2	-.1	.2	.3	.0	-.2	.2	-.1	-.3	-.3	-.1	-.1	.0	.1	-.3	.1	.1	.3	.2	.1	-.1	.0	-.2
3	.2	-.2	1.0	.1	.1	.2	.0	-.2	.0	.2	-.2	.2	.1	.1	.2	.2	.2	-.1	.1	-.1	-.1	-.2	-.1	.1	.2	.0	.3
4	.5	-.4	.1	1.0	.5	.0	-.3	-.3	.1	.2	-.1	.0	.3	.4	.1	.0	.0	.0	.3	-.2	.1	-.1	-.2	-.1	.1	.2	.2
5	.4	-.2	.1	.5	1.0	.1	-.1	-.3	.1	.2	-.1	.1	.2	.3	.1	.2	.1	-.1	.2	-.1	.0	-.2	-.1	.0	.2	.2	.3
6	.2	-.1	.2	.0	.1	1.0	-.2	-.2	.1	.3	-.2	.1	.3	.2	.3	.3	.3	-.1	.1	-.4	.0	-.2	-.2	.2	.2	.2	.3
7	-.2	.2	.0	-.3	-.1	-.2	1.0	.2	.1	-.1	.1	-.2	-.3	-.2	-.1	.0	.0	.1	-.2	.2	.0	.2	.2	-.1	-.2	.0	-.2
8	-.3	.3	-.2	-.3	-.3	-.2	.2	1.0	-.1	-.3	.2	-.2	-.4	-.3	-.2	-.1	.0	.3	-.4	.1	.1	.3	.3	-.2	-.2	-.3	-.3
9	.1	.0	.0	.1	.1	.1	.1	-.1	1.0	.3	.1	.1	.0	.1	.2	.1	.2	.0	.2	.2	.1	.2	.1	.1	.0	.4	.2
10	.2	-.2	.2	.2	.2	.3	-.1	-.3	.3	1.0	-.2	.3	.3	.2	.3	.3	.4	-.2	.3	.0	.0	-.3	-.3	.2	.3	.4	.4
11	-.1	.2	-.2	-.1	-.1	-.2	.1	.2	.1	-.2	1.0	-.3	-.2	-.1	-.2	-.2	-.2	.2	-.1	.1	.0	.3	.3	.0	-.2	-.1	-.3
12	.1	-.1	.2	.0	.1	.1	-.2	-.2	.1	.3	-.3	1.0	.2	.1	.1	.1	.1	-.2	.2	.0	-.2	-.1	-.1	.1	.0	.2	.4
13	.3	-.3	.1	.3	.2	.3	-.3	-.4	.0	.3	-.2	.2	1.0	.3	.4	.2	.3	-.2	.2	-.2	.0	-.3	-.1	.1	.3	.2	.4
14	.3	-.3	.1	.4	.3	.2	-.2	-.3	.1	.2	-.1	.1	.3	1.0	.3	.1	.2	-.1	.3	-.1	-.2	-.3	-.2	.0	.2	.2	.3
15	.2	-.1	.2	.1	.1	.3	-.1	-.2	.2	.3	-.2	.1	.4	.3	1.0	.5	.6	.0	.2	-.2	.0	-.2	-.2	.2	.4	.4	.5
16	.0	-.1	.2	.0	.2	.3	.0	-.1	.1	.3	-.2	.1	.2	.1	.5	1.0	.6	.0	.2	-.1	.0	-.2	-.2	.3	.4	.4	.3
17	.1	.0	.2	.0	.1	.3	.0	.0	.2	.4	-.2	.1	.3	.2	.6	.6	1.0	.0	.2	.0	.0	-.1	-.2	.2	.4	.5	.4
18	.0	.1	-.1	.0	-.1	-.1	.1	.3	.0	-.2	.2	-.2	-.2	-.1	.0	.0	.0	1.0	-.1	.1	.1	.3	.2	-.2	-.2	-.1	-.2
19	.2	-.3	.1	.3	.2	.1	-.2	-.4	.2	.3	-.1	.2	.2	.3	.2	.2	.2	-.1	1.0	-.1	.1	-.3	-.4	.2	.2	.2	.3
20	-.2	.1	-.1	-.2	-.1	-.4	.2	.1	.2	.0	.1	.0	-.2	-.1	-.2	-.1	.0	.1	-.1	1.0	.0	.3	.3	.0	-.3	-.1	-.3
21	.1	.1	-.1	.1	.0	.0	.0	.1	.1	.0	.0	-.2	.0	-.2	.0	.0	.0	.1	.1	.0	1.0	.1	.1	.0	.1	.0	.0
22	-.2	.3	-.2	-.1	-.2	-.2	.2	.3	.2	-.3	.3	-.1	-.3	-.3	-.2	-.2	-.1	.3	-.3	.3	.1	1.0	.4	-.1	-.3	-.2	-.4
23	-.2	.2	-.1	-.2	-.1	-.2	.2	.3	.1	-.3	.3	-.1	-.1	-.2	-.2	-.2	-.2	.2	-.4	.3	.1	.4	1.0	-.1	-.3	-.3	-.4
24	.1	.1	.1	-.1	.0	.2	-.1	-.2	.1	.2	.0	.1	.1	.0	.2	.3	.2	-.2	.2	.0	.0	-.1	-.1	1.0	.2	.3	.3
25	.2	-.1	.2	.1	.2	.2	-.2	-.2	.0	.3	-.2	.0	.3	.2	.4	.4	.4	-.2	.2	-.3	.1	-.3	-.3	.2	1.0	.4	.6
26	.2	.0	.0	.2	.2	.2	.0	-.3	.4	.4	-.1	.2	.2	.2	.4	.4	.5	-.1	.2	-.1	.0	-.2	-.3	.3	.4	1.0	.4
27	.3	-.2	.3	.2	.3	.3	-.2	-.3	.2	.4	-.3	.4	.4	.3	.5	.3	.4	-.2	.3	-.3	.0	-.4	-.4	.3	.6	.4	1.0
28	.1	-.1	.1	.1	.2	.1	-.2	-.2	.0	.1	-.2	.2	.3	.2	.5	.4	.4	-.1	.3	-.2	-.2	-.3	-.3	.2	.5	.3	.5

Notes. 1= PIS item 1, 2 = PIS item 2, 3 = PIS item 3, and so on; Correlations kept to single digit due to size of Table.

## Appendix B10

Table 11.

Pattern Matrix for the 28-Item PIS

	Factor		
	1	2	3
PIS17	.90		
PIS15	.74		
PIS16	.72		
PIS26	.60		
PIS25	.58		-.30
PIS27	.56		
PIS28	.52		-.26
PIS24	.41		
PIS10	.41	.32	
PIS6	.29		
PIS3			
PIS4		.75	
PIS1		.65	
PIS2		-.60	
PIS8		-.56	
PIS5		.55	
PIS14		.50	
PIS19		.42	
PIS13	.26	.31	
PIS12			
PIS9	.31	.28	.66
PIS22			.51
PIS20			.47
PIS7		-.25	.32
PIS23			.30
PIS11			
PIS18			
PIS21			

*Note.* Rotation Method: Promax with a Kaiser Normalisation.

## Appendix B11

When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Table 12.

*Total Variance Explained: 23-Item PIS*

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings(a)
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	5.83	25.36	25.36	5.21	22.64	22.64	4.67
2	2.57	11.19	36.54	2.01	8.74	31.38	3.71
3	1.90	8.26	44.80	1.29	5.59	36.97	2.27
4	1.43	6.21	51.01				
5	1.09	4.76	55.77				
6	1.01	4.40	60.17				
7	.93	4.03	64.20				
8	.86	3.74	67.94				
9	.78	3.37	71.31				
10	.73	3.16	74.47				
11	.71	3.10	77.58				
12	.64	2.78	80.35				
13	.62	2.69	83.05				
14	.54	2.34	85.39				
15	.52	2.25	87.64				
16	.50	2.15	89.79				
17	.47	2.04	91.83				
18	.41	1.77	93.60				
19	.40	1.72	95.31				
20	.31	1.36	96.67				
21	.30	1.29	97.96				
22	.27	1.18	99.14				
23	.20	.86	100.00				

Notes. Extraction Method: Maximum Likelihood.

## Appendix B12

Table 13.

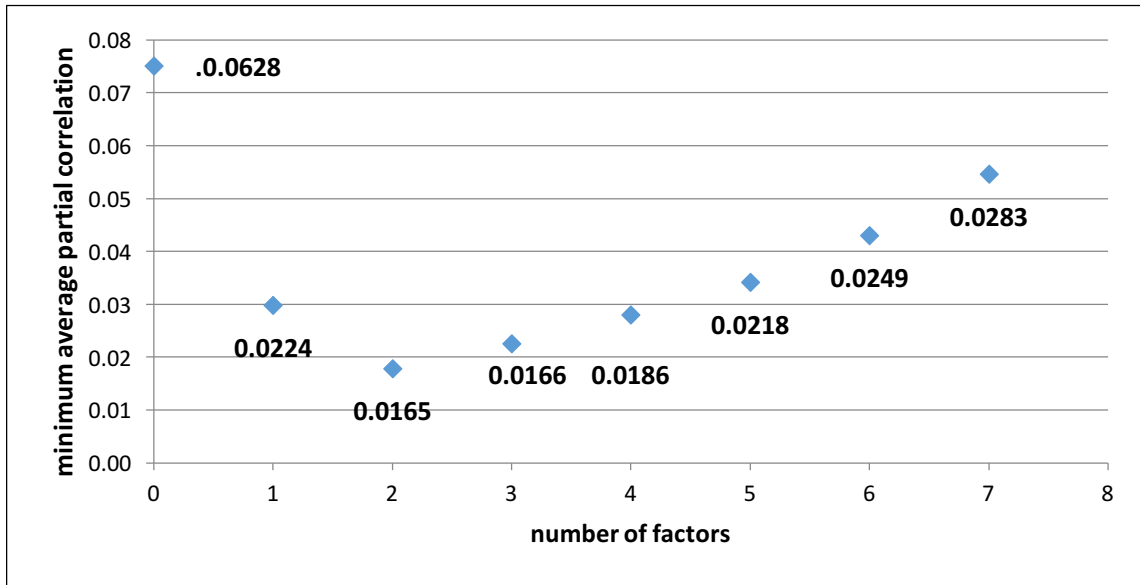
*Parallel test results for factor analysis iteration 2 for 23 variables*

Factor	Means	95 percentile	Actual data
1	1.937	2.101	5.970
2	1.769	1.886	2.469
3	1.643	1.735	1.776
4	1.535	1.612	1.247
5	1.438	1.512	1.153
6	1.354	1.423	1.040
7	1.275	1.338	0.951
8	1.200	1.259	0.898
9	1.130	1.185	0.782
10	1.063	1.118	0.751
11	1.000	1.056	0.739
12	0.938	0.992	0.661
13	0.878	0.932	0.623
14	0.821	0.870	0.536
15	0.766	0.815	0.517
16	0.713	0.762	0.503
17	0.662	0.710	0.482
18	0.609	0.657	0.439
19	0.561	0.609	0.385
20	0.508	0.554	0.315
21	0.456	0.505	0.302
22	0.402	0.450	0.263
23	0.340	0.395	0.197

## Appendix B13

### MAP results for factor analysis iteration 2 for 23 variables

Figure 2. Plot of Factors and Average Squared Correlations (MAP Results) for 23 PIS Items



## Appendix B14

Table 14.

*MAP results for 23 Items*

# factors	Velicer's average squared correlation
0	0.0628
1	0.0224
2	0.0165
3	0.0166
4	0.0186
5	0.0218
6	0.0249
7	0.0283
8	0.0328
9	0.0382
10	0.0447
11	0.0518
12	0.0618
13	0.0719
14	0.0835
15	0.1001
16	0.1213
17	0.1437
18	0.1772
19	0.2326
20	0.3275
21	0.4868
22	1

## Appendix B15

Table 15.

*Pattern Matrix: for the 23-Item PIS*

Item	Factor		
	1	2	3
PIS17	.89		
PIS16	.72		
PIS15	.72		
PIS26	.63		
PIS25	.61		
PIS27	.59		
PIS28	.52		
PIS24	.48		
PIS10	.47		
PIS4		.81	
PIS2		-.60	
PIS5		.59	
PIS14		.55	
PIS8		-.51	
PIS1		.47	
PIS13	.32	.40	
PIS19		.38	
PIS7		-.31	
PIS20			.70
PIS22			.60
PIS23			.60
PIS6			-.33
PIS9	.26		.32

*Notes.* Extraction Method: Maximum Likelihood. Rotation Method: Promax with Kaiser Normalization. A rotation converged in 5 iterations.

## Appendix B16

Table 16.

*Communalities: 23-Item PIS*

Item	Initial	Extraction
PIS1	.36	.35
PIS2	.36	.35
PIS4	.57	.48
PIS5	.37	.29
PIS6	.36	.15
PIS7	.25	.21
PIS8	.45	.33
PIS9	.40	.51
PIS10	.42	.37
PIS13	.45	.32
PIS14	.35	.30
PIS15	.56	.52
PIS16	.43	.42
PIS17	.63	.63
PIS19	.39	.28
PIS20	.38	.29
PIS22	.42	.36
PIS23	.43	.24
PIS24	.23	.15
PIS25	.48	.50
PIS26	.49	.44
PIS27	.54	.54
PIS28	.47	.39

## Appendix B17

Table 17.

*Total Variance Explained: 22 Item-PIS Scale*

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings(a)
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	5.93	26.96	26.96	5.25	23.87	23.87	4.57
2	2.43	11.07	38.04	1.86	8.48	32.36	4.06
3	1.42	6.45	44.49				
4	1.22	5.54	50.04				
5	1.14	5.20	55.24				
6	1.03	4.71	59.96				
7	.97	4.32	64.28				
8	.87	3.98	68.26				
9	.76	3.45	71.72				
10	.75	3.40	75.13				
11	.71	3.265	78.40				
12	.66	3.04	81.45				
13	.56	2.50	83.95				
14	.53	2.40	86.35				
15	.51	2.31	88.76				
16	.49	2.29	91.06				
17	.44	2.00	93.06				
18	.38	1.71	94.76				
19	.35	1.57	96.33				
20	.31	1.40	97.79				
21	.28	1.30	99.09				
22	.19	.96	100.00				

*Notes.* Extraction Method: Maximum Likelihood. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

## Appendix B18

Table 18.

*Parallel test results for factor analysis iteration 3 for 22 PIS variables*

Factor	Means	95th percentile	Actual data
1	1.905	2.055	5.932
2	1.743	1.860	2.437
3	1.615	1.710	1.420
4	1.508	1.589	1.220
5	1.416	1.485	1.144
6	1.329	1.397	1.038
7	1.249	1.313	.951
8	1.173	1.235	.877
9	1.105	1.166	.761
10	1.036	1.093	.750
11	0.972	1.029	.718
12	0.911	0.961	.661
13	0.851	0.904	.568
14	0.793	0.847	.530
15	0.738	0.791	.517
16	0.683	0.733	.497
17	0.631	0.683	.440
18	0.578	0.630	.387
19	0.525	0.574	.351
20	0.472	0.521	.315
21	0.416	0.470	.286
22	0.352	0.411	.199

## Appendix B19

### MAP results for factor analysis iteration 3 for 22 variables

**Figure 3.** Plot of Factors and Average Squared Correlations (MAP Results) for 22 PIS Items

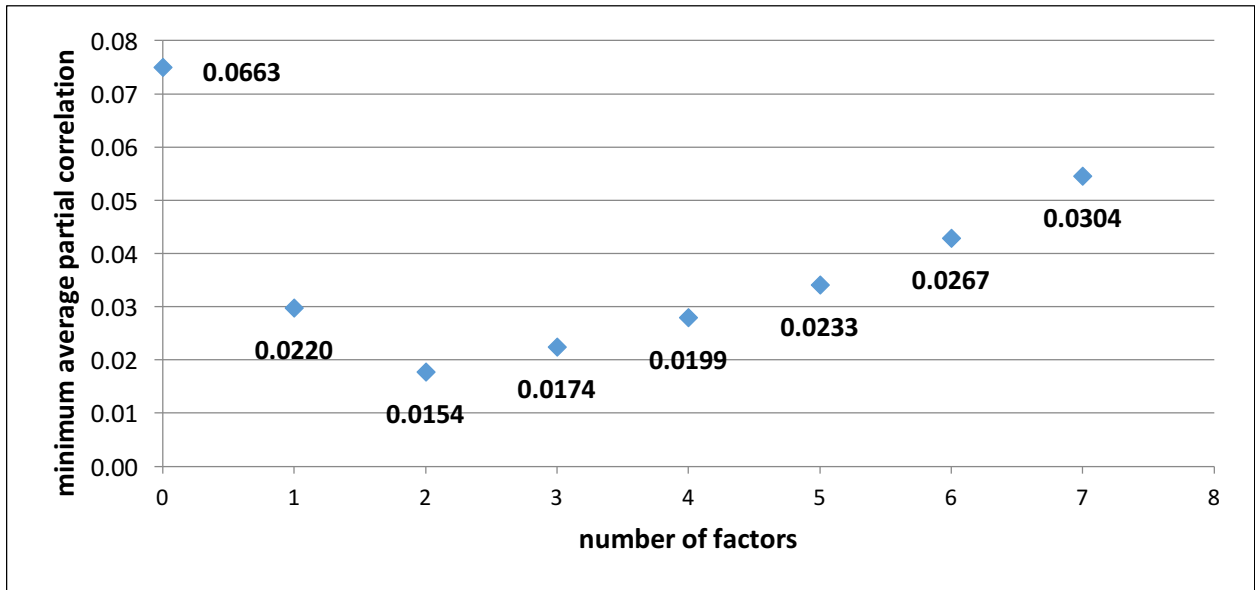


Table 19.

*MAP Results for 22-Item PIS*

# factors	Velicer's average squared correlation
0	0.0663
1	0.0220
2	0.0154
3	0.0174
4	0.0199
5	0.0233
6	0.0267
7	0.0304
8	0.0358
9	0.0423
10	0.0498
11	0.0583
12	0.0694
13	0.0852
14	0.0972
15	0.1163
16	0.1423
17	0.1797
18	0.2340
19	0.3147
20	0.4805
21	1

## Appendix B20

Table 20.

*Communalities: 22-Item PIS*

Item	Initial	Extraction
PIS1	.36	.33
PIS2	.36	.35
PIS4	.56	.45
PIS5	.37	.28
PIS6	.35	.15
PIS7	.24	.15
PIS8	.45	.33
PIS10	.39	.28
PIS13	.44	.32
PIS14	.34	.29
PIS15	.56	.52
PIS16	.43	.43
PIS17	.63	.61
PIS19	.37	.27
PIS20	.37	.10
PIS22	.38	.24
PIS23	.42	.21
PIS24	.23	.15
PIS25	.46	.43
PIS26	.42	.36
PIS27	.52	.52
PIS28	.47	.35

*Note.* Extraction Method: Maximum Likelihood.

## Appendix B21

Table 21.

*Pattern Matrix: 22-Item Scale*

Item	Factor	
	1	2
PIS17	.85	
PIS16	.71	
PIS15	.71	
PIS25	.61	
PIS27	.58	
PIS26	.58	
PIS28	.53	
PIS24	.41	
PIS10	.38	
PIS6	.31	
PIS4		.73
PIS2		-.64
PIS1		.59
PIS8		-.56
PIS5		.53
PIS14		.51
PIS19		.41
PIS7		-.40
PIS13	.26	.39
PIS22		-.36
PIS23		-.29
PIS20		.24

*Notes.* Extraction Method: Maximum Likelihood. Rotation Method: Promax with Kaiser Normalization. Rotation converged in 3 iterations.

## Appendix B22

Table 22.

*Total Variance Explained: 17-Item PIS*

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings(a)
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	4.95	29.10	29.10	4.32	25.39	25.39	3.90
2	2.40	14.10	43.20	1.83	10.73	36.12	3.17
3	1.15	6.79	49.99				
4	1.04	6.14	56.13				
5	.92	5.39	61.52				
6	.79	4.62	66.15				
7	.76	4.46	70.61				
8	.72	4.24	74.85				
9	.69	4.08	78.93				
10	.66	3.87	82.80				
11	.57	3.35	86.14				
12	.54	3.15	89.29				
13	.48	2.82	92.11				
14	.40	2.36	94.47				
15	.36	2.13	96.60				
16	.33	1.94	98.53				
17	.25	1.47	100.00				

*Note:* Extraction Method: Maximum Likelihood.

## Appendix B23

Table 23.

*Communalities: 17-Item PIS*

Item	Initial	Extraction
PIS1	.34	.35
PIS2	.34	.33
PIS4	.49	.52
PIS5	.36	.31
PIS7	.20	.13
PIS8	.38	.29
PIS10	.32	.28
PIS14	.30	.31
PIS15	.52	.52
PIS16	.42	.44
PIS17	.59	.61
PIS19	.30	.27
PIS24	.21	.15
PIS25	.45	.42
PIS26	.41	.37
PIS27	.48	.49
PIS28	.44	.36

*Note.* Extraction Method: Maximum Likelihood.

## Appendix B24

Table 24.

*Parallel test results for factor analysis iteration 4 for 17 variables*

Factor	Means	95th percentile	Actual data
1	1.753	1.903	4.947
2	1.587	1.698	2.397
3	1.463	1.556	1.154
4	1.356	1.433	1.044
5	1.265	1.334	.917
6	1.181	1.246	.786
7	1.104	1.164	.759
8	1.027	1.086	.720
9	0.957	1.013	.694
10	0.888	0.945	.657
11	0.825	0.878	.569
12	0.760	0.818	.535
13	0.697	0.752	.478
14	0.634	0.691	.402
15	0.571	0.629	.361
16	0.505	0.561	.329
17	0.428	0.497	.250

## Appendix B25

### MAP results for factor analysis iteration 4 for 17 variables

**Figure 4.** Plot of Factors and Average Squared Correlations (MAP Results) for 17 PIS Items

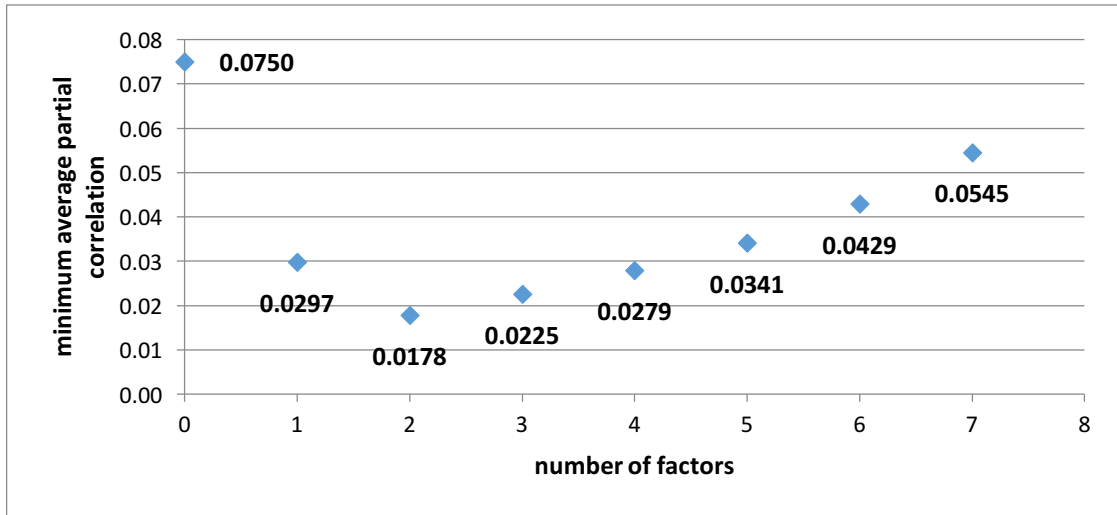


Table 25.

*MAP results for 17-item PIS*

# factors	Velicer's average squared correlation
0	0.0750
1	0.0297
2	0.0178
3	0.0225
4	0.0279
5	0.0341
6	0.0429
7	0.0545
8	0.0690
9	0.0849
10	0.1125
11	0.1371
12	0.1688
13	0.2247
14	0.3255
15	0.5105
16	1

## Appendix B26

Table 26.

*10-Point Self-Esteem Scores*

	Self Esteem (Based on 10 point Items) Time 1	Self Esteem (Based on 10 point Items) Time 2	Self Esteem (Based on 10 point Items) Time 3
No. Valid	115	61	51
No. Missing	13	67	77
Mean	1.42	1.24	1.42
Median	1.68	1.16	1.20
Std. Deviation	1.690	1.55	1.56

## Appendix B27

Table 27.

*Correlations: Self-esteem scale variants*

	Self Esteem (10 point scale) Time 1	Self Esteem (10 point scale) Time 2	Self Esteem (10 point scale) Time 3	Self Esteem (binary scale) Time 1	Self Esteem (binary scale) Time 2	Self Esteem (binary scale) Time 3
Self Esteem (10 point scale) Time 1						
Self Esteem (10 point scale) Time 2	.89(**)					
Self Esteem (10 point scale) Time 3	.85(**)	.92(**)				
Self Esteem (binary scale) Time 1	.97(**)	.87(**)	.82(**)			
Self Esteem (binary scale) Time 2	.87(**)	.96(**)	.88(**)	.88(**)		
Self Esteem (binary scale) Time 3	.79(**)	.87(**)	.96(**)	.80(**)	.87(**)	

Note. \*\* Correlation is significant at the 0.01 level (2-tailed).

## APPENDIX C: Study 3A

## Appendix C1

Table1.

*Fit Indices for Confirmatory Factor Analysis for 17-item PIS*

### Model Fit Summary

#### CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	35	197.746	118	.000	1.676
Saturated model	153	.000	0		
Independence model	17	703.567	136	.000	5.173

#### RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.071	.053	.088	.027
Independence model	.176	.164	.189	.000

## Appendix C2

Table 2 represents the unstandardised loadings along with the standard errors, critical ratios (CRs) and *p*-values. All of the unconstrained estimates for the 17 items exceeded a CR of 2.00 and are significant but weakest for Item 24.

Table 2.

Confirmatory factor analysis: Unstandardised Regression Weights for 17-item PIS

### Estimates (Group number 1 - Default model)

#### Scalar Estimates (Group number 1 - Default model)

#### Maximum Likelihood Estimates

#### Regression Weights: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Label
pis10 <--- F1	.462	.058	7.899	***	
pis24 <--- F1	.265	.088	2.992	.003	
pis28 <--- F1	.462	.061	7.535	***	
pis26 <--- F1	.575	.062	9.284	***	
pis27 <--- F1	.521	.056	9.266	***	
pis25 <--- F1	.525	.070	7.463	***	
pis16 <--- F1	.516	.081	6.352	***	
pis15 <--- F1	.424	.074	5.697	***	
pis17 <--- F1	.585	.063	9.231	***	
pis7 <--- F2	.384	.090	4.256	***	
pis19 <--- F2	.337	.067	5.058	***	
pis8 <--- F2	.485	.090	5.378	***	
pis14 <--- F2	.457	.079	5.777	***	
pis5 <--- F2	.382	.080	4.761	***	
pis1 <--- F2	.603	.087	6.946	***	
pis2 <--- F2	.338	.081	4.173	***	
pis4 <--- F2	.434	.083	5.219	***	

Note. \*\*\*  $p < .001$

## Appendix C3

Table 3.

*Confirmatory Factor Analysis: Standardised Regression Weights for 17- item PIS.*

### Standardized Regression Weights: (Group number 1 - Default model)

	Estimate
pis10 <--- F1	.646
pis24 <--- F1	.272
pis28 <--- F1	.622
pis26 <--- F1	.730
pis27 <--- F1	.729
pis25 <--- F1	.618
pis16 <--- F1	.541
pis15 <--- F1	.492
pis17 <--- F1	.727
pis7 <--- F2	.403
pis19 <--- F2	.472
pis8 <--- F2	.498
pis14 <--- F2	.531
pis5 <--- F2	.447
pis1 <--- F2	.622
pis2 <--- F2	.396
pis4 <--- F2	.485

Table 3 presents the regression weights that emerged when measured variables were converted to *z* scores. Inspection of Table 3 shows that PIS 24 and PIS 15 are not especially aligned with Factor 1 and PIS 7, 19, 8, 5, 2, and 4 are not especially aligned with Factor 2, all being below 0.50.

## Appendix C4

Table 4 shows Factors 1 and 2 are strongly correlated.

Table 4.

*Confirmatory Factor Analysis: Covariances and Correlations for Factors 1 and 2 of 17-item PIS*

### **Covariances: (Group number 1 - Default model)**

	Estimate	S.E.	C.R.	P	Label
F1 <--> F2	.685	.072	9.566	***	

### **Correlations: (Group number 1 - Default model)**

	Estimate
F1 <--> F2	.685

Note. \*\*\*  $p < .001$

## Appendix C5

Table 5.

*Confirmatory Factor Analysis: Variances for the 17-item PIS*

### **Squared Multiple Correlations: (Group number 1 - Default model)**

	Estimate
pis4	.235
pis2	.157
pis1	.387
pis5	.200
pis14	.282
pis8	.248
pis19	.223
pis7	.163
pis17	.528
pis15	.243
pis16	.292
pis25	.381
pis27	.531
pis26	.533
pis28	.387
pis24	.074
pis10	.417

Table 5 above shows the  $R^2$  corresponding to the 17 PIS observed variables and indicates that 16 of the 17 respective variables explained a respectable portion of the variance (between 16% and 53%), and only Item 24 had a negligible  $R^2$  at .074.

## Appendix C6

Table 6.

*Modification Indices for Confirmatory Factor Analysis with 17-Item PIS*

### Modification Indices (Group number 1 - Default model)

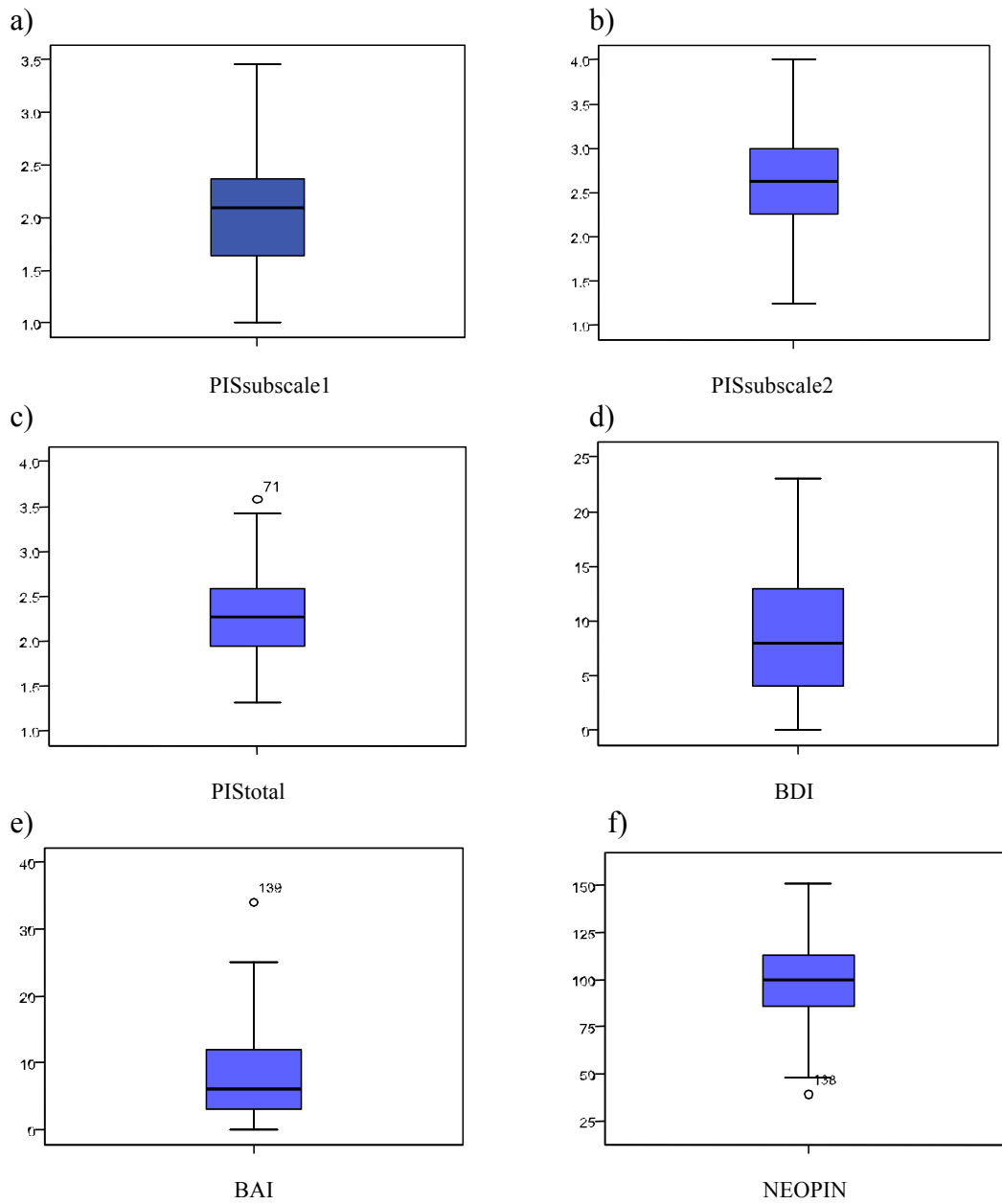
#### Covariances: (Group number 1 - Default model)

	M.I.	Par Change
e16 <--> F1	5.181	-.143
e14 <--> e17	8.427	.160
e12 <--> e17	6.733	-.160
e11 <--> F2	13.016	-.197
e11 <--> F1	24.011	.249
e11 <--> e14	4.734	-.096
e10 <--> e13	6.517	.150
e9 <--> e17	6.525	-.107
e9 <--> e12	4.571	.097
e7 <--> e9	9.025	.127
e6 <--> e11	7.725	.109
e4 <--> e9	4.963	.066
e4 <--> e6	4.390	-.073
e3 <--> e9	6.412	-.079
e3 <--> e6	10.283	.117
e2 <--> e10	11.356	-.245

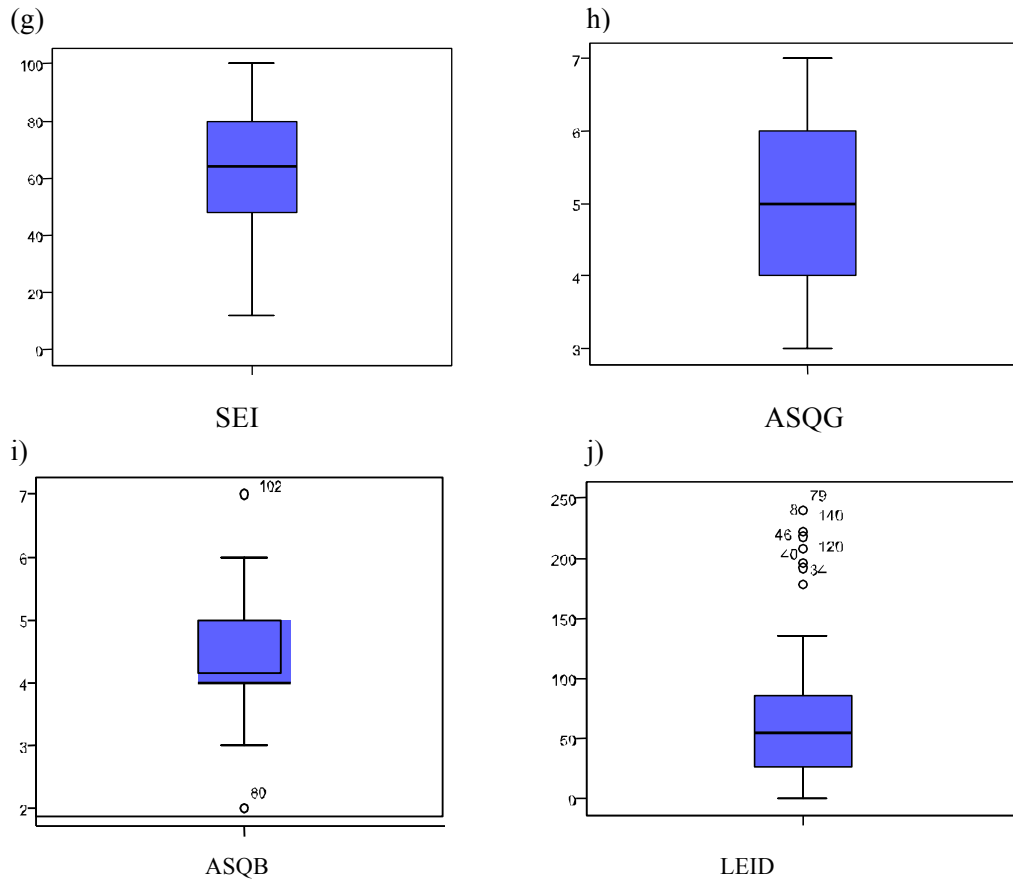
## Appendix C7

The box plots for all variables (see Figure 1) illustrate that the life event scales had outlier cases far removed from the majority of the distribution.

**Figure 1.** Box Plots for Measures

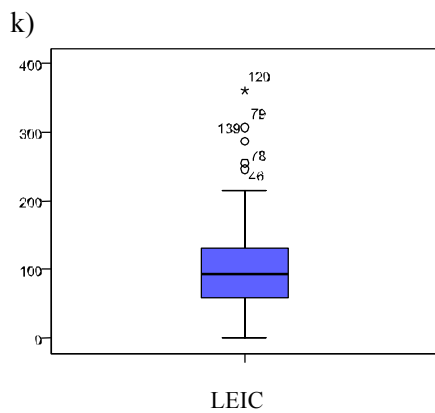


**Figure 1.** Box Plots for Measures: continued



To deal with outliers and positive skew, square root transformation was applied to the following four variables: BDI, BAI, LEID, and LEIC. Results of these transformations are presented in Figure 2.

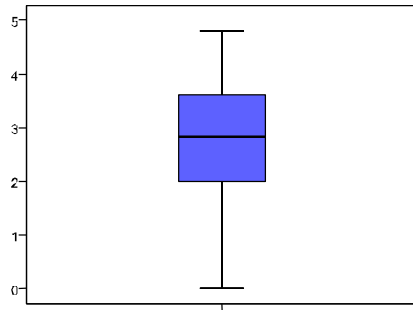
**Figure 1a:** Box plots for Original Variables



## Appendix C8

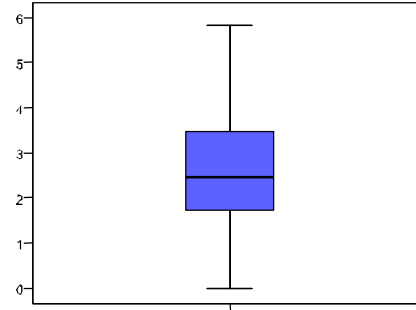
**Figure 2.** Box Plots for Transformed Variables

a)



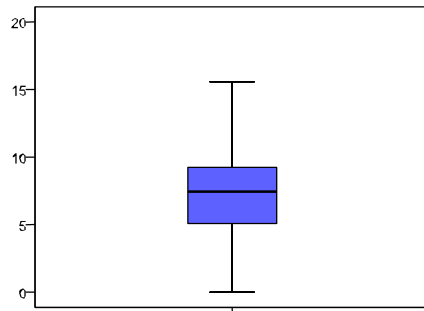
SQRT\_BDI

b)



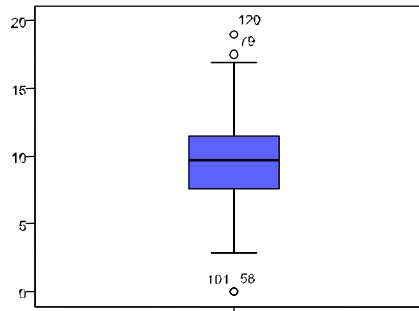
SQRT\_BAI

c)



SQRT\_LEID

d)



SQRT\_LEIC