Trauma and Psychosis: Investigating the Role of Post-Traumatic Intrusions, Schemas and Avoidance

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Abstract

Increasing evidence suggests that childhood trauma may play a role in the aetiology of psychosis, leading to suggestions that trauma-related symptoms may be mechanisms in the process. Two prominent cognitive models implicate post-traumatic intrusions and trauma-related schemas and emotion as key mechanisms. Neither of the models has been extensively tested, and both have implications for the content of hallucinations and delusions in relation to traumatic experiences. The aims of the current study are to 1) investigate statistical associations between the severity of trauma and psychosis, 2) investigate phenomenological associations between trauma, post-traumatic intrusions, hallucinations and delusions, and 3) explore the relationship between trauma-related avoidance and psychosis.

Sixty-six people with first episode psychosis aged between 15 and 24 years were assessed for childhood trauma, post-traumatic stress disorder (PTSD) symptoms, psychotic symptoms and experiential avoidance. The content of hallucinations, delusions, post-traumatic intrusions and traumatic experiences (up to five of each) was assessed. Content relationships between hallucinations, trauma and post-traumatic intrusions were categorised as ‘direct’ (where hallucination content was identical to trauma or intrusion content), ‘indirect’ (where hallucinations contained elements of trauma/intrusion-specific content but were not exact representations of traumas/intrusions) or ‘thematic’ (where hallucinations were related to trauma or intrusions at the level of broader, schema-related themes).

Sixty-five percent of the sample had experienced childhood trauma, and 26% met diagnostic criteria for PTSD. Childhood trauma severity was correlated with hallucination and delusion severity with moderate effect sizes (although the correlation with hallucinations did not
reach significance). Post-traumatic intrusions correlated with both hallucinations and delusions with moderate to large effect sizes. In terms of hallucination content, 78% of people with hallucinations and childhood trauma had hallucinations related in content to their trauma. These relationships were primarily thematic, although a notable minority (25%) had hallucination content directly representative of their trauma. Sixty-four percent of people had more than one type of relationship (direct, indirect, thematic, or no relationship) between their trauma and hallucination content. Of those with hallucinations and post-traumatic intrusions, 73% experienced hallucinations related in content to their post-traumatic intrusions. For delusion content, 89% of people with delusions and trauma had delusional content related to their trauma.

Relationships between childhood trauma, avoidance, hallucinations and delusions were investigated, and it was found that childhood trauma was correlated with experiential avoidance (with a moderate effect size), and that both experiential avoidance and post-traumatic avoidance were correlated with hallucinations and delusions (with moderate effect sizes). In a series of multiple linear regressions, post-traumatic intrusions (but not childhood trauma, post-traumatic avoidance, experiential avoidance or maladaptive schemas) were independently associated with hallucination severity and explained 13% of the variance in hallucinations. Post-traumatic intrusions and maladaptive schemas (but not childhood trauma, post-traumatic avoidance or experiential avoidance) were independently associated with delusion severity, and explained 14% and 5-8% of the variance in delusion severity respectively. These findings suggest that post-traumatic intrusions and maladaptive schemas may be particularly important mechanisms in the relationship between trauma and psychosis, and may be playing a stronger role than avoidance. This has implications for the treatment of trauma and PTSD symptoms in people with psychosis.
Research trialling interventions that specifically target post-traumatic intrusions and schemas in people with early psychosis who have experienced childhood trauma is recommended.
Declaration

This is to certify that:

(i) the thesis comprises only my original work towards the degree of Master of Psychology (Clinical Psychology)/Doctor of Philosophy

(ii) due acknowledgment has been made in the text to all other material used

(iii) the thesis is fewer than 100,000 words in length, exclusive of tables, maps, bibliographies and appendices

[Natalie Louise Peach signature]

Natalie Louise Peach

I, Natalie Louise Peach, declare that the research reported in this thesis was conducted in accordance with the principles for the ethical treatment of human participants, as approved for this research by the University of Melbourne Human Research Ethics Committee.

[Natalie Louise Peach signature]

Natalie Louise Peach
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Chapter 1. Introduction and Overview

1.1 General Introduction

In recent decades, increasing evidence has implicated psychological and social factors as risk factors in the aetiology of psychosis. It is now well established that many people with psychosis have experienced trauma in childhood. The psychological effects of trauma and abuse in childhood can be complex and varied, and growing evidence suggests that for some people, hallucinations and delusions may be part of an array of psychopathological consequences that can manifest as a result of trauma.

Support for the idea that trauma may be aetiologically related to hallucinations and delusions comes from several different lines of research. There are now a substantial number of studies that have shown that there are high rates of childhood trauma and post-traumatic stress disorder (PTSD) in people with psychosis (Arseneault et al., 2011; Cutajar, et al., 2010; de Bont et al., 2015; Halász, Levy-Gigi, Kelemen, Benedek, & Keri, 2013; Hardy et al., 2016; Kelleher et al., 2013; Matheson, Shepherd, Pinchbeck, Laurens, & Carr 2013; Neria, Bromet, Sievers, Lavelle, & Fochtmann 2002; Varese et al., 2012). Other studies have highlighted the frequent occurrence of hallucinations and delusions in the context of PTSD (David et al, 1997; Hamner, 1997; Mueser & Butler, 1987; Scott, Nurcombe, Sheridan, & McFarland, 2007). Symptom-specific associations between hallucinations and delusions and childhood trauma have also been found (Bentall et al., 2014; Berg et al., 2015; Daalman et al., 2012; Goldstone, Farhall, & Ong, 2011; Hardy et al., 2016; Varese et al., 2012), although the specificity of the impact of trauma on psychotic symptoms has been debated, with some researchers finding no association between childhood trauma and a differential course of symptoms (van Dam et al., 2015).
The close associations between trauma, hallucinations, delusions and PTSD have led to the development of cognitive models of the aetiology and maintenance of psychotic symptoms from trauma. The two most prominent cognitive models propose that post-traumatic intrusions, maladaptive schemas, and negative emotion are all mechanisms by which trauma impacts psychosis, however the models places different emphasis on which mechanism is proposed to be the primary driver of the aetiology of psychosis from trauma. One model (the ‘intrusions’ model) conceptualises hallucinations as variants of the intrusive symptoms of PTSD (Morrison, 2001; Morrison, Frame, & Larkin, 2003) while the other (the ‘schema/emotion’ model) suggests that the major mechanisms through which trauma impacts psychosis are maladaptive schemas and emotional processes (Garety et al., 2001). Neither of these models has been extensively tested. In this thesis, the two models are described, and theoretical and empirical evidence for both is reviewed. Some of the supporting evidence for the models has come from findings of phenomenological associations between trauma and psychotic symptoms, although very little research has been conducted in this area. Previous studies have demonstrated that the content of hallucinations and delusions can be related to traumatic experiences, although the salience of the link can vary (Hardy et al., 2005; Reiff, Castille, Muenzenmaier, & Link, 2012). In some cases, the content of hallucinations can be directly related to the person’s traumatic experience, providing support for the ‘intrusions’ model mentioned above. Other relationships between trauma and hallucination content exist at the level of broader, schema-related or emotional themes, lending support for the ‘schema/emotion’ model (Hardy et al., 2005). The co-occurrence of different types of content relationships between trauma and hallucinations may be indicative of multiple post-traumatic cognitive processes underpinning hallucinations within individuals. In line with this, in Chapter 3 of this thesis the two cognitive models are expanded and integrated with current theories.
of PTSD, and research questions pertaining to hallucination content in relation to trauma are posed. Both models also have implications for delusion content in relation to trauma, which is explored in Chapter 4.

Post-traumatic intrusions are implicated as mechanisms in the relationship between trauma and psychosis by both of the cognitive models mentioned above, particularly the ‘intrusions’ model. Relationships between hallucinations, delusions and post-traumatic intrusions have not been adequately researched, and no studies to date have investigated the relationship between the content of hallucinations and the content of post-traumatic intrusions.

In addition to the intrusive symptoms of PTSD, avoidance symptoms may also play a key role in the aetiology of hallucinations and delusions from trauma. Avoidance has been linked to a variety of psychopathological symptoms including hallucinations and delusions (Goldstone et al., 2012; 2011a & b; Hardy et al., 2016; Udachina et al., 2009). Studies assessing avoidance in the context of psychotic symptoms have primarily focused on experiential avoidance (the avoidance of aversive internal experiences), which has been found to be related to hallucination and delusion severity. Fewer studies have investigated post-traumatic avoidance (the avoidance of trauma-specific internal and external stimuli). It may be that following trauma, avoidance of painful trauma-specific memories, thoughts, events or environments play a key role in the aetiology of further psychopathology such as hallucinations and delusions. As with post-traumatic intrusions, the role of post-traumatic avoidance in the aetiology and maintenance of hallucinations and delusion is not well understood, and is important for developing appropriate psychological interventions for psychosis with people who have experienced trauma.
1.2 Outline of the Chapters of the Thesis

Chapter 2 of this thesis reviews research pertaining to the prevalence of childhood trauma in psychotic disorders, demonstrating increasing evidence for a causal relationship. Studies investigating the prevalence of PTSD in people with psychosis are also reviewed, and symptom and diagnostic overlap between PTSD and psychotic disorders are discussed. A review of research investigating the relationship between trauma and specific positive psychotic symptoms (hallucinations and delusions) demonstrates an association between childhood trauma and both hallucinations and delusions.

Chapter 3 outlines two prominent models of the cognitive mechanisms proposed to underpin the relationship between childhood trauma and hallucinations. One model proposes post-traumatic intrusions to be the primary mechanism, while the other emphasises the role of maladaptive schemas and emotion. Empirical and theoretical data pertaining to both models is examined, with a specific focus on 1) the relationship between hallucinations and post-traumatic intrusions, and 2) the relationship between the content of hallucinations in relation to traumatic experiences. Previous research demonstrates evidence for a relationship between hallucinations and post-traumatic intrusions. Relationships between the content of hallucinations and traumatic experiences vary in terms of the salience of the link. The models of trauma and hallucinations are expanded and integrated with prominent cognitive models of PTSD based on the empirical data that exists to date.

In Chapter 4, the relationship between childhood trauma and delusions is explored. The two models of trauma and psychosis outlined in Chapter 3 are described in terms of their account of the aetiology of delusions from trauma. Studies investigating the relationship between 1)
delusions and post-traumatic intrusions, 2) delusions and maladaptive schemas, and 3) delusion content in relation to traumatic experiences are then reviewed.

In Chapter 5, research pertaining to the relationship between avoidance, hallucinations and delusions is reviewed. Most research to date has focused on experiential avoidance, which has been shown to be related to PTSD symptomatology and also to hallucinations and delusions. Studies investigating the role of post-traumatic avoidance in hallucinations and delusions point to an association, but are few in number. Construct overlap between experiential avoidance and post-traumatic avoidance is discussed, and the importance of investigating the specific relationship between the avoidance of trauma-related stimuli and hallucinations and delusions is highlighted.

Chapter 6 contains a summary of the introductory chapters of the thesis, outlining the rationale, the three main aims, and the hypotheses and research questions of the study.

Chapter 7 outlines the methodology for the study. This includes a description of the participant sample, recruitment for the study, and ethical considerations. Measures used in the study, including their reliability and validity are described, as well as the procedure for eliciting and coding the descriptions of traumatic experiences and the content of hallucinations, delusions and post-traumatic intrusions. A power analysis and the approach to data analysis are also described.

Chapter 8 presents the results of the study, according to the three main aims. The results for Aim 1 pertain to the severity associations between childhood trauma, post-traumatic intrusions, hallucinations and delusions. For Aim 2, results pertaining to the content of hallucinations, delusions, post-traumatic intrusions and traumatic experiences are presented. Results for Aim 3 relate to the relationships between childhood trauma, avoidance, hallucinations and delusions.
Chapter 9 constitutes a detailed discussion of the study’s results in terms of their support for the hypotheses outlined in Chapter 6. The findings of the study are discussed in relation to the theory and research described in Chapters 2 to 5, and with reference to the two prominent models of the relationship between childhood trauma and psychotic symptoms. Support for the different mechanisms proposed by these two models is discussed. Limitations, clinical implications, and directions for future research are also considered.
Chapter 2. Trauma, PTSD and Psychosis

This chapter presents an overview of research pertaining to the prevalence of trauma in people with psychosis, including consideration of a potentially causal relationship. It then provides an outline of studies assessing rates of PTSD in groups with psychosis, and also considers symptom and diagnostic overlap between PTSD and psychotic disorders. Finally, it presents a review of literature investigating the relationship between trauma and hallucinations and delusions.

2.1 Trauma in People with Psychosis

2.1.1 Historical Focus on Biological vs Social Factors

Debate about the aetiology and nature of psychotic illness is continuing over a century after Kraeplin’s concept of ‘dementia praecox’ (later termed ‘schizophrenia’ by Bleuler) was described. The evolving diagnostic construct of schizophrenia has long been underpinned by assumptions that it characterises signs and symptoms that stem from a single organic disease entity. This assumption has fuelled strong emphasis on a search for biological factors in the aetiology of psychotic disorders, and a declining focus on research into social causes (Jarvis, 2007). After being unacknowledged for decades, research has only relatively recently begun to focus on the nature of the relationship between traumatic experiences and psychosis.

The role of trauma in the aetiology of psychosis has largely been conceptualised as ‘triggering’ events within the framework of stress-vulnerability models, with the underlying cause presumed to be primarily genetic (Read, Bentall, & Fosse, 2009). Results of genetics research schizophrenia in recent decades have been highly inconsistent, and have failed to identify a single underlying disease process (Ruggeri & Tansella, 2009). Tosato and Lasalvia (2009) note that ‘the difficulty in gaining a consistent and clear-cut picture of the genetics of schizophrenia mirrors the
marked clinical and neurobiological heterogeneity of the disorder’. Continuing lack of evidence for the stress-vulnerability model, as well as robust evidence for the idea that trauma might create an enduring vulnerability for psychosis, has led some researchers (e.g., Kelleher et al., 2013; Read, van Os, Morrison, & Ross, 2005; van Winkel, van Nierop, Myin-Germeys, & van Os, 2013) to claim that childhood trauma is a likely causal factor for psychosis. Other researchers have highlighted the fact that while neither environmental adversity nor genetic factors alone provide a certainty of developing psychosis, gene-environment interactions may better explain psychosis aetiology (van Os & Sham, 2003). Recent studies have drawn attention to the occurrence of evocative gene-environment interactions, wherein genetically predisposed/heritable traits increase the risk of exposure to adverse environments (for example, in the relationship between cannabis use and psychosis, where genetic predisposition for psychosis may increase likelihood of cannabis use; Henquet, Di Forti, Morrison, Kuepper, & Murray, 2008).

2.1.2 Rates of Trauma in People with Psychosis

There is now a substantial amount of evidence showing that there are high rates of childhood trauma in people who experience psychosis (Bebbington et al. 2004; Bonoldi et al., 2013; Fisher et al., 2010; Matheson et al., 2013; Mueser et al. 1998; Varese et al., 2012). Several narrative reviews have examined the link between various types of childhood trauma (e.g., childhood sexual abuse, childhood physical abuse, childhood emotional abuse, neglect and bullying) as risk factors for psychosis, and have found that a clear relationship exists (Bendall, Jackson, Hulbert, & McGorry, 2008; Larkin & Read, 2008; Morgan & Fisher, 2007; Read, van Os, Morrison, & Ross, 2005). However, as noted in some of these reviews, methodological limitations (such as reliance on retrospective reporting of trauma, a predominance of cross-sectional studies,
and lack of appropriate control groups) in a large number of these studies have prevented clear conclusions from being made about the relationship between trauma and psychosis, and whether or not it might be causal. For example, in Bendall et al.’s (2008) review of 46 studies it was found that 28-73% of people with psychosis had experienced childhood trauma such as sexual, emotional or physical abuse, but 40 of these studies either did not use a control group, used only a clinical control group, or used an unmatched population control group, which prevented any conclusions from being drawn about rates of trauma in people with psychosis compared to people in the general population. Of the six studies that included appropriate control groups, three found a significant relationship between trauma and psychosis, two found a relationship that was not statistically significant, and one found no significant relationship (but had systematic biases that may have been responsible for this finding) (Bendall et al., 2008).

Read, Bentall, and Fosse (2009) reviewed 11 large-scale population studies (four prospective and seven cross-sectional) and found that ten of these reported a significant relationship between childhood trauma and psychosis, with odds ratios ranging from 1.8 to 9.3 (Bebbington et al., 2004; Janssen et al., 2004; Lataster et al., 2006; Schreirer et al., 2009; Scott, Chant, Andrews, Martin, & McGrath, 2007; Shevlin, Dorahy, & Adamson, 2007; Spauwen et al., 2006; Whitfield, Dube, Felitti, & Anda, 2005). These studies controlled for other factors known to be related to psychosis (such as family history of psychosis, urbanicity, substance use). Bebbington et al.’s (2004) study found that sexual abuse, bullying, violence in the home and running away from home was experienced by 35-46% of the psychosis group. Compared to people without a psychiatric illness, people with psychosis were 15.5 times more likely to have been victims of sexual abuse. After controlling for demographic variables and interrelationships between the various victimisation experiences, it was found that numerous of these adverse events predicted
psychosis. People with psychosis who have experienced trauma have generally been found to have psychotic symptoms that are more severe and more treatment refractory compared with those without trauma (Gearon, Bellack, & Tenhula, 2004; Muenzenmaier, Meyer, Struening, & Ferver, 1993; Ross, Anderson & Clark, 1994). All nine studies in Read et al.’s (2009) review that investigated the possibility of a dose-response relationship between trauma and psychosis found one to be present. For example, Schreirer et al.’s (2009) prospective study of 6,437 children found that by age 12, children were twice as likely to experience psychotic symptoms if they had been victims of either overt or relational bullying, but 4.7 times more likely to experience these symptoms if they had been victims of both types of bullying. The presence of a dose-response relationship, where increasing amounts of exposure increases risk, is considered to be strong evidence for a causal relationship (e.g., Hill, 1965). Further discussion of causality in the relationship between trauma and psychosis is in section 2.1.3 below.

In more recent years, several studies have addressed some of the methodological limitations raised and have provided more robust evidence for a relationship between childhood trauma and psychosis (Arseneault et al., 2011; Cutajar, et al., 2010; Fisher et al., 2010; Freeman & Fowler, 2009; Galletly, van Hooff, & McFarlane, 2011; Heins et al., 2011; Steel, Haddock, Tarrier, Picken, & Barrowclough, 2011). For example, Cutajar et al. (2010) used a group of 2,759 individuals (aged 15 to 58 years) who experienced sexual abuse prior to age 16, and compared them to an age- and gender-matched control cohort of 2,677 people from the general population who had not experienced abuse. They found that people who were sexually abused prior to age 16 were twice as likely to receive a diagnosis of a psychotic disorder later in life. Sexual abuse was assessed through police records (hence eliminating the possibility of recall bias) and history of mental illness was assessed through psychiatric case notes. Arseneault et al. (2011) assessed over
2,000 twins (by interviewing the twins and their mothers) at age 7, 10 and 12 years for maltreatment by an adult, peer victimisation, and involvement in accidents. They found that the risk for experiencing psychotic symptoms (assessed at the final follow-up interview) was approximately three times higher for those who had experienced maltreatment by an adult or peer victimisation. This result was maintained after adjusting for individual and socioeconomic factors, other child psychopathology and genetic vulnerability to psychosis.

Two recent meta-analyses have also found robust associations between childhood trauma and psychosis (Varese et al., 2012; Matheson et al., 2013). Varese et al. analysed 36 studies (18 case-control, 10 prospective and quasi-prospective, and eight population based cross sectional studies) with a combined total of 81,253 participants. Types of childhood trauma assessed were sexual abuse, physical abuse, emotional abuse, bullying and death of a parent prior to age 18. Psychosis was defined as either having a diagnosis of a psychotic disorder or experiencing psychotic symptoms. All three types of studies demonstrated odds ratios of approximately 3 for psychosis after childhood trauma, with an overall odds ratio of 2.78 (95% CI = 2.34–3.31). Each type of childhood trauma also had similar odds ratios, ranging from 2.38 to 3.40 (with the exception of parental death which had an odds ratio of 1.7 and was not significant). The overall effect of trauma on psychosis remained even when analyses were performed only on studies that controlled for confounders. Ten studies investigated the possibility of a dose-response relationship and nine found one to be present. (These studies used various methods to define a dose-response relationship, so an overall synthesis of data could not be done.)

Matheson et al. (2013) conducted a meta-analysis investigating the specificity of the relationship between childhood trauma and schizophrenia compared to a range of other psychiatric diagnoses. They analysed 25 studies, including case-control, cohort and cross-sectional studies.
Odds ratios were compared for childhood trauma and schizophrenia with those of non-psychiatric controls, anxiety disorders, depressive disorders, dissociative disorders and PTSD, other psychotic disorders and personality disorders. Results showed significantly increased rates of childhood trauma in those with schizophrenia compared with non-psychiatric controls (OR = 3.60, 95% CI = 2.08-6.23). The risk of developing any of these disorders following childhood trauma was comparable, with the exception of anxiety disorders. No differences in rates of childhood trauma were found between schizophrenia and affective psychosis, depression or personality disorders, and higher rates of childhood trauma were found in PTSD and dissociative disorders compared with schizophrenia.

### 2.1.3 The Question of Causality

Whether the relationship between trauma and psychosis is causal has been a topic of much debate in recent decades (Morgan & Fisher, 2007; Read, van Os, & Morrison, 2005). While it is not possible to completely confirm causality in the association between trauma and psychosis, several established criteria for assessing likely causality can be applied (Hill, 1965). These include establishing a clear temporal relationship between trauma and psychotic symptoms, robust replication of the association, demonstration of a dose-response relationship, the identification of plausible mechanisms, and alleviation of psychotic symptoms in response to reducing trauma-related consequences (Hardy et al., 2016; Kelleher et al., 2013).

There have been several recent prospective cohort studies that have addressed the question of causality in the relationship between trauma and psychosis (Alemany et al., 2012; Bentall & Fernyhough, 2008; Husted, Ahmed, Chow, Brzustowicz, & Bassett, 2010; Schreier, et al., 2009;
These studies have largely found that psychotic experiences are predicted by childhood trauma occurring at an earlier time point. However, as Kelleher et al. (2013) notes, there are some fundamental areas in which these studies fall short of being able to provide strong evidence for causality. Firstly, despite the fact that most studies showed that childhood trauma predicts later episode of psychotic experiences, most did not investigate whether participants may have had any of these experiences prior to the trauma. No studies endeavoured to show that childhood trauma predicted newly incident psychotic experiences after ascertaining that there were no psychotic experiences occurring at baseline time point. Secondly, no studies had shown that when childhood trauma ceases to occur after a certain time point, so too do psychotic experiences. Thirdly, the issue of causal direction has not been well addressed; most research has not focused on potential alternative explanations for the relationship between childhood trauma and psychosis. It is possible that psychotic symptoms increase the risk of experiencing childhood trauma. There is some evidence of developmental abnormalities in children who go on to develop psychosis (Canon & Clarke, 2005) and these difficulties may be associated with social isolation and behavioural concerns, thus possibly increasing the risk of being abused or victimised. Alternatively, the relationship between trauma and psychosis could be bidirectional, in that trauma and psychotic experiences are both cause and effect of one another.

Kelleher et al. (2013) conducted a methodologically robust study which provides evidence for a causal relationship between trauma and psychosis. They surveyed a cohort of 1,112 high school students age 13 to 16, assessing for the presence/absence of experiences of auditory hallucinations, bullying and physical assault at baseline and then three-month and 12-month follow up. They found that both physical assault and bullying predicted psychotic experiences at both
three- and 12-month follow up even after adjusting for psychotic experiences at baseline; that is, both types of trauma predicted new incidents of psychotic experiences. A dose-response relationship between bullying and subsequent psychotic experiences was found; a higher severity of bullying (as indicated by the number of types of bullying experienced) increased the odds of psychotic experiences at both follow-up assessments. (Physical assault severity was not measured, it was only recorded as present or absent.) They also found that when traumatic experiences ceased occurring, the odds of reporting psychotic symptoms decreased. People who experienced physical assault at baseline as well as at three- and 12-month follow-up were more likely to experience psychotic symptoms at 12-month follow-up compared to people who had experienced physical assault at baseline but not thereafter. Similar results were found for bullying. The experience of psychotic symptoms at baseline was found to predict the experience of both bullying and physical assault at three-month follow-up (even after adjusting for both trauma types at baseline). Psychotic experiences at baseline predicted physical assault (but not bullying) at 12-month follow-up. Kelleher et al.’s study demonstrates a clear temporal relationship, the strength of which was large (high odds ratios) and was shown to fluctuate in a dose-response fashion. Furthermore, when trauma ceased, the likelihood of psychotic experiences significantly decreased compared to people who continued to experience further similar traumas across assessment time points. The relationship was found to be bidirectional; that is, experiencing psychosis at baseline predicted experiences of trauma later. However after removing all people who experienced psychotic symptoms at baseline from the analysis, it was still found that traumatic experiences predicted new occurrences of psychotic symptoms. Kelleher et al. measured the objective occurrence of physical assault and bullying, but did not include a measure of how subjectively traumatising these events were for their participants, which (as the authors note) may be a factor impacting the risk for
psychosis. Also their measure of psychotic symptoms pertained only to auditory hallucinations. Nevertheless this is the only high quality study to date which specifically aimed to addresses the issue of causality; it overcomes some of the limitations of previous studies and has provided evidence for a causal, dose-response relationship between childhood trauma and psychotic symptoms.

2.2 PTSD and Psychosis

2.2.1 Rates of PTSD in People with Psychosis

Rates of PTSD in people with psychosis have also been found to be relatively high compared to the prevalence in the general population. Achim et al. (2011) conducted a meta-analysis of studies investigating the prevalence of anxiety disorders in people with schizophrenia. Twenty of the studies in their analysis (with a total of 1388 participants) assessed for PTSD, and the mean prevalence across these studies was 12.4%. This is notably higher than PTSD rates in the population; lifetime PTSD prevalence has been estimated at 8 to 9%, and current past year PTSD prevalence at 3.5% (Bresslau, Davis, Andreski, & Peterson., 1991; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). There was substantial variation in rates of PTSD between studies, and it was found that studies that used self-report measures may have overestimated PTSD, due to overlap between trauma-related symptoms and symptoms of psychosis (Achim et al., 2011).

An overview of studies investigating the prevalence of PTSD in groups of people with psychosis is shown in Table 2.1. Studies included in the table were those that reported the prevalence of PTSD using samples of people who met diagnostic criteria for a psychotic disorder. Studies specifically examining prevalence of post-psychotic PTSD (i.e., PTSD arising from trauma that is specifically a result of the psychosis) were excluded. As most studies do not specify what
<table>
<thead>
<tr>
<th>Author (Year)</th>
<th>Sample</th>
<th>Age in Years Mean (SD)</th>
<th>Gender (% female)</th>
<th>PTSD Diagnostic Tool</th>
<th>Rates of PTSD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel et al. (2017)</td>
<td>165 people with psychotic disorder diagnoses</td>
<td>41.9 (10.1)</td>
<td>29%</td>
<td>Clinician-Administered PTSD scale (CAPS)</td>
<td>18% current PTSD (Lifetime trauma)</td>
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<tr>
<td>Hardy et al. (2016)</td>
<td>228 people with relapsing psychosis</td>
<td>38.2 (11.1)</td>
<td>28%</td>
<td>Self-Report Scale for PTSD (SRS-PTSD)</td>
<td>22% current PTSD (Lifetime trauma)</td>
</tr>
<tr>
<td>de Bont et al. (2015)</td>
<td>2608 patients with psychotic disorder diagnoses</td>
<td>41.9 (SD not reported)</td>
<td>38%</td>
<td>Clinician-Administered PTSD scale (CAPS) and Trauma Screening Questionnaire (TSQ)</td>
<td>16% current PTSD (Lifetime trauma)</td>
</tr>
<tr>
<td>Aakre et al. (2014)</td>
<td>42 patients with schizophrenia or schizoaffective disorder and substance use disorder</td>
<td>41.0 (6.8)</td>
<td>100%</td>
<td>Clinician-Administered PTSD Scale (CAPS)</td>
<td>48% current PTSD (Lifetime trauma)</td>
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<tr>
<td>Chapleau et al. (2014)</td>
<td>60 patients with schizophrenia or schizoaffective disorder</td>
<td>50.3 (11.1)</td>
<td>93%</td>
<td>PTSD Checklist</td>
<td>55% current PTSD (Lifetime trauma)</td>
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<tr>
<td>Halász et al. (2013)</td>
<td>125 patients with schizophrenia</td>
<td>40.1 (10.2)</td>
<td>45%</td>
<td>Clinician-Administered PTSD Scale (CAPS)</td>
<td>17% current PTSD (Lifetime trauma)</td>
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<tr>
<td>Bendall et al. (2012)</td>
<td>36 outpatients of early psychosis services.</td>
<td>21.4 (3.4)</td>
<td>39%</td>
<td>Impact of Events Scale – Revised (IES-R)</td>
<td>39% had current PTSD symptoms from childhood trauma at clinical levels</td>
</tr>
<tr>
<td>Newman et al. (2010)</td>
<td>70 psychiatric inpatients with schizophrenia and schizoaffective disorder</td>
<td>36.0 (12.0)</td>
<td>29%</td>
<td>SCID-IV</td>
<td>13% current PTSD 31% lifetime PTSD</td>
</tr>
<tr>
<td>Lommen &amp; Restifo (2009)</td>
<td>33 outpatients with schizophrenia or schizoaffective disorder</td>
<td>42.3 (10.6)</td>
<td>30%</td>
<td>PTSD Symptom Scale (PSS). Two different scoring methods; symptom present if frequency at least 1 and then 2.</td>
<td>Frequency at least 1: 39% current PTSD Frequency at least 2: 21% current PTSD (Lifetime trauma)</td>
</tr>
<tr>
<td>Author (Year)</td>
<td>Sample</td>
<td>Age in Years Mean (SD)</td>
<td>Gender (% female)</td>
<td>PTSD Diagnostic Tool</td>
<td>Rates of PTSD</td>
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<td>Calhoun et al. (2007)</td>
<td>165 inpatients of a Veterans Affairs psychiatric unit with a schizophrenia spectrum disorder</td>
<td>48.0 (7.8)</td>
<td>0%</td>
<td>SCID-IV and PTSD Checklist (using DSM-IV decision-rule)</td>
<td>Rates of current PTSD with different types of trauma:</td>
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<td>Child sexual abuse: 33%</td>
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<td>Adult sexual abuse: 24%</td>
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<td>Child physical abuse: 72%</td>
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<td>Adult physical abuse: 90%</td>
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<tr>
<td>Kilcommons &amp; Morrison (2005)</td>
<td>32 patients of community mental health centres with schizophrenia spectrum disorder</td>
<td>34.5 (10.0)</td>
<td>22%</td>
<td>PTSD Symptom Scale (PSS)</td>
<td>53% current PTSD (Lifetime trauma)</td>
</tr>
<tr>
<td>Gearon et al. (2003)</td>
<td>54 outpatients of two community-based clinics with schizophrenia spectrum disorder and substance abuse/dependence</td>
<td>40.6 (6.8)</td>
<td>100%</td>
<td>Clinician-Administered PTSD Scale (CAPS)</td>
<td>46% overall current PTSD.</td>
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<td>Rates of current PTSD if trauma included:</td>
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<td></td>
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<td></td>
<td>Child sexual abuse: 61%</td>
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<td>Adult sexual abuse: 59%</td>
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<td>Child physical abuse: 65%</td>
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<td>Adult physical abuse 50%</td>
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<td>Other adulthood traumas: 45-66%</td>
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<td>Revictimisation: 61%</td>
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<td>Resnick et al. (2003)</td>
<td>47 patients of four community mental health centres with schizophrenia or schizoaffective disorder</td>
<td>44.1 (9.7)</td>
<td>64%</td>
<td>Clinician-Administered PTSD Scale (CAPS)</td>
<td>13% current PTSD</td>
</tr>
<tr>
<td>Neria et al. (2002)</td>
<td>426 patients with a first psychiatric admission for psychosis</td>
<td>Mean and SD not reported; 62% of the sample was over age 25</td>
<td>40%</td>
<td>DSM-III-R PTSD Module</td>
<td>14% lifetime PTSD in the full sample</td>
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<td>27% lifetime PTSD in those who reported trauma exposure</td>
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<td>(5% of those with trauma reported that their trauma was post-psychotic).</td>
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<tr>
<td>Author (Year)</td>
<td>Sample</td>
<td>Age in Years</td>
<td>Gender (% female)</td>
<td>PTSD Diagnostic Tool</td>
<td>Rates of PTSD</td>
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</table>
| Mueser et al. (1998)| 94 patients with schizophrenia or schizoaffective disorder. (A subgroup of a larger sample of 275 patients with severe mental illness.) | 40.0 (11.6)  | 56%               | PTSD Checklist        | 37% current PTSD in schizoaffective disorder subgroup  
|                     | (For the entire sample of 275)                                        |              |                   |                      | 28% current PTSD in schizophrenia subgroup          
|                     |                                                                        |              |                   |                      | (Lifetime trauma)                                  |
proportion of trauma experienced by participants occurs before or after the onset of psychosis (and whether or not the trauma being measured includes trauma resulting from the experience of psychosis), studies in which it was likely that a considerable portion of the trauma was post-psychotic were also excluded. For example, in their assessment of trauma, Steel et al. (2011) added specific items to detect post-psychotic trauma in their sample of patients with schizophrenia spectrum disorders (e.g., trauma from hospitalisation or from disturbing psychotic symptoms); they also reported a mean of five hospitalisations for their participants, suggesting that a substantial amount of the reported trauma may have occurred as a result of the psychosis. Studies reporting rates of pre- and post-psychotic trauma were excluded if over 10% of the sample reported that their trauma was post-psychotic. (The only study that was found which did report these rates was Neria et al.’s (2002) study in which 5% of the participants with trauma reported experiencing a trauma as a result of their illness.) Studies were also excluded from Table 2.1 if they investigated PTSD symptom severity but did not report prevalence of PTSD in the sample (e.g., O’Hare & Sherrer, 2013; O’Hare, Shen, & Sherrer, 2013; Scheller-Gilkey, Moynes, Cooper, Kant, & Miller, 2004). After these exclusions, a total of 15 studies were included in the table.

The studies in Table 2.1 found overall current PTSD rates to be between 16 and 55%. Two reported rates of lifetime PTSD (Neria et al., 2002; Newman, Turnbull, Berman, Rodrigues, & Serper, 2010); rates of 27% and 31% respectively. Most studies used a general measure of lifetime trauma and did not differentiate between childhood and adulthood trauma. The three studies that did specifically examine childhood abuse found that rates of PTSD were typically higher for those reporting child abuse compared to adult abuse (Calhoun et al., 2007; Gearon, Kaltman, Brown, & Bellack, 2003; Hardy et al., 2016). Rates of PTSD for childhood sexual abuse were higher than those for adult sexual abuse in all of these studies. Gearon et al. and Calhoun et al.’s studies also
compared rates of PTSD for childhood and adulthood physical abuse; rates of PTSD if trauma included childhood physical abuse compared with adult physical abuse were higher only in Gearon et al.’s study. (Calhoun et al.’s study included only male war veterans, and this sample reported a very high rate (90%) of PTSD if trauma included adult physical abuse; Gearon et al.’s study was all-female). Neria et al. (2002) found that the risk of developing PTSD was over twice as high for people who had experienced childhood victimisation compared to those who had not.

The majority of participants in the studies in Table 2.1 were male. Eight of the 15 studies had more than twice as many males than females in their samples, and across all studies the participants were over 60% male. Only two studies (Bendall, Alvarez-Jimenez, Hulbert, McGorry, & Jackson, 2012; Neria et al., 2002) used samples of early or first episode psychosis patients, highlighting the need for more research investigating the prevalence of PTSD in this group.

Although the Clinician-Administered PTSD Scale (CAPS; Blake et al., 1995) is the most well-validated and accepted measure of diagnosing and assessing severity of PTSD symptoms (Weathers, Keane & Davidson, 2001), only six studies to date have used the CAPS to assess PTSD in samples with psychosis (Aakre, Brown, Benson, Drapalski, & Gearon, 2014; de Bont et al., 2015; Halász et al., 2013; Neria et al., 2002; Resnick, Bond, & Mueser, 2003; Steel, Doukani, & Hardy, 2017). In the most robust study assessing PTSD prevalence in psychotic disorders to date, de Bont et al. (2015) assessed the validity of the Trauma Screening Questionnaire (TSQ) as a screening instrument for detecting PTSD in people with psychotic disorders, using the CAPS as the ‘gold standard’ measure. In their sample of 2608 people with psychotic disorders they found a PTSD prevalence rate of 16%, and found that the TSQ was a valid predictor of PTSD. Resnick et al. (2003) used the CAPS to assess the relationship between the severity of PTSD symptoms and psychotic symptoms in a schizophrenia sample. They found no overall relationship between PTSD
symptom severity and schizophrenia symptom severity (with the exception of PTSD avoidance symptoms being associated with positive psychotic symptoms in men only); their primary finding was a significant relationship between PTSD symptom severity and emotional distress levels. Aakre et al. (2014) used the CAPS to compare rates of PTSD among three groups of women who had substance use disorders: those with schizophrenia, those with severe non-psychotic depression, and those with no other DSM-IV Axis I disorder. They found the rate of PTSD in the schizophrenia group (48%) to be significantly higher than the rate of PTSD in the group with no other disorder (5%), and comparable to the rate of PTSD in the group with severe depression (29%).

Overall, these studies provide consistent evidence that the rate of PTSD in people with psychotic disorders is distinctly higher than that in the general population. Childhood trauma may be associated with higher rates of PTSD compared with adulthood trauma, and more studies are needed to assess for PTSD in first episode psychosis samples using well validated, clinician-administered measures of PTSD symptoms.

2.2.2 Low Detection in Clinical Settings

Despite the high prevalence of PTSD in groups with psychosis and other severe mental illness, it has been shown that in clinical settings identification of PTSD in psychiatric patients is extremely low. Among psychiatric patients who met diagnostic criteria for PTSD during research interviews, the estimated rate of having a PTSD diagnosis recorded by a clinician in their chart has been found to range from 0 to 3% (Cascardi et al., 1996; Mueser et al., 1998; Switzer et al., 1999). Fifty-three percent of Kilcommons and Morrison’s (2005) sample of 32 patients with psychotic disorder diagnoses met criteria for current PTSD but only one of these patients had a PTSD diagnosis recorded in their chart.
2.2.3 Severity Associations

Trauma severity has been shown to be associated with the severity of both PTSD and psychotic symptoms, and also with distress levels and poor psychosocial functioning (Kilcommons & Morrison, 2005; Lysaker et al., 2001; Resnick et al., 2003). Kilcommons and Morrison (2005) demonstrated that trauma severity (defined as the number of different types of trauma experienced by participants) was related to the frequency and level of distress associated with PTSD symptoms, as well as the severity of both hallucinations and delusions.

2.2.4 Hallucinations and Delusions in PTSD

There is also a close relationship between PTSD diagnoses and the experience of psychotic symptoms; many people who have experienced trauma and have PTSD also have hallucinations and delusions (Hamner, Frueh, Ulmer, & Arana, 1999). A large amount of research conducted with war veterans has found high rates of psychotic symptoms in this population, and it has been estimated that 30-40% of combat veterans with PTSD experience positive psychotic symptoms (David et al, 1997; Hamner, 1997; Mueser & Butler, 1987). Butler, Mueser, Sprock, and Braff’s (1996) study with male war veterans with and without PTSD found that those with PTSD were significantly more likely to experience hallucinations, delusions and bizarre behaviour, but not thought disorder. Some researchers have pointed out the possibility that when hallucinations and delusions are present, people with PTSD may be misdiagnosed with schizophrenia, bipolar disorder, or another psychotic disorder (Berenson, 1998; Morrison, 2001; Volkmar, Cohen, Hoshino, Rende, & Paul, 1988; Waldfogel & Mueser, 1988). As Butler et al. (1996) have noted, the possibility of misdiagnosis is quite high given that PTSD is not routinely ruled out when
making a schizophrenia diagnosis, and the symptoms of PTSD set out in the DSM-IV do not include the presence of hallucinations or delusions that are (at least on face value) unrelated to trauma.

High rates of hallucinations have also been found in adolescent inpatients whose only diagnosis was PTSD (Scott et al., 2007). Scott et al.’s study noted that the rate of hallucinations in their PTSD group (90%) was the same as that for their group with psychotic disorder diagnoses. This finding contrasts with other studies that have compared rates of hallucinations in adolescent psychiatric patients who have a psychotic disorder with those with non-psychotic disorders; these studies found higher rates in those with psychosis (e.g., Garralda, 1984; Rothstein, 1981). Scott et al.’s use of a standardised diagnostic interview with a hallucination questionnaire, rather than reliance on medical chart reviews to assess hallucinations, may explain this difference.

2.3. PTSD and Psychosis as Diagnostic Categories

2.3.1 The Formulation of PTSD as a Diagnostic Construct

Over the last several decades it has become increasingly understood that a variety of psychopathological symptoms not formerly conceptualised as ‘post-traumatic’ may be better accounted for as components of complex patterns of maladaptive thinking and behaviour highly likely to have their origins in early adverse experiences. Much discussion has occurred in this area in the context of the ongoing formulation of PTSD as a diagnostic entity. PTSD was originally developed in light of observations of individuals who had been involved in military combat, or relatively circumscribed, often isolated, traumatic events such as rape or natural disaster (Friedman, Resick, & Keane, 2007). The hallmark PTSD symptom domains of the DSM-IV (re-experiencing, avoidance and hyperarousal) are, by definition, identified based on the salience of the link between
the symptoms and the traumatic event. (DSM-5 symptoms are discussed in section 2.3.2 below.) Increasing attention is now being directed towards psychopathological symptoms and processes that develop subsequent to prolonged, repeated traumatic experiences (such as child abuse), and which may manifest in such a way that the connection to trauma is less overt (Herman, 1992; Resick et al., 2012).

### 2.3.2 Complex Trauma and Complex PTSD

Many forms of childhood trauma such as sexual abuse and other experiences often occurring in the family home involve continual, repeated experiences of interpersonal victimisation. Herman (1992) coined the term ‘complex trauma’ in order to distinguish this type of victimisation from trauma consisting of single, isolated incidents. In cases of complex trauma, the victim is typically subject to a relative state of captivity and to the ongoing control of the perpetrator. The observed pattern of post-traumatic symptoms that often emerges after experiences of complex trauma, has led to the proposal of another diagnostic syndrome, ‘complex PTSD’ (Herman, 1992). Current conceptualisations of complex PTSD include, in addition to characteristic symptoms of PTSD, several areas relating to impaired self-regulation: difficulty with emotion regulation, alterations in consciousness and attention (e.g., dissociation), impaired relational capacities, negatively affected belief systems, and somatisation (Cloitre et al., 2009). Several of these symptoms have been incorporated into the re-formulation of PTSD in DSM-5, including a new criterion for ‘negative alterations in cognitions and mood’ and specifiers for dissociative symptoms (American Psychiatric Association, 2013). This expanding concept of what can constitute trauma/abuse sequelae is coherent with the considerable diagnostic overlap that exists between PTSD (and complex PTSD) and other diagnostic groups such as dissociative disorders.
(Muenzenmaier, Castille, & Shelley, 2005; Read, van Os, Morrison, & Ross, 2005) and borderline personality disorder (McLean & Gallop, 2003; Zanarini et al., 1998). There is a high prevalence of hallucinations and delusions (often trauma-related) in people with diagnoses of PTSD (Hamner et al., 1999; Mueser & Butler, 1987), dissociative disorders (Dorahy et al., 2009; Ross, Anderson, & Clark, 1994) and borderline personality disorder (Hammersley et al., 2003). Despite the diagnostic overlap between these disorders and complex PTSD, ongoing research and debate about the construct validity of complex PTSD has not included investigation of the prevalence and nature of hallucinations and delusions in this group.

It has been shown that cumulative trauma in childhood is associated with increased trauma-related symptom complexity (defined as the number of different symptoms exceeding a specified level of severity) in adulthood (Cloitre et al., 2009). Increasing evidence suggests that the ever-widening picture of what might constitute ‘post-traumatic’ symptoms includes psychotic symptoms, which have long been conceptualised as being unrelated to trauma in terms of aetiology.

2.3.3 Symptom Overlap in PTSD and Psychotic Disorders

The notable overlap that exists between PTSD and psychotic disorders (most particularly schizophrenia) as diagnostic categories has been a focus of recent research. The symptom domains of PTSD have included specific symptoms that are also part of the diagnostic criteria for many psychotic disorders. For example, PTSD re-experiencing symptoms in the DSM-IV included hallucinations as one way of feeling or acting as if the traumatic event were recurring (American Psychiatric Association, 2000). This has led some researchers to suggest that in schizophrenia, positive symptoms such as hallucinations and delusions could be manifestations of intrusive re-experiencing symptoms or dissociative symptoms as a result of trauma (Kilcommons, Morrison,
Hallucinations do not appear as part of the PTSD diagnostic criteria for intrusive symptoms in the DSM-5. McCarthy-Jones and Longden (2015) have argued that psychotic symptoms such as auditory verbal hallucinations are phenomenologically similar in schizophrenia and PTSD, and that the presence of auditory verbal hallucinations in schizophrenia is often associated with previous trauma (as they are by definition in PTSD). It has also been argued that the presence of negative symptoms can easily be interpreted in the context of either PTSD or schizophrenia (there is overlap between PTSD avoidance symptoms and negative symptoms of schizophrenia in both the DSM-IV and DSM-5). PTSD diagnostic criteria includes a restricted range of affect (described as a “numbing of general responsiveness”), and negative symptoms of schizophrenia include affective flattening. Similarly, anhedonia is a symptom of both PTSD and schizophrenia diagnoses (phrased as a “markedly diminished interest or participation in significant activities” in PTSD and “anhedonia” in schizophrenia) (American Psychiatric Association, 2000; 2013). Signs such as poor eye contact can be interpreted as indicative of PTSD avoidance, or of apathetic social withdrawal associated with schizophrenia (Gearon et al., 2004; Muenzenmaier et al., 2005). Paranoia has been likened to extreme hypervigilance characteristic of PTSD (Morrison et al., 2003). Given these similarities, it is clear that at times symptoms of PTSD and schizophrenia may manifest themselves in ways such that they are not easy to differentiate from each other, particularly in light of the fact that, as mentioned above, the salience of the link between experiences of trauma and subsequent symptoms can be highly variable. Further review of the literature and consideration of phenomenological relationships between PTSD and psychotic symptoms are discussed in Chapter 3.
2.4. Positive Psychotic Symptoms in People with Trauma Histories

Earlier psychosis research was carried out under the assumption that psychotic symptoms were symptoms of distinct diseases such as schizophrenia. The fact that hallucinations and delusions are experienced by people in the general population, as well as transdiagnostically, has redirected research attention towards investigating the occurrence and nature of specific symptoms of psychosis, rather than focusing solely on diagnostic groups (Bentall, 1990; Bentall & Fernyhough, 2008). The following sections contain a review of literature in which relationships between trauma and hallucinations, and/or delusions were investigated. Read, van Os, Morrison, and Ross (2005) reviewed research examining the relationship between child abuse and specific psychotic symptoms (hallucinations, delusions, thought disorder and negative symptoms). For the purposes of the current review, Read et al.’s (2005) review will be described to examine studies published prior to 2005 (section 2.4.1), and the subsequent section contains a review of studies published after 2005 (section 2.4.2). Methodological considerations pertaining to both pre- and post-2005 studies are contained in section 2.4.3.

Only studies examining hallucinations or delusions (not thought disorder or negative symptoms) were considered for this review. Some studies have analysed hallucinations and delusions together as one variable, which will be referred to as ‘positive symptoms’, and are included for discussion if the ‘positive symptoms’ variable consisted of only hallucinations and delusions (not thought disorder). Studies have been classified into two groups according to the samples that were utilised. ‘Clinical’ studies are those employing samples who a) met criteria for a psychosis diagnosis, b) were selected based on participants’ exposure to a certain type of trauma (e.g., a sample of sexually assaulted women; Kilcommons et al., 2008; exposure to a traumatic bushfire; Galletly et al., 2011) or c) were in need of care for other reasons (e.g., homeless
adolescents; Mundy, Robertson, Robertson, & Greenblatt, 1990). ‘Non-clinical’ studies are those that used samples from the general population. Read et al.’s (2005) review included some studies that had samples with a variety of psychiatric diagnoses, while the review of studies published after 2005 restricted the ‘clinical’ category to studies using samples with psychosis diagnoses.

2.4.1 Research on Trauma, Hallucinations and Delusions Published Prior to 2005

Read et al. (2005) identified 26 studies that examined the link between child abuse, hallucinations and/or delusions in both clinical and non-clinical samples. Findings from clinical studies are discussed in section 2.4.1.1 and findings from non-clinical studies are discussed in section 2.4.1.2.

2.4.1.1 Clinical Studies Published Prior to 2005

_Hallucinations._ Read et al. (2005) concluded that there is evidence for a particularly strong link between child abuse and hallucinations, one which appears to exist not only in psychosis but across diagnostic boundaries (e.g., in bipolar disorder; Hammersley et al., 2003). While a high prevalence of hallucinations was found in people who experienced child abuse in several studies in the review, many of these studies contained notable methodological limitations (further discussed below).

Clinical studies examining child abuse and hallucinations in children and adolescents demonstrated higher frequencies of hallucinations in those who were abused as children and those who were not (Famularo, Kinscherff, & Fenton, 1992; Sansonnet-Hayden, Hayley, Marriage, & Fine, 1987). Famularo et al. (1992) found that in their sample of 61 maltreated children (aged five
to ten) who were recruited through a court and outpatient unit, 9% had psychosis diagnoses compared with none of the 35 children in their non-maltreated group (groups were matched on gender, age, family income and ethnicity). Those in the maltreated group were significantly more likely to experience hallucinations, and the authors noted that the majority of the hallucinations described were related in content to the children’s traumatic experiences. In Sansonnet-Hayden et al.’s (1987) study of 54 consecutive admissions to an adolescent inpatient unit (age range 13-17), 31% reported that they had been victims of childhood sexual abuse; the abused group was more likely to hallucinate compared to those who had not. (The abused and non-abused groups did not differ on age, IQ, or parental death, but the abused group were of lower socioeconomic status and reported more stressors occurring over the last year.) This study involved obtaining trauma histories directly from participant interviews, although the interviews were only loosely structured and were conducted by multiple members of the clinical staff on the inpatient unit. In another study of 96 homeless adolescents (approximately half of whom had received psychiatric treatment in the past), those who had experienced extra-familial sexual abuse were more likely to experience auditory hallucinations (Mundy et al., 1990). However, this relationship was no longer significant when depression was taken into account, suggesting that depression may be a mediator in the relationship between childhood trauma and hallucinations.

Larger inpatient studies with adults have also found relationships between child abuse and hallucinations. For example, one inpatient study found that hallucinations were experienced by 53% of people who were subject to physical abuse, 58% of those with sexual abuse, and 71% of those who had experienced both (Read & Argyle, 1999). In this study the medical charts of 100 consecutive inpatients of an acute psychiatric inpatient unit were reviewed in order to assess recorded abuse and the presence and content of positive psychotic symptoms; twenty-two charts
contained documented sexual or physical abuse. The use of chart review to assess trauma is methodologically problematic considering the underreporting of abuse by victims and low rates of detection (and detailed information) of trauma histories by clinicians. The study also had a small sample size and lacked a control comparison group (i.e., assessing prevalence of positive symptoms in people without abuse histories). Similar prevalence figures for hallucinations were found in another study of outpatients, which additionally reported the prevalence of people without abuse histories who experienced hallucinations to be 19% (Read, Agar, Argyle, & Aderhold, 2003). (The samples in these two studies consisted of individuals with a variety of psychiatric diagnoses. Only four of the 22 abused patients in Read and Argyle’s (1999) study and 37 of the 200 in Read et al.’s (2003) study had psychosis diagnoses; the most common diagnosis in both samples was major depressive disorder.)

Read et al.’s (2005) review also pointed to potential evidence for an especially strong link between hallucinations and sexual abuse in particular. Eight of the nine clinical studies that investigated a relationship between hallucinations and sexual abuse found one to be present (Bowe, Morrison, & Morley, 2005; Ensink, 1992; Hammersley et al., 2003; Kilcommons & Morrison, 2005; Mundy et al., 1990; Offen, Waller, & Thomas, 2003; Read et al., 2003; Sansonnet-Hayden et al., 1987). Kilcommons and Morrison (2005) found in their sample of adult participants meeting criteria for a range of schizophrenia spectrum disorders that those who had been sexually assaulted over their lifetime were more likely to experience hallucinations (but not delusions). They did not find physical assault to be related to hallucinations or delusions separately (but it was related to ‘positive symptoms’ combined). Read et al. (2003) found that in their psychiatric sample of adults that those who had experienced childhood or adult sexual abuse were more likely to experience hallucinations. One clinical study in Read et al.’s (2005) review did not find evidence for a
relationship between sexual abuse and hallucinations; Honig et al. (1998) found that hallucinations were related to physical but not sexual abuse in their three cohorts of voice-hearers (patients with schizophrenia, dissociative disorder or non-patient voice-hearers). Overall, there were consistent findings of relatively strong relationships between trauma and the experience of hallucinations within these clinical samples.

_Delusions._ Read et al.’s (2005) review found mixed support for the relationship between child abuse and delusions. Many of the studies in this review that examined this relationship had similar methodological limitations to those studies investigating hallucinations (small sample sizes and reliance on medical chart review for trauma assessment). One of the earliest studies to report on the relationship between childhood trauma and delusions investigated 26 chronically actively psychotic female inpatients, 12 of whom reported childhood incest and found that incest survivors had a comparatively high prevalence of delusions with sexual themes (Beck & van der Kolk, 1987). However, the data collection in this study was limited to interviews with clinical staff and medical chart reviews, and the number of people reporting sexual delusions was small (five in the incest group and none in the non-incest group). Ross et al. (1994) reported that in patients with schizophrenia, the symptoms more likely to occur among those who had been abused compared with those who were not were ideas of reference (77%), paranoid ideation (54%), and voices commenting (69%). Mundy et al.’s (1990) study with 96 homeless adolescents (described above in the discussion of hallucinations) showed that physical abuse from family members (but not sexual abuse or physical abuse from non-family members) was related to paranoia; as with hallucinations, this study found that this relationship was lost when depression was included in the model.
Several studies that found relationships between child abuse and hallucinations found no relationship with delusions (Famularo et al., 1992; Hammersley et al., 2003; Sansonnet-Hayden et al., 1987). Many of the methodological limitations of these studies are addressed in more recent studies and discussed in later sections.

Positive Symptoms. All of the clinical studies in Read et al.’s (2005) review examined the relationship between child abuse and hallucinations and delusions separately. As mentioned previously, Kilcommons and Morrison (2005) found in their sample of adults with psychosis that sexual abuse was related to hallucinations (but not delusions), and that while physical assault was not related to either hallucinations or delusions, it was related to both combined.

2.4.1.2 Non-Clinical Studies Published Prior to 2005

Hallucinations. The four non-clinical studies that specifically examined hallucinations found evidence for a relationship with at least one type of child abuse (Janssen et al., 2004; Morrison & Petersen, 2003; Startup, 1999; Whitfield et al., 2005). Whitfield et al. (2005) conducted a large retrospective mail survey (n = 17,337) of members of a USA health insurance plan, and analysed the relationship between a variety of childhood traumatic experiences and hallucinations. They found that having a mentally ill family member was associated with the greatest odds of reporting hallucinations (OR = 2.5), followed by childhood emotional abuse (OR = 2.3) and sexual and physical abuse (both ORs = 1.7). Reporting multiple childhood traumatic experiences was associated with increased odds of experiencing hallucinations, after adjusting for gender, race and education level, providing evidence of a dose-response relationship. Other adverse experiences (e.g., substance abuse by a family member, having a mother who was subject
to domestic physical violence) were also associated with hallucinations (odds ratios were lower but significant).

Morrison and Petersen (2003) found in their sample of 64 undergraduate students and warehouse workers that a predisposition for auditory hallucinations was associated with experiences of bereavement, emotional or physical abuse, and a predisposition for visual hallucinations was found in those who had experienced emotional abuse and bullying. This study did not find an association between hallucinations and sexual abuse. Janssen’s (2004) robust study from the general population (described in detail below) found that the rate of hallucinations was 0.4% in those who had not reported child abuse compared with 1.7% in those who had (OR = 4.0). This association did not remain significant after adjusting for demographic variables and non-psychotic diagnoses at baseline (OR = 2.5). Overall, findings from the non-clinical studies in this review demonstrate a clear link between trauma in the general population and the occurrence of hallucinations.

Delusions. None of the non-clinical studies covered in Read et al.’s (2005) review examined the relationship between child abuse and delusions as a primary research aim. Only one non-clinical study (Janssen et al., 2004) included an analysis of delusional experiences separate from hallucinations. This study found that child abuse was possibly more strongly related to delusions than hallucinations; the rate of delusional ideation was 0.5% in those who had not experienced child abuse compared with 1.9% in those who had (OR = 3.9). This association remained significant after adjusting for demographic variables and non-psychotic diagnoses at baseline (OR = 2.8). (As noted above, similar prevalence figures and odds ratios were found for hallucinations in this study, however after adjustment the relationship between hallucinations and child abuse was no longer significant.)
Positive Symptoms. Two non-clinical studies in Read et al.’s (2005) review examined the link between child abuse and hallucinations and delusions as a single variable (Berenbaum, Valera, & Kearns, 2003; Janssen et al., 2004). Janssen et al. (2004) conducted a longitudinal survey of 4,045 adults in the general population in which participants were interviewed by phone regarding their experiences of child abuse (childhood sexual, physical, emotional abuse and childhood neglect) and their experiences of hallucinations and delusions. People without hallucinations or delusions were assessed three years later for presence of positive symptoms. Three measures of positive symptoms were used in this study, pertaining to increasing levels of symptom severity: ‘any psychosis’, ‘pathological level of psychosis’ and ‘need for care’. It was found that a history of childhood abuse was associated with a much higher risk of subsequently developing positive symptoms (odds ratios for each level of symptom severity were 2.5, 9.3 and 7.3 respectively, after controlling for a wide range of demographic variables, drug use and any psychiatric diagnoses). Berenbaum, Valera, and Kearns (2003) investigated schizotypal personality traits in a sample of 75 women from the general population, which included a specific examination of the cognitive-perceptual facet of schizotypal personality disorder (unusual perceptual experiences, ideas of reference, magical thinking and paranoid ideation). These hallucinatory and delusion-like experiences were analysed as one variable, which was found to be related to all forms of child abuse measured (sexual, physical, emotional abuse and physical and emotional neglect). These studies add to evidence for the role of trauma in the experience of both hallucinations and delusions in the general population.
2.4.2 Research on Trauma, Hallucinations and Delusions Published After 2005

Studies examining relationships between trauma, hallucinations and delusions which were published after Read et al.’s (2005) paper are reviewed here. As mentioned previously, studies included in this review are those that examined the relationship between a) trauma and hallucinations, b) trauma and delusions, and/or c) trauma and ‘positive symptoms’, where positive symptoms are hallucinations and delusions analysed together as one variable. As the focus here is purely on hallucinations and delusions (and not other psychotic symptoms), studies that included thought disorder as an element of the ‘positive symptoms’ variable were excluded (e.g., Heins et al., 2011; Ramsay, Flanagan, Gantt, Broussard, & Compton, 2011).

2.4.2.1 Clinical Studies Published after 2005

Studies published after 2005 that investigated the relationship between trauma and hallucinations and/or delusions, and that used clinical samples are found in Table 2.2. Of the 12 studies in Table 2.2, nine examined the relationship between trauma and hallucinations (Berg et al., 2015; Bendall et al., 2013; Daalman et al., 2012; Hardy et al., 2016; Kilcommons, Morrison, Knight, & Lobban, 2008; Perona-Garcelán et al., 2012; Sheffield, Williams, Blackford, & Heckers, 2013; Üçok & Bikmaz, 2007; Varese, Barkus, & Bentall, 2012), and nine examined trauma and delusions (Ashcroft, Kingdon, & Chadwick, 2012; Bendall et al., 2013; Galletly et al., 2011; Goldstone et al., 2011; Hardy et al., 2016; Kilcommons et al., 2008; Perona-Garcelán et al., 2012; Sheffield et al., 2013; Üçok & Bikmaz, 2007). None of these clinical studies analysed hallucinations and delusions together as one variable.

Hallucinations. All nine studies in Table 2.2 that examined trauma and hallucinations found evidence for a relationship (Berg et al., 2015; Bendall et al., 2013; Daalman et al., 2012;
Table 2.2
Clinical Studies Published After 2005 Examining the Relationship Between Trauma and Hallucinations and/or Delusions

<table>
<thead>
<tr>
<th>Author (Year)</th>
<th>Sample</th>
<th>Age in Years (Mean (SD))</th>
<th>Gender (% female)</th>
<th>Trauma Type (Measure)</th>
<th>Psychotic Symptoms (Measure)</th>
<th>Key Results</th>
</tr>
</thead>
</table>
| Hardy et al. (2016) | 228 people with relapsing psychosis (non-affective psychosis diagnoses) | 38.2 (11.1) | 28% | CSA, ASA CEA, AEA CPA, APA, Childhood and adulthood non-victimisation traumas. (THQ<sup>1</sup>) | Auditory Hallucinations. Persecutory and Referential Delusions (SAPS<sup>2</sup>) | • CSA was related to auditory hallucinations (OR = 2.21).  
• CEA was related to both persecutory and referential delusions (ORs = 2.21 and 2.43). |
| Berg et al. (2015) | 454 patients with psychotic disorder | Ethnic majority: 30.1 (10.5)  
Ethnic minority: 28.6 (8.8) | 45% | CPA, CSA, CEA, CPN CEN. (CTQ<sup>3</sup>) | Hallucinations (Current: 1 PANSS<sup>4</sup> item; Lifetime: 3 SCID-I<sup>5</sup> items). | • Current hallucinations correlated with CPA, CSA, CEA, CPN (not CEN).  
• Lifetime hallucinations: all trauma types correlated with at least 1 SCID-I item. |
| Bendall et al. (2013) | 13 FEP patients with CSA history, 15 FEP patients with no trauma history | FEP+CSA group: 20.6 (3.1)  
FEP no trauma group: 22.1 (3.2) | 51% | CSA (CTQ<sup>3</sup>) | Hallucinations Delusions (PANSS<sup>4</sup>) | • The psychosis group with CSA had more severe hallucinations and delusions than the psychosis group without any childhood trauma. |
| Sheffield et al. (2013) | 114 patients with psychotic disorder (87 with and 27 without auditory hallucinations) | With hallucinations: 35.5 (14.1)  
Without: 37.9 (12.1) | 49% | CPA, CSA, CEA, CPN, CEN (CTQ<sup>3</sup>) | Hallucinations Delusions (SCID-I<sup>5</sup>) | • Patients with psychotic disorder and auditory hallucinations had more CSA, CEA and CPA than those with psychotic disorder and no auditory hallucinations.  
• CEA and CPA, in the absence of CSA, did not lead to a higher rate of auditory hallucinations.  
• Childhood trauma did not increase the risk of any other type of hallucination or any type of delusion. |
<table>
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<tr>
<th>Author (Year)</th>
<th>Sample</th>
<th>Age in Years Mean (SD)</th>
<th>Gender (% female)</th>
<th>Trauma Type (Measure)</th>
<th>Psychotic Symptoms (Measure)</th>
<th>Key Results</th>
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</table>
| Ashcroft et al. (2012) | 59 patients with schizophrenia (36 with and 23 without persecutory delusions) | With delusions: 42.6 (10.9) Without delusions: 36.4 (9.6) | 32% | CPA, CSA, CEA, CPN, CEN (CTQ³) | Delusions (SCID-I³) | • Those with persecutory delusions had more CEA (and a trend towards more CEN).  
• No differences were found for total CTQ score, CPA, CPN or CSA. |
| Daalman et al. (2012) | n = 351 100 psychotic patients with AVH 127 non-psychotic individuals with AVHs 124 healthy controls | Psychosis + AVH: 38.0 (11.5) Non-psychotic+ AVH: 42.4 (12.6) | 64% | CPA, CSA, CEA, CPN, CEN (CTQ³) | Hallucinations (PSYRATS², AHRS⁷) | • Both non-psychotic individuals with AVH and psychotic disorder patients with AVH had more CSA and CEA compared to healthy controls.  
• No difference between the two groups who experienced AVH in prevalence of traumatic experiences.  
• Severity of childhood trauma correlated with severity of hallucinations and delusions.  
• Dissociation mediated the relationship between childhood trauma and hallucinations but not delusions. |
| Perona-Garcelán et al. (2012) | 71 patients with psychosis diagnoses | 39.1 (8.9) | 24% | General CT (TQ⁴) | Hallucinations Delusions (PANSS⁴) | |
| Varese et al. (2012) | n = 65 45 patients with schizophrenia-spectrum disorders (3 groups; hallucinating, remitted hallucinators and non-hallucinating) 20 healthy controls (no history of hallucinations) | Hallucinating: 45.6 (12.2) Remitted hallucinators: 39.4 (13.3) Non-hallucinating: 48.3 (12.2) Controls: 39.5 (14.6) | 46% | CSA, CPA, CEA, neglect/negative home environment. (CATS¹³) | Hallucinations (PANSS², LSHS¹⁴) | • Hallucinating and non-hallucinating patients scored significantly higher than controls on CATS scores.  
• The three patient groups did not differ on total CATS scores.  
• Hallucinating patients scored significantly higher on all CATS subscales than healthy controls.  
• Non-hallucinating patients reported higher levels of neglect and CPA compared to controls.  
• Remitted hallucinators were higher than controls on neglect only.  
• Compared to remitted and non-hallucinators, the hallucinating group scored more highly on CSA but not CPA, CEA or neglect. |
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<tr>
<th>Author (Year)</th>
<th>Sample</th>
<th>Age in Years Mean (SD)</th>
<th>Gender (% female)</th>
<th>Trauma Type (Measure)</th>
<th>Psychotic Symptoms (Measure)</th>
<th>Key Results</th>
</tr>
</thead>
</table>
| Galletly (2011) | n = 993. 529 people exposed as children to traumatic bushfire. 464 controls | 28.2 (2.3) (Age at 20 year follow-up) | 50% | CT including CPA, CSA, CEA, CPN, CEN; and lifetime trauma. (ACE<sup>9</sup> and CIDI<sup>10</sup> items). | Delusions (Items from Psychosis Screen of the Australian National Survey of Health and Wellbeing) | • Delusional thinking associated with a range of childhood adversity including CPA, CSA, CEA, CPN and CEN (but not exposure to the bushfires).  
• Delusional thinking more likely in people exposed to a greater number of traumas. |
| Goldstone et al. (2011) | 100 patients with psychotic disorders | Age range 18 to 46+ | 53% | CSA, CEA, CPA (ETI<sup>11</sup>) | Delusions (PDI<sup>12</sup>) | • Delusions associated with CSA, CEA, CPA. |
| Kilcommons et al. (2008) | n = 80. 40 victims of sexual assault (excluded if had ever had a psychotic disorder diagnosis) 40 non-sexually assaulted controls | Sexual assault group: 28.7 (10.5)  
No sexual assault group: 22.0 (7.9) | 88% | Sexual assault. (SEQ<sup>15</sup>, DTS<sup>16</sup>) | Hallucinations Delusions (RHS<sup>17</sup>, PDI<sup>12</sup>, PSYRATS<sup>6</sup>) | • Sexual assault group higher than non-assaulted group on all measures of psychotic-like experiences: auditory and visual hallucinations, hallucination vividness and distress, delusional preoccupation and conviction. |
| Üçok & Bikmaz (2007) | 57 patients with first-episode schizophrenia | Not reported | 49% | CSA, CPA, CEA, CPN, CEN. (CTQ<sup>3</sup>, CAQ<sup>18</sup>). | Hallucinations Delusions (BPRS<sup>19</sup>, SAPS<sup>2</sup>) | • Hallucination and delusion severity associated with childhood trauma severity.  
• Those with CSA had higher overall SAPS scores.  
• Those with CEA had more hallucinations and delusions of mind-reading |

*Note: FEP = First episode psychosis; CT = Childhood trauma; CSA = Childhood sexual abuse; CPA = Childhood physical abuse; CEA = Childhood emotional abuse; CPN = Childhood physical neglect, CEN = Childhood emotional neglect; ASA = Adulthood sexual abuse; APA = Adulthood physical abuse; AEA = Adulthood emotional abuse.

*Note 2. Measures: 1 = Trauma History Questionnaire; 2 = Scales for the Assessment of Positive Symptoms; 3 = Childhood Trauma Questionnaire; 4 = Positive and Negative Syndrome Scale; 5 = Structured Clinical Interview for DSM Disorders (Axis I); 6 = Psychotic Symptom Rating Scales; 7 = Auditory Hallucination Rating Scale; 8 = Trauma Questionnaire; 9 = Adverse Childhood Experiences Scale; 10 = Composite International Diagnostic Interview; 11 = Early Trauma Inventory; 12 = Peters Delusion Inventory; 13 = Child Abuse and Trauma Scale; 14 = Launay-Slade Hallucination Scale; 15 = Sexual Events Questionnaire; 16 = Davidson Trauma Scale; 17 = Revised Hallucination Scale; 18 = Childhood Abuse Questionnaire; 19 = Brief Psychotic Rating Scale.
Hardy et al., 2016; Kilcommons et al., 2008; Perona-Garcelán et al., 2012; Sheffield et al., 2013; Üçok & Bikmaz, 2007; Varese, Barkus, & Bentall, 2012). In the largest clinical study on the subject to date, Berg et al. (2015) assessed childhood trauma and hallucinations in a sample of 454 patients with psychotic disorder diagnoses. They found that four of the five domains of trauma on the Childhood Trauma Questionnaire (CTQ; Bernstein et al., 2003) - sexual abuse, physical abuse, emotional abuse and physical neglect - were correlated with current hallucinations (measured on the Positive and Negative Syndrome Scale (PANSS; Kay, Fiszbein, & Opler, 1987)). Sexual and physical abuse and physical neglect were all correlated with all three SCID-I items used to measure lifetime hallucinations, and the other types of trauma (emotional abuse, emotional neglect and overall trauma) were correlated with at least one of the SCID-I items. However, all correlations were weak, ranging from 0.10 to 0.19. In another large clinical study, Daalman et al. (2012) compared groups of 100 psychotic patients with auditory verbal hallucinations, 127 non-psychotic individuals with auditory verbal hallucinations, and 124 healthy controls on the five domains of the CTQ. They found that patients and non-patients with hallucinations reported having more sexual and emotional abuse compared to healthy controls (odds ratios were 2.5 and 3.5 regarding sexual abuse and 7.3 and 5.7 regarding emotional abuse). There was no difference between the two hallucinating groups on prevalence of any trauma. The authors concluded that sexual and emotional abuse appear to be related to the presence of auditory verbal hallucinations (not to the presence or absence of psychotic disorder). Hardy et al. (2016) assessed 228 patients with relapsing psychosis for childhood and adulthood victimisation (sexual, emotional and physical abuse) as well as non-victimisation trauma using the Trauma History Questionnaire (Green, 1996). They found that auditory hallucinations (measured on the Scales for the Assessment of Positive
Symptoms; Andreasen, 1984) were associated with childhood sexual abuse (OR = 2.3), but not with any other trauma type.

Of the eight studies in Table 2.2 that specifically investigated sexual abuse and hallucinations, seven found a relationship (Berg et al., 2015; Bendall et al., 2013; Hardy et al., 2016; Sheffield et al., 2013; Daalman et al., 2012; Varese et al., 2012; Kilcommons et al., 2008). Only Üçok and Bikmaz (2007) did not find childhood sexual abuse to be related to hallucinations in their study with patients with first episode schizophrenia. They noted that their sample may have consisted of patients with a better prognosis due to the fact that a number of participants dropped out before having childhood trauma assessed, and also that they excluded several individuals who did not meet their remission criteria (childhood sexual abuse may have been related to hallucinations in those with more severe illness). They also suggested that their smaller sample of 54 may have increased the chance of Type II error.

Overall, these studies appear to provide evidence for a relationship between trauma and hallucinations. These more recent (post-2005) studies tend to be methodologically stronger. In terms of trauma assessment, more studies have not relied on chart review and are using well-validated measures such as the CTQ (e.g., Ashcroft et al., 2012; Berg et al., 2015; Bendall et al., 2013; Daalman et al., 2012; Sheffield et al., 2013; Üçok & Bikmaz, 2007). More recent studies typically have larger sample sizes (e.g., Berg et al., 2015; Hardy et al., 2016; Sheffield et al., 2013), and control for variables known to be related to psychosis. Other methodological considerations are further discussed in section 2.4.3.

**Delusions.** Results from the studies in Table 2.2 that examined trauma and delusions generally provided evidence for a relationship, although these findings were somewhat more mixed compared to the findings for hallucinations. Eight of the nine studies in Table 2.2 that
investigated trauma and delusions found some evidence for a relationship (Ashcroft et al., 2012; Bendall et al., 2013; Galletly et al., 2011; Goldstone et al., 2011; Hardy et al., 2016; Kilcommons et al., 2008; Perona-Garcelán et al., 2012; Üçok & Bikmaz, 2007). Across these studies, various types of trauma were measured, and different instruments and approaches were used in the assessment of trauma and delusional experiences, making comparisons between studies difficult. No clear pattern of any one type of abuse was apparent from these studies. For example, of the eight studies that included a measure of sexual abuse/assault, three found a relationship with delusions (Bendall et al., 2013; Goldstone et al., 2011; Kilcommons et al., 2008), four did not (Ashcroft et al., 2012; Hardy et al., 2016; Sheffield et al., 2013; Üçok & Bikmaz, 2007) and one found mixed results (Galletly et al., 2011). Two of these studies compared groups of people who had and had not been sexually abused/assaulted and found greater delusional severity in the abused groups (Bendall et al., 2013; Kilcommons et al., 2008). Two studies correlated scores from the sexual abuse subscale of the CTQ with delusional severity (Sheffield et al., 2013, Üçok & Bikmaz, 2007) and neither found a relationship. Another study compared groups of schizophrenia patients with and without persecutory delusions on scores on the CTQ and did not find a difference between groups on sexual abuse (Ashcroft et al., 2012).

There may be some evidence for a specific relationship between emotional abuse and delusions. Hardy et al.’s (2016) study found that persecutory and referential delusions were associated with childhood emotional abuse (ORs = 1.9 and 2.1), but not with any other type of victimisation or non-victimisation trauma measured. In Ashcroft et al.’s (2012) study with 59 schizophrenia patients (36 with and 23 without persecutory delusions) it was found that the group with persecutory delusions scored significantly higher on childhood emotional abuse (with a trend towards significance for childhood emotional neglect). There were no group differences on
measures of childhood sexual or physical abuse, physical neglect, or total trauma score. Üçok and Bikmaz (2007) assessed 57 patients with first episode psychosis on five types of trauma (using the CTQ) and two types of delusions (mind-reading and delusions of reference, measured with subscales of the SAPS. They found that emotional abuse was related to both types of delusions, and emotional neglect with delusions of reference only. (No other types of abuse were related to delusions). Goldstone et al.’s (2011) study with 100 psychosis patients found that childhood emotional abuse (as well as sexual and physical abuse) was related to vulnerability to delusions. This study used the Peters Delusions Inventory (Peters, Joseph, Day, & Garety, 2004), which was designed to detect vulnerability to delusions in non-clinical contexts, but was used in this study for consistency in measuring delusions in both their clinical and non-clinical groups. Sheffield et al. (2013) divided their sample of 114 patients with psychotic disorders into those who had and had not experienced any one of eight types of delusions (reference, persecutory, grandiose, somatic, control, thought broadcasting, bizarre and other). They did not find any differences on emotional (or any other type of) trauma between the groups for any of the eight types of delusion.

In Galletly et al.’s (2011) large study of 993 people (529 who had been exposed as children to a traumatic bushfire, and 464 controls), four screening (and three probe) questions were used to measure subclinical delusional experiences. Lifetime exposure to trauma was assessed using the standard list of traumatic events from the Composite International Diagnostic Interview (CIDI; World Health Organisation, 1997) as well as other items added by the authors. Childhood trauma was assessed with the Adverse Childhood Experiences Scale (ACE; Dube et al., 2003) which includes subscales measuring a range of traumas occurring prior to age 16 (sexual, physical and emotional (verbal) abuse, physical and emotional neglect, household mental illness, household substance abuse, witnessing violence against mother, incarcerated family member and parental
divorce). This study found that delusional experiences (defined as positive responses to at least one screening item one probe) were associated with all subscales of the ACE except witnessing domestic violence against mother and parental divorce. The odds ratio for emotional (verbal) abuse was particularly high (7.9). Odds ratios for the other types of child abuse were: physical abuse 5.5, sexual abuse 2.8, physical neglect 6.9, and emotional neglect 4.2. They did not find exposure to the bushfires to be related to delusional experiences, but found a dose-response relationship between trauma and delusions (the greater the number of traumas experienced, the greater the likelihood of experiencing delusions).

2.4.2.2 Non-Clinical Studies Published After 2005

Studies published after 2005 that investigated the relationship between trauma and hallucinations and/or delusions, and that used non-clinical samples are found in Table 2.3. Of the 12 studies in Table 2.3, six examined hallucinations (Campbell & Morrison, 2007; Freeman & Fowler, 2009; Gracie et al., 2007; Kelleher et al., 2013; Shevlin et al., 2007; Steel, Marzillier, Fearon, & Ruddle, 2009), six examined delusions (Campbell & Morrison, 2007; Freeman & Fowler, 2009; Goldstone et al., 2011; Gracie et al., 2007; Scott et al., 2007; Steel et al., 2009), and four examined ‘positive symptoms’ (Arseneault et al., 2011; Lataster et al., 2006; Schreier et al., 2009; Spauwen et al., 2006).

Hallucinations. Of the six non-clinical studies in Table 2.3 that examined trauma and hallucinations, five found a relationship (Campbell & Morrison, 2007; Freeman & Fowler, 2009; Kelleher et al., 2013; Shevlin et al., 2007; Steel et al., 2009). Only Gracie et al.’s (2007) study did not find a relationship between trauma and hallucinations, but they did find that childhood sexual abuse was related to perceptual anomalies (which may be considered a less severe form of
## Table 2.3
Non-Clinical Studies Published After 2005 Examining the Relationship Between Trauma and Hallucinations and/or Delusions

<table>
<thead>
<tr>
<th>Author (Year)</th>
<th>Sample</th>
<th>Age in Years Mean (SD)</th>
<th>Gender (% female)</th>
<th>Trauma Type (Measure)</th>
<th>Psychotic Symptoms (Measure)</th>
<th>Key Results</th>
</tr>
</thead>
</table>
| Kelleher et al. (2013) | 1,112 adolescent students. | Age range 13-16 years | 45% | Bullying, physical assault. (Authors’ questionnaire). | Hallucinations (One item from the APSS¹) | • Bidirectional relationship between hallucinations and both bullying and physical assault.  
• Bullying and physical assault predicted newly incident hallucinations over time.  
• Dose-response relationship between bullying severity and odds of later reporting hallucinations.  
• Cessation of bullying and physical assault predicted cessation of hallucinations over time. |
| Arseneault et al. (2011) | 2,127 same-sex twin children | 12.0 (0) | Not reported | Child maltreatment, accidents, bullying. (Authors’ questions). | Positive symptoms (Authors’ selected questions) | • Maltreated (relative risk = 3.16) or bullied (relative risk = 2.47) children more likely to report psychotic symptoms than children without these traumas.  
• The higher risk for psychotic symptoms was observed whether the traumatic events occurred early or later in childhood.  
• The risk associated with these traumas remained significant after controlling for numerous variables including genetic liability for psychosis.  
• The risk associated with accidents was small (relative risk = 1.47) and inconsistent across ages. |
| Goldstone et al. (2011) | 133 university students | Age range 18 to 46+ | 53% | CSA, CEA, CPA (ETI²) | Delusions (PDI³) | • Delusions associated with CEA only. |
| Freeman & Fowler (2009) | 200 members of the general population with no history of Axis I disorder (United Kingdom) | 37.5 (13.3) | 50% | Total number of: lifetime traumatic events, victimisation events, childhood events and events in the past year. (LSC⁴) | Hallucinations Delusions (GPTS⁵,CAPS⁶) | • Experiencing at least one lifetime trauma associated with 2.5 times greater risk of persecutory thought, and 4.8 times greater risk of auditory verbal hallucinations, compared with having no trauma.  
• Severe CSA and non-victimisation events particularly associated with paranoia and auditory hallucinations.  
• Recent adult trauma did not have an impact. |
<table>
<thead>
<tr>
<th>Author (Year)</th>
<th>Sample</th>
<th>Age in Years Mean (SD)</th>
<th>Gender (% female)</th>
<th>Trauma Type (Measure)</th>
<th>Psychotic Symptoms (Measure)</th>
<th>Key Results</th>
</tr>
</thead>
</table>
| Schreier et al. (2009) | 6,437 children from the general population | 12.0 (0) | 51% | Peer victimisation. (BVIS<sup>7</sup>) | Positive symptoms (PLIKS<sup>8</sup>) | • Risk of experiencing psychotic symptoms at age 12 was twice as high for victims of bullying at age 8 and/or 10 years.  
• Associations were stronger (odds ratios up to 4.6) when bullying was chronic or severe (experiences of relational and overt victimization). |
| Steel et al. (2009) | 384 university students | 24.9 (7.2) | 76% | CSA, CPA, CEA (TLEQ<sup>9</sup>) | Hallucinations Delusions (SPS<sup>10</sup>) | • Hallucinatory and delusional experiences associated with CSA and CPA but not CEA.  
• Experiencing more than one form of childhood abuse was associated with hallucinatory but not delusional experiences. |
| Campbell & Morrison (2007) | 373 secondary school students | 14.8 (0.7) | 56% | Bullying. (BVQ<sup>11</sup>) | Hallucinations Delusions (LSHS<sup>12</sup>, PS<sup>13</sup>, Ambiguous Sounds Task). | • Bullying frequency correlated with predisposition to self-reported hallucinations and paranoia.  
• When divided into bullied and not-bullied groups, the bullied group experienced more self-reported hallucinations and paranoia.  
• The effect of bullying on predisposition to auditory hallucinations as measured by the Ambiguous Sounds Task was not significant. |
| Gracie et al. (2007) | 228 university students (2 groups; with and without history of interpersonal trauma) | 28.9 (8.7) | 71% | General childhood trauma, Lifetime sexual abuse/assault, lifetime physical assault, (TLEQ<sup>9</sup> + selected items from CTQ<sup>14</sup>) | Hallucinations Delusions (LSHS<sup>12</sup>, PS<sup>13</sup>, SIAPA<sup>15</sup>) | • Paranoia associated with overall childhood trauma, sexual abuse and physical abuse.  
• Perceptual abnormalities associated with sexual abuse only.  
• No differences between trauma and no trauma groups on predisposition to hallucinations. |
<table>
<thead>
<tr>
<th>Author (Year)</th>
<th>Sample</th>
<th>Age in Years Mean (SD)</th>
<th>Gender (% female)</th>
<th>Trauma Type (Measure)</th>
<th>Psychotic Symptoms (Measure)</th>
<th>Key Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scott et al. (2007)</td>
<td>10,641 members of the general population (Australia)</td>
<td>Not reported (All participants over age 18)</td>
<td>Not reported</td>
<td>Lifetime trauma (CIDI16 items)</td>
<td>Delusions (CIDI16 items)</td>
<td>• Endorsement of delusional experience was higher in those who had experienced a traumatic event (relative risk = 2.68). &lt;br&gt;• The relative risk increased in those who had PTSD (relative risk = 9.24). &lt;br&gt;• The same pattern of results was found with each of the ten individual types of trauma assessed. &lt;br&gt;• Dose-response relationship between number of traumas and endorsement of delusional experiences.</td>
</tr>
<tr>
<td>Shevlin et al (2007)</td>
<td>5,877 members of the general population (USA and UK)</td>
<td>32.0 (11.0)</td>
<td>52%</td>
<td>CN, CPA, physical assault, rape, molestation. (CIDI16 items)</td>
<td>Hallucinations (CIDI16 items).</td>
<td>• Visual hallucinations associated with CN, rape and molestation &lt;br&gt;• Auditory hallucinations associated with rape and molestation. &lt;br&gt;• Tactile hallucinations associated with CPA, rape and molestation. &lt;br&gt;• All 3 hallucination types more likely if experienced multiple traumas (dose-response).</td>
</tr>
<tr>
<td>Lataster et al. (2006)</td>
<td>1,290 children from the general population (Netherlands)</td>
<td>14.0 (1.0)</td>
<td>51%</td>
<td>Bullying, CSA (Authors’ questions)</td>
<td>Positive symptoms (Questions derived from the DISC-III17)</td>
<td>• Positive symptoms associated with bullying (OR = 2.9) and sexual trauma (OR = 4.8). &lt;br&gt;• Dose-response relationships were found for the relationship between both trauma types and the experience of psychotic symptoms.</td>
</tr>
<tr>
<td>Author (Year)</td>
<td>Sample</td>
<td>Age in Years Mean (SD)</td>
<td>Gender (% female)</td>
<td>Trauma Type (Measure)</td>
<td>Psychotic Symptoms (Measure)</td>
<td>Key Results</td>
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</tbody>
</table>
| Spauwen et al. (2006) | 2,524 adolescents from the general population (Germany) | 21.7 (3.4) | 49% | Lifetime trauma. (CIDI^{16} items) | Positive symptoms (CIDI^{16} items) | • Psychotic symptoms associated with trauma, particularly at more severe levels (OR = 1.89) and following trauma associated with intense fear, helplessness or horror.  
• The risk difference between those with and without trauma at baseline was 7% in the group with baseline psychosis proneness, but only 1.8% in those without. |

**Note:** CSA = Childhood sexual abuse; CPA = Childhood physical abuse; CEA = Childhood emotional abuse; CN = Childhood neglect.

**Note 2. Measures.** 1 = Adolescent Psychotic Symptom Screener; 2 = Early Trauma Inventory; 3 = Peters Delusion Inventory; 4 = Life Stressor Checklist; 5 = Green et al. Paranoid Thoughts Scale; 6 = Cardiff Anomalous Perceptions Scale; 7 = Bullying and Friendship Interview Schedule; 8 = Psychosis-Like Symptoms Interview; 9 = Traumatic Life Events Questionnaire; 10 = Schizotypal Personality Scale; 11 = Bully/Victim Questionnaire; 12 = Launay-Slade Hallucination Scale; 13 = Paranoia Scale; 14 = Childhood Trauma Questionnaire; 15 = Structured Interview for Assessing Perceptual Abnormalities; 16 = Composite International Diagnostic Interview; 17 = Diagnostic Interview Schedule for Children for DSM-III.
hallucination and possibly more likely to occur in a non-clinical group). Kelleher et al.’s (2013) study (described above in section 2.1.3) with over 1,000 adolescents has provided strong evidence for a causal, dose-response relationship between childhood trauma (bullying and physical assault) and the subsequent development of auditory hallucinations.

Of the four studies in Table 2.3 that investigated sexual abuse and hallucinations, two found a relationship (Steel et al., 2009; Freeman & Fowler, 2009). The two that did not were Gracie et al.’s (2007) study (which did find sexual abuse to be related to perceptual anomalies), and Shevlin et al.’s (2007) study, in which childhood sexual abuse was not related to hallucinations, but adult rape and sexual molestation were.

**Delusions** All six non-clinical studies from Table 2.3 that investigated trauma and delusions found evidence for a relationship (Campbell & Morrison, 2007; Freeman & Fowler, 2009; Goldstone et al., 2011; Gracie et al., 2007; Scott et al., 2007; Steel et al., 2009). As with the clinical studies, the variety in methods of trauma and delusion assessment makes comparison across studies difficult. The largest study was conducted by surveying 10,641 members of the general population (Scott et al., 2007). Delusional experiences were assessed with three screening items (each with follow-up probes) that related to delusions of control, thought interference/passivity, delusions of reference or persecution, and grandiose delusions. Trauma exposure was assessed with the CIDI list of ten traumatic events that may have been experienced (combat, natural disaster, witness someone being injured/killed, rape, sexual molestation, physical assault, threatened/kidnapped, torture/terrorism, other event, someone close to you traumatised). If any of these events were endorsed, follow-up questions were asked to ascertain a PTSD diagnosis. The likelihood of experiencing delusions was significantly higher for all types of trauma on the CIDI (relative risks ranged from 1.5 to 7.9). (For participants who had PTSD, relative risks
ranged from 6.9 to 18.1.) This study also demonstrated a clear dose-response relationship, where delusional experiences increased with increasing number of reported traumas. Gracie et al. (2007) found that general childhood trauma, physical abuse and sexual abuse were all related to paranoia, and that the number of interpersonal traumas experienced was a more important factor in levels of paranoia than type of trauma.

In terms of the possible specific link between emotional abuse and delusions, only two studies investigated this and the results were mixed. One study found that vulnerability to delusions was associated with childhood emotional abuse but not childhood sexual or physical abuse (Goldstone et al., 2011), while the other found that sub-clinical delusional experiences (paranoia and suspiciousness) were associated with childhood sexual and physical abuse but not emotional abuse (Steel et al., 2009).

Positive Symptoms All four non-clinical studies that analysed ‘positive symptoms’ as a single variable were large population studies (Arseneault et al., 2011; Lataster et al., 2006; Schreier et al., 2009; Spauwen et al., 2006). All of these studies found a robust relationship between positive symptoms and the types of trauma that were measured. Schreier’s et al.’s (2009) study on 6,437 children who were assessed for bullying/peer victimisation experiences at age 8 and 10 found that the risk of developing psychotic symptoms at age 12 was twice as high for those who had been bullied (independent of prior psychopathology, IQ and family adversity). Associations were stronger (odds ratios up to 4.6) when bullying was severe (experiences of both relational and overt victimisation) or chronic. Arseneault et al.’s (2011) study of same-sex twins found similar results for bullying and positive symptoms, and also found that children who had been maltreated by an adult were three times more likely to develop positive symptoms compared to those who had not. The higher risk for psychotic symptoms was observed whether the traumatic events occurred early
in life or later in childhood, and the risk associated with these traumatic events remained significant after controlling for gender, socioeconomic deprivation, IQ, early symptoms of internalizing or externalizing problems; and genetic liability to developing psychosis.

2.4.3 Methodological Considerations

As childhood trauma is a broad term which encompasses a variety of adverse experiences, there are many ways of conceptualising and measuring it. A variety of measures were used across different studies (few prior to 2005 used the same measures), and several have assessed trauma with a single question, conceptualising it as a dichotomous experience (i.e., trauma/abuse did or did not occur). Different methods of trauma assessment generally assess different aspects and severity of trauma, which makes comparison between studies difficult. Different methods of assessing trauma have been shown to lead to varying rates of disclosure of abuse; confidential self-report measures have been shown to lead to twice the number of trauma histories reported than a psychiatric interview with female inpatients (Dill, Chu, Grob, & Eisen, 1991). Several older (pre-2005) studies relied on chart review for their assessment of trauma. More recent studies have made use of standardised, adequately validated measures such as the CTQ, where criterion-related validity (correctly detecting abuse/neglect histories) is emphasised and which captures the continuous nature of the severity of childhood abuse/neglect.

Reliance on retrospective self-report of childhood trauma is a methodological limitation for most of the studies in this review. Concerns have been raised about the possibility that in people with psychosis, current psychopathology such as delusional beliefs or impaired reality testing might influence recall of traumatic events (Howard, 1993; Lysaker, Beattie, Strasburger, & Davis, 2005; Young, Read, Barker-Collo, & Harrison, 2001). It has been shown that in the general
population the reporting of adverse childhood events can fluctuate, and can be influenced by factors such as depression, psychological distress and chronic stress (Colman et al., 2015). However, in a study that investigated the validity and reliability of retrospective self-reporting of child abuse with patients with psychosis, high levels of concurrent validity between different measures of abuse were found, as well as good convergent validity with clinical case notes (Fisher et al., 2009). This study also found that patients’ reports of childhood trauma were relatively stable over a period of seven years, and were also unrelated to the severity of current psychotic symptoms (Fisher et al., 2009). As prospective studies of child abuse are not ethically possible (the discovery of child abuse would require that it be reported to relevant authorities, after which the abuse would be likely to cease), research will generally have to rely on well-validated retrospective measures of childhood trauma.

A major problem for many of these studies is the number of statistical tests performed and the risk of Type 1 error. (Most of these studies investigated the relationship between multiple types of trauma and multiple types of psychotic symptoms.) The tendency to publish only significant results or not report non-significant findings may colour the general body of research. Furthermore, high intercorrelations between different types of trauma make it difficult to speculate about a particular type of trauma being related to a particular psychotic symptom. Several studies have focused on only one type of trauma (e.g., sexual or physical abuse) which may be problematic as multiple types of abuse are known to frequently co-occur (Briere & Runtz, 1988).

Overall, the last decade has seen an improvement in the methodological quality of studies examining the relationship between trauma and psychotic symptoms, with the publication of several large population studies (sample sizes ranging from 1,000 to over 17,000) that control for demographic and other factors known to be related to psychosis (e.g., family history of psychosis,
urbanicity, substance use). Many of these studies have been designed to investigate aspects of the trauma-psychosis relationship that may indicate a causal relationship, e.g., being prospective in design (Arseneault et al., 2011; Janssen et al., 2004; Kelleher et al., 2013; Schreier et al., 2009; Spauwen et al., 2006), being designed to measure dose-response relationships (Arseneault et al., 2011; Galletly et al., 2011; Kelleher et al., 2013; Lataster et al., 2006; Scott et al., 2007; Shevlin et al., 2007; Spauwen et al., 2006; Whitfield et al., 2005), and being designed to measure newly incident psychotic symptoms subsequent to trauma, and cessation of psychosis following cessation of trauma (e.g., Kelleher et al., 2013).

2.5 Summary of Trauma, PTSD and Psychosis Research

In summary, a substantial number of studies have demonstrated a high prevalence of childhood trauma in people with psychosis, several of which have been large, methodologically strong studies published in more recent years. A high prevalence of PTSD is also consistently found in groups with psychosis, and hallucinations and delusions are frequently found to occur in patients with PTSD. In terms of specific psychotic symptoms, there appears to be evidence for a moderate to strong relationship between trauma and hallucinations (particularly strong with sexual abuse). There is also evidence for a moderately strong relationship between trauma and delusions, although there are a smaller total number of studies (and fewer high quality studies) that specifically investigate delusions. Data from several studies demonstrate a cumulative effect of trauma on psychotic symptoms, whereby a greater number of traumas is generally related to more severe hallucinations and delusions. Evidence for this may be stronger than evidence for any one type of abuse being related to specific psychotic symptoms. The overall quality of studies has improved in more recent years, with an increasing number of large, methodologically sophisticated
studies demonstrating a relationship between trauma and psychotic symptoms. Although few studies have used methodologies designed to investigate whether this relationship is causal, those that have done so provide emerging evidence that this may be the case.
Chapter 3. Models and Evidence Pertaining to PTSD-Related Processes Underlying the Link Between Trauma and Hallucinations

The close links between trauma, psychosis and PTSD (reviewed in Chapter 2) have led some researchers to explore the potential processes involved in the aetiology of hallucinations in people who have experienced trauma (Bebbington, 2009; McCarthy-Jones, et al., 2014). Various cognitive models have been developed that postulate explanations of the mechanisms of the effects of trauma on the development of psychotic symptoms. The most prominent models argue for the role of particular post-traumatic processes such as post-traumatic intrusions (Morrison, 2001; Morrison, Frame & Larkin, 2003; Waters, Badcock, Michie, & Maybery, 2006), and schemas and emotion (Garety, Kuipers, Fowler, Freeman, & Bebbington, 2001) in the aetiology of psychosis. Much of the support for these models has come from observations relating to the phenomenology and content of trauma and psychotic symptoms. This chapter will firstly outline the conceptual underpinnings of these two most prominent models and then examine empirical data in relation to both. Finally it will expand these models to integrate theories of PTSD based on the empirical data that exists to date.

3.1 Cognitive Models of Trauma and Hallucinations

3.1.1 Model 1 - Hallucinations as Intrusive Memories of Trauma

Chapter 2 presented evidence for a relationship between childhood trauma and hallucinations in people with psychotic disorders. One of the more widely-held explanations for the association between childhood trauma and hallucinations is that hallucinations are variants of the intrusive symptoms of PTSD (Morrison, 2001; Morrison et al., 2003; Waters et al., 2006).
Morrison et al.’s (2003) model takes the view that positive psychotic symptoms and post-traumatic intrusions are phenomenologically identical, and argue that many positive psychotic symptoms can be conceptualised as intrusions into awareness. They observe that both hallucinations and flashbacks are sensory experiences with no corresponding external stimulus, are often associated with fear and threat, are subjectively experienced as real and are experienced as happening in the present. The involuntary, intrusive qualities of hallmark PTSD symptoms are also qualities of hallucinations experienced by patients with psychosis. Morrison et al. (2003) have argued that the major difference between a post-traumatic intrusion and a hallucination is that people experiencing hallucinations tend to appraise their experiences as objectively real while those experiencing flashbacks know they are memories of trauma. They suggest that ultimately it may be the patient’s and/or clinician’s level of awareness of the relationship between intrusions and a traumatic event, as well as the patient’s appraisal of the intrusions and positive beliefs about psychotic experiences, that determines diagnosis rather than any real phenomenological difference between the intrusions experienced. Interpretation of the intrusion as a memory of a past trauma results in a diagnosis of PTSD, while interpretation in a culturally unacceptable manner results in a diagnosis of psychosis.

Similarly Waters et al. (2006) suggest in their model of auditory hallucinations that auditory hallucinations occur as a result of “unintentional activation of memories” or “the failure to inhibit memories of prior events”. They argue that two key deficits lead to auditory hallucinations; 1) a failure to intentionally inhibit/suppress a thought after determining that it is irrelevant, and 2) a context memory deficit. Failure in intentional inhibition has been shown to result in intrusive thoughts, which occur more frequently in people with schizophrenia than healthy and psychiatric controls (Morrison & Baker, 2000). As failure in intentional inhibition can also
occur in non-hallucinating patients, the second (context memory) deficit is proposed to be required for the occurrence of hallucinations. The context of an episodic memory refers to spatial and temporal characteristics present during the encoding of the event; it is proposed that in hallucinations, the content of a memory is unintentionally activated but the context is not. This results in the memories being confused with current reality. Context memory deficits have been found in patients with schizophrenia who hallucinate (Bazin, Perruchet, Hardy-Bayle, & Feline, 2000; Waters, Maybery, Badcock, & Michie, 2004). It has been argued that failure in intentional inhibition leads to the intrusive nature of the memory/cognition, and the context memory deficit results in it not being experienced as a product of the person’s own mind (and hence as a hallucination; Badcock, Waters, & Maybery, 2007). Memories of traumatic events share these characteristics (uninhibited recall and poor contextualisation). People who have experienced trauma often report experiencing intrusive memories (usually in the form of sensory impressions relating to the trauma) that are triggered involuntarily and experienced as though they are happening in the present moment (Ehlers & Clark, 2000). Cognitive models of PTSD conceptualise post-traumatic intrusions to be symptoms of disrupted encoding and retrieval processes of traumatic memories (Ehlers & Clark, 2000; McNally, 2003). It has been suggested that the intrusive, ‘here-and-now’ qualities of trauma memories are at least partially due to inadequate elaboration and integration of the memory into the context of time, place and its relationship to other autobiographical memories (Ehlers & Clark, 2000). These shared characteristics between hallucinations and intrusive trauma memories may be indicative of similar cognitive processes involved in their aetiology.
3.1.2 Model 2 – Schema and Emotion as Mediators Between Trauma and Hallucinations

Another prominent model of the relationship between trauma and psychosis involves the theory that trauma may lead to maladaptive schemas about the self, others and the world, which facilitate external or paranoid appraisals of anomalous experiences (Bentall, Corcoran, Howard, Blackwood, & Kinderman, 2001; Garety et al., 2001). Schemas can be defined as broad, pervasive themes comprised of memories, emotions, cognitions, and bodily sensations regarding oneself and one’s relationships with others (Young, Klosko, & Weishaar, 2003). Schema development begins in childhood and is elaborated on throughout one’s lifetime, resulting in attention and memory biases and influencing what people believe to be true about themselves (Pervine & John, 2001). Schema theorists propose that early maladaptive schemas develop as a result of adverse childhood experiences, and are key factors in the development and maintenance of many psychopathologies (Young et al., 2003). They propose that a child who has been abandoned, abused, neglected, or rejected may experience a later life event that is perceived as similar to the childhood experience. This may trigger maladaptive schemas (such as defectiveness/shame or mistrust/abuse), which can cause a strong negative emotional reaction and influence the way the person processes information (Young et al., 2003).

Garety et al.’s (2001) schema/emotion model of psychosis postulates that the major route for the development of hallucinations proceeds through cognitive and affective changes. In this model, an individual with a biopsychosocial predisposition for psychosis experiences a triggering event (such as difficult/traumatic life events, adverse environments, substance use or periods of isolation) that leads to a cognitive disturbance (intrusion of unintended material from memory and/or difficulties self-monitoring intentions and actions) (Frith, 1992; Hemsley, 1993). This basic
cognitive disturbance leads to anomalous conscious experiences that include subclinical psychotic symptoms (e.g., heightened perception, actions experienced as unintended, racing thoughts, thoughts experienced as voices, two unconnected events appearing to be causally linked). The triggering event/circumstances and anomalous experiences lead to emotional changes and increased levels of arousal. These emotional changes (e.g., feelings of anxiety, depression, anger, stress) are proposed to feed back into the moment-by-moment processing of anomalous experiences and shape their content. For example, anxiety and depression resulting from a job loss, and additional anxiety from initial voice-hearing experiences may facilitate the appearance of threatening and critical content in the voices (“You won’t get another job now, you’re useless. We’re after you.”) Biased appraisal processes lead to judging the anomalous experiences as externally caused, and are made worse by negative emotional states. In this model, a person’s initial predisposition for psychosis may be due to early adverse experiences (e.g., social adversity, marginalisation, childhood loss, childhood trauma) that result in an enduring cognitive vulnerability characterised by maladaptive schemas about the self and the world. These pre-existing negative schemas are further activated by a triggering event that occurs later, and play a key role in the person’s tendency to make external (and often catastrophic or fear-based) attributions. This model implicates intrusive memory processes as having a role in the aetiology of psychotic symptoms, but unlike Morrison’s (2003) model, emphasizes the role of schemas and emotion as the primary route driving psychosis development. Garety et al. (2001) argue that the people who experience anomalous cognitive experiences who go on to develop full psychotic symptoms are those who are unable to self-correct the bias towards making external attributions (e.g., ‘I thought I was hearing the voice of the devil, but I’ve been stressed and it must be my mind playing tricks’). Negative schematic beliefs about the self as vulnerable or the world as threatening
are proposed to facilitate external, emotion-laden attributions, thus contributing to the maintenance of the hallucinations.

3.2 Hallucinations and Post-Traumatic Intrusions

3.2.1 Post-Traumatic Intrusions in the Two Models

While several factors contribute to the cogency of the two theoretical models described in section 3.1 (e.g., prevalence data pertaining to trauma, PTSD and hallucinations (see Chapter 2); phenomenological similarities between hallucinations and intrusive PTSD symptoms; and clinical experience), the models have not been extensively tested. Identifying the cognitive mechanisms by which hallucinations may develop from traumatic experiences is crucial for the development of effective, targeted psychological interventions.

The first model (the ‘intrusions’ model) proposes that post-traumatic intrusions are the primary mechanism through which trauma leads to the development and maintenance of hallucinations (Morrison, 2001; Morrison et al., 2003). It is suggested in this model that hallucinations and post-traumatic intrusions may in fact be variants of the same phenomenon. The second model (the ‘schema/emotion’ model) conceptualises post-traumatic intrusions as one of a variety of post-traumatic cognitive disturbances that may play a role (though not a central role) in the aetiology of hallucinations (Garety et al., 2001). Despite the fact that post-traumatic intrusions are implicated to some degree in both of these models, the relationship between post-traumatic intrusions and hallucinations is notably under-researched and has not been extensively empirically investigated.
3.2.2 Studies Investigating Hallucinations and Intrusions

Studies that have investigated the relationship between hallucinations and intrusive processes are shown in Table 3.1. The studies in the table include those that specifically examined post-traumatic intrusions (Alsawy, Wood, Taylor, & Morrison, 2015; Bendall et al., 2013; Gracie et al., 2007; Hardy et al., 2016; Lysaker & LaRocco, 2008), as well as those that examined other intrusions (e.g., intrusive thoughts or images not necessarily about trauma) (Glazer et al., 2013; Morrison & Baker, 2000; Morrison et al., 2002). Of the eight studies in the table, six found at least some evidence for an association between intrusive processes and hallucinations (Alsawy et al., 2015; Bendall et al., 2013; Glazer et al., 2013; Gracie et al., 2007; Morrison & Baker, 2000; Morrison et al., 2002). Five of the studies used clinical samples (Bendall et al., 2013; Hardy et al., 2016; Lysaker & LaRocco, 2008; Morrison & Baker, 2000; Morrison et al., 2002) and three used non-clinical samples (Alsawy et al., 2015; Glazer et al., 2013; Gracie et al., 2007).

Of the five studies that used clinical samples, three found a relationship between intrusions and hallucinations (Bendall et al., 2013; Morrison & Baker, 2000; Morrison et al., 2002). Only one of these studies assessed for trauma (childhood sexual abuse) and specifically measured post-traumatic intrusions (Bendall et al., 2013). In this study, 13 of 25 participants with first episode psychosis had experienced childhood sexual abuse, and in the abused group post-traumatic intrusions were correlated with hallucinations at trend levels ($p = .06$). Morrison and Baker (2000) assessed the frequency of intrusive thoughts in patients with schizophrenia who had auditory hallucinations compared with two non-hallucinating control groups (psychiatric and non-psychiatric). They found that patients with auditory hallucinations experienced more frequent intrusive thoughts compared with both control groups, and that they also rated their intrusions as more distressing, unacceptable and uncontrollable compared with the control groups. Trauma was
<table>
<thead>
<tr>
<th>Author (Year)</th>
<th>Sample</th>
<th>Age in Years Mean (SD)</th>
<th>Gender (% female)</th>
<th>Trauma (Measure)</th>
<th>Intrusions (Measure)</th>
<th>Hallucinations (Measure)</th>
<th>Key Results</th>
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<tr>
<td>Hardy (2016)</td>
<td>228 people with relapsing psychosis</td>
<td>38.2 (11.1)</td>
<td>72%</td>
<td>Childhood sexual abuse (THQ(^1))</td>
<td>Post-traumatic intrusions (SRS-PTSD(^2))</td>
<td>Auditory hallucinations (PANSS(^3))</td>
<td>• Post-traumatic intrusions did not mediate the relationship between childhood sexual abuse and hallucinations</td>
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</table>
| Alsawy et al. (2015)| 7403 adults from Adult Psychiatric Morbidity Survey (UK) 16 years and older | 16 years and older     | 57%               | Trauma present/absent (SCID-IV Checklist\(^4\)) | Post-traumatic intrusions (TSQ\(^5\)) | Auditory hallucinations (PSQ\(^6\)) | • Post-traumatic intrusions (particularly upsetting dreams and upsetting trauma reminders) were associated with greater odds of hallucinations.  
  • Dose-response relationship was found                                                                 |
<p>| Bendall et al. (2013)| 13 patients with first episode psychosis and childhood sexual abuse    | 20.6 (3.1)             | 54%               | Childhood sexual abuse (CTQ(^7))      | Post-traumatic intrusions (IES(^8))       | Hallucinations (PANSS(^3))     | • Post-traumatic intrusions correlated with hallucinations at trend level                               |
| Glazer et al. (2013)| 55 non-clinical participants (31 students, 24 other adults)            | 24.0 (SD not reported) | 58%               | Trauma not assessed                   | Intrusive images (Authors’ interview)        | Predisposition to hallucinations (LSHS-R(^9)) | • Presence of intrusive images was associated with more severe hallucinatory experiences               |
| Lysaker &amp; LaRocco (2008)| 68 patients with schizophrenia spectrum disorders                    | 48.4 (7.9)             | 16%               | Any trauma over the lifetime (TAA(^10)) | Post-traumatic intrusions (TSI(^11))       | Hallucinations (PANSS(^3))     | • Post-traumatic intrusions were not correlated with hallucinations                                   |</p>
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<tr>
<th>Author</th>
<th>Sample</th>
<th>Age in Years Mean (SD)</th>
<th>Gender (% female)</th>
<th>Trauma (Measure)</th>
<th>Intrusions (Measure)</th>
<th>Hallucinations (Measure)</th>
<th>Key Results</th>
</tr>
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<tr>
<td>Gracie et al. (2007)</td>
<td>228 students (non-clinical)</td>
<td>28.9 (8.7)</td>
<td>71%</td>
<td>Any trauma over the lifetime (TLEQ(^{12}))</td>
<td>Post-traumatic intrusions (SRS-PTSD(^{2}))</td>
<td>Hallucinations (PS(^{13}))</td>
<td>Post-traumatic intrusions correlated with hallucinations&lt;br&gt;Post-traumatic intrusions were independently associated with hallucinations in multiple regression</td>
</tr>
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<td>Morrison et al. (2002)</td>
<td>35 patients with schizophrenia spectrum disorders engaged in cognitive therapy</td>
<td>33.7 (10.2)</td>
<td>34%</td>
<td>Trauma not assessed</td>
<td>Intrusive images (Authors’ interview)</td>
<td>Assessed for any hallucinations (Authors’ interview)</td>
<td>74% experienced intrusive images&lt;br&gt;50% of those with intrusive images had hallucinations&lt;br&gt;85% of those with intrusions and hallucinations related their intrusions to memories of life events</td>
</tr>
<tr>
<td>Morrison &amp; Baker (2000)</td>
<td>15 people with schizophrenia and auditory hallucinations, 15 psychiatric controls, and 15 non-psychiatric controls</td>
<td>41.8 (11.8)</td>
<td>27%</td>
<td>Trauma not assessed</td>
<td>Intrusive thoughts (DTQ(^{14}))</td>
<td>Auditory hallucinations (DVQ(^{15}))</td>
<td>Patients with auditory hallucinations had more intrusive thoughts than the control groups&lt;br&gt;Patients’ intrusive thoughts were rated more distressing, uncontrollable and unacceptable than the control groups</td>
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*Note: 1 = Childhood Trauma Questionnaire; 2 = Self-Report Scale - PTSD; 3 = Positive and Negative Syndrome Scale; 4 = Structured Clinical Interview for DSM-IV, non-patient version; 5 = Trauma Screening Questionnaire; 6 = Psychosis Screening Questionnaire; 7 = Childhood Trauma Questionnaire; 8 = Impact of Events Scale; 9 = Revised Launay-Slade Hallucination Scale; 10 = Trauma Assessment for Adults; 11 = Trauma Symptom Inventory; 12 = Traumatic Life Events Questionnaire; 13 = Paranoia Scale; 14 = Distressing Thoughts Questionnaire; 15 = Distressing Voices Questionnaire.*
not assessed in this study, and the extent to which the intrusions may have been post-traumatic was also not determined. Another study investigated intrusive images in 35 patients experiencing hallucinations and/or delusions who were in the course of cognitive therapy (Morrison et al., 2002). Semi-structured interviews were used to explore the content and meaning of intrusive images experienced in conjunction with their psychotic symptoms. They found that 26 (74%) of their participants experienced intrusive images alongside their hallucinations and/or delusions, and that of these 26, 71% were able to relate their images to memories of past events. Thirteen (50%) of the 26 patients with intrusive images experienced hallucinations, and of these, 11 (85%) related their intrusive images to memories of past events. While it was not part of Morrison et al.’s research aim to formally assess whether these past events were traumatic, brief accounts of the events provided by each participant were described in the study, and the majority of these (88%) were events that appeared to be threatening, harmful or humiliating (e.g., physical and sexual abuse or assault, witnessing violence, social humiliation). The authors likened the patients’ intrusive images that were associated with previous life events to the flashbacks and vivid images characteristic of PTSD. Almost all patients (96%) who experienced intrusive images could relate their images to particular negative emotions and beliefs about the self, others or the world. Results were interpreted by the authors as evidence for similar emotional and cognitive processes maintaining both psychotic disorders and anxiety disorders (including PTSD, formerly categorised as an anxiety disorder; American Psychiatric Association, 2000). This was the only study that reported on the content of intrusions, however the content of hallucinations and delusions was not assessed.

In the first study to investigate theoretically-based, trauma-related psychological mechanisms as mediators between trauma and psychotic symptoms in a large clinical sample (228
patients with relapsing psychosis), Hardy et al. (2016) investigated intrusive trauma memory, post-traumatic numbing/avoidance, hyperarousal, trauma-related beliefs and depression as mediators between different types of trauma and psychotic symptoms. A specific association between childhood sexual abuse and auditory hallucinations was found (OR = 2.21), and intrusive trauma memory was investigated as a mediator in this relationship. However, it was found that mediation occurred through post-traumatic avoidance/numbing and hyperarousal, but not intrusive trauma memory, negative beliefs or depression. In this study, intrusive trauma memory was assessed only in relation to traumas that participants reported as currently affecting them the most, which was often not their sexual abuse. Intrusions related to sexual abuse may therefore not have been detected (a limitation of the study acknowledged by the authors).

All three of the non-clinical studies that examined intrusions and hallucinations found evidence for a relationship (Alsawy et al., 2015; Glazer et al., 2013; Gracie et al., 2007). Two of these studies had large sample sizes and assessed intrusions that were specifically post-traumatic (Alsawy et al., 2015; Gracie et al., 2007). Alsawy et al. (2015) used a large population sample of adults (n = 7,403) to investigate associations between psychotic experiences (auditory hallucinations and paranoia) and PTSD symptoms (post-traumatic intrusions and hyperarousal). Post-traumatic intrusions were measured with five items on the Trauma Screening Questionnaire (Brewin et al., 2002), each pertaining to a different type of intrusion: upsetting memories, upsetting dreams, feeling the event is happening again, upsetting reminders of trauma, and bodily reactions. It was found that post-traumatic intrusions were associated with greater odds of experiencing auditory hallucinations. Analyses of the different types of intrusions separately showed that upsetting dreams and upsetting reminders of trauma were associated with greater odds of hallucinations, but upsetting memories, feeling the event is happening again, and bodily reactions
were not. A clear dose-response relationship was found in this study; the greater the number of intrusion types experienced, the greater the odds of having hallucinations. Gracie et al. (2007) used a sample of 228 students to investigate the relationship between trauma and predisposition to paranoia and hallucinations. They found that post-traumatic intrusions were correlated with both paranoia and hallucinations, and in subsequent multiple regressions (in which comorbidity of hallucinations and delusions were controlled for), post-traumatic intrusions were independently associated with hallucinations, but not with paranoia.

The five studies in Table 3.1 that specifically assessed post-traumatic intrusions in relation to hallucinations all used self-report measures of intrusions (Alsawy et al., 2015; Bendall et al., 2013; Gracie et al., 2007; Hardy et al., 2016; Lysaker & LaRocco, 2008). Three of these five studies used clinical samples (Bendall et al., 2013; Hardy et al., 2016; Lysaker & LaRocco, 2008). Given the proposed central role of post-traumatic intrusions in the aetiology and maintenance of hallucinations in psychotic disorders (Morrison, 2001; Morrison et al., 2003), it is important to thoroughly investigate post-traumatic intrusions in relation to hallucinations in clinical groups with psychosis. Assessment of hallucinations and post-traumatic intrusions with well-validated clinician-administered measures in these groups would add to the quality of the evidence supporting a relationship.

In summary, there are few studies that have investigated the relationship between hallucinations and post-traumatic intrusions. Overall, the studies in Table 3.1 provide mixed evidence for a relationship in both clinical and non-clinical groups. More research is needed to thoroughly investigate the relationship, particularly in clinical groups with larger sample sizes, and using comprehensive, clinician-administered measures of post-traumatic intrusions and hallucinations. It is also possible that publication bias may influence the pattern of findings from
these studies, with significant results potentially more likely to be published. No studies to date have investigated the content of post-traumatic intrusions in relation to hallucination content in people with psychosis.

3.3 Content of Hallucinations in Relation to Trauma – Review of the Literature

The two models described in section 3.1 emphasise different cognitive mechanisms as the key processes by which trauma confers a risk for psychosis. One conceptualises hallucinations as variants of post-traumatic intrusions (Morrison, 2001; Morrison et al., 2003) and the other proposes that maladaptive trauma-related schemas and emotional processes are the primary drivers impacting hallucination development. As both models are contingent on the presence of a relationship between traumatic experience and the content of hallucinations, it is important to examine the existing empirical evidence for this relationship. Investigating the content of hallucinations in relation to trauma provides another avenue for understanding the nature of the connection between these experiences. It also has compelling clinical implications in that therapeutic approaches can incorporate the understanding of hallucinations as potentially representational of earlier traumatic experiences. Studies assessing the relationship between traumatic experiences and the content of hallucinations are reviewed in this section.

Table 3.2 shows a summary of studies using clinical samples of greater than five participants that assessed the content of hallucinations in relation to trauma in people with primary diagnoses of psychosis and/or PTSD. The search for research on trauma and hallucinatory content included a search of the PSYCINFO database using a variety of terms (‘trauma’, ‘abuse’, ‘psychosis’, ‘hallucination’, ‘content’) as well as searches through reference lists of other relevant
<table>
<thead>
<tr>
<th>Author (Year)</th>
<th>Sample</th>
<th>Age in Years Mean (SD)</th>
<th>Gender (% female)</th>
<th>Methodology by which content was assessed</th>
<th>Aspects of content assessed</th>
<th>Key findings relating to content</th>
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<tr>
<td>Corstens &amp; Longden (2013)</td>
<td>100 patients with auditory hallucinations (80 had psychosis diagnoses; 89 had experienced at least one adverse childhood event)</td>
<td>35.9 (11.7)</td>
<td>57%</td>
<td>Data from the records of patients who had systematically generated formulations of their hallucinations in collaboration with their treating clinicians.</td>
<td>• Voices criticising self/others, commands, threats, voices interacting with each other, advice/encouragement, premonitions, speaking in foreign language, referring to traumatic events. • Voice identity (abusive/non-abusive family members; non-abusive acquaintance; other perpetrator).</td>
<td>Of the entire sample: • 17% of participants had voices referring to traumatic events. • 45% attributed their voices’ identity as that of an abusive family member. • 23% attributed voices’ identity to ‘other perpetrators’.</td>
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<td>Jessop et al. (2008)</td>
<td>26 adolescent inpatients with hallucinations (13 had primary diagnoses of PTSD, 5 had primary diagnosis of schizophrenia, others had comorbid diagnoses)</td>
<td>15.7 (Range 13-17)</td>
<td>65%</td>
<td>Clinician-administered questionnaire containing items from the PANSS(^1), BPRS(^2), and K-SADS(^3).</td>
<td>• Location, vividness, insight, frequency, duration, level of distress and content of hallucinations.</td>
<td>PTSD group: 46% reported an association between trauma and hallucination content. (Content was “not typically a direct reflection of a traumatic event”, but “included themes that were understandable in the context of trauma”.) 31% reported neutral/helpful content, 23% religious, 0% grandiose. Most common themes of hallucinations related to self-harm or derogatory voices. • Schizophrenia group: 60% reported bizarre, religious or grandiose themes. 80% had helpful content. No remark made about hallucination content in relation to trauma.</td>
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<tr>
<td>Author (Year)</td>
<td>Sample</td>
<td>Age in Years Mean (SD)</td>
<td>Gender (% female)</td>
<td>Methodology by which content was assessed</td>
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<td>Scott et al. (2007)</td>
<td>66 adolescent inpatients with hallucinations, divided into 3 mutually exclusive groups: Psychotic disorder (n=18), PTSD (n=20), other disorder (n=28).</td>
<td>15.5 (Range 13-17)</td>
<td>71%</td>
<td>Structured interview using the K-SADS³.</td>
<td>Modality, form and content of hallucinations</td>
<td>PTSD group: Five (25%) “reported that the content of their hallucinations represented a past traumatic experience, e.g., hearing the voice of a perpetrator” (all trauma was related to sexual abuse). Psychotic disorder group: Authors reported that “hallucinations representing psychological trauma did not occur in patients with psychotic disorder”. No difference between PTSD group and schizophrenia regarding form or types of content (running commentary, voices conversing, derogatory, neutral, non-verbal, thought echo).</td>
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<td>Raune et al. (2006)</td>
<td>41 patients with first episode psychosis</td>
<td>29.6 (11.1)</td>
<td>42%</td>
<td>Structured interview using the SCAN⁴</td>
<td>Themes of auditory hallucinations (persecutory, depressive, grandiose). Attributes of stressful events (threat, loss, danger, humiliation, intrusiveness, self-esteem).</td>
<td>Intrusive trauma was associated with persecutory and depressive hallucinations.</td>
</tr>
<tr>
<td>Hardy et al. (2005)</td>
<td>75 inpatients and outpatients with current hallucinations and diagnosis of non-affective psychosis.</td>
<td>39.1 (11.9)</td>
<td>31%</td>
<td>Trauma descriptions recorded by interviewer after participants completed the THQ⁵. Hallucination descriptions obtained with structured interviews using the SCAN⁴ and the PSYRATS⁶.</td>
<td>Themes of trauma and hallucination content (humiliation, intrusiveness, threat, guilt). Determined whether there was 1) direct, 2) thematic or 3) no association between hallucinations and trauma.</td>
<td>Of those participants with trauma, 13% had hallucinatory content directly related, 45% had content thematically related and 43% had content unrelated to their trauma.</td>
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<tr>
<td>Author (Year)</td>
<td>Sample</td>
<td>Age in Years Mean (SD)</td>
<td>Gender (% female)</td>
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<td>Read &amp; Argyle (1999)</td>
<td>Records of 22 psychiatric patients with sexual abuse history (17 of whom reported experiencing hallucinations, delusions, and/or thought disorder)</td>
<td>35.5 (8.6)</td>
<td>55%</td>
<td>Chart review</td>
<td>• Content (where reported) of hallucinations, delusions and thought disorder in relation to trauma.</td>
<td>• 3 of 7 instances of hallucinations contained content that the authors interpreted as being related to the person’s trauma.</td>
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<td>Hamner (1997)</td>
<td>25 war veterans with PTSD, 9 of whom had psychotic symptoms. (Of these 9, 8 had hallucinations.)</td>
<td>48.0 (5.3)</td>
<td>0%</td>
<td>Structured interview using the SCID-III$^7$ (PTSD and psychosis modules).</td>
<td>• Content of hallucinations</td>
<td>• Of the 9 veterans with psychotic symptoms (8 of whom had hallucinations), 2 (22%) had hallucinations or delusions that were strictly related to the trauma, and 7 (78%) had at least some hallucinations or delusions that were not related to the trauma.</td>
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<td>Mueser &amp; Butler (1987)</td>
<td>36 inpatient war veterans with PTSD, 5 of whom had auditory hallucinations</td>
<td>46.0 (9.0)</td>
<td>0%</td>
<td>Structured interview using the MMPI$^8$.</td>
<td>• Content of hallucinations</td>
<td>• For all 5 patients, the majority of hallucination content consisted of hearing voices attributed to fellow soldiers or soldiers they had killed.</td>
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<td>• 2 experienced hallucinations (auditory, visual, olfactory) with content representing exactly what was experienced during combat (wounded soldiers’ groans, gunfire, helicopters, visions and smells experienced during combat).</td>
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</table>

*Note. 1 = Positive and Negative Syndrome Scale; 2 = Brief Psychotic Rating Scale; 3 = Schedule for Affective Disorders and Schizophrenia for School-Aged Children; 4 = Schedules for Clinical Assessment in Neuropsychiatry; 5 = Trauma History Questionnaire; 6 = Psychotic Symptom Rating Scales; 7 = Structured Clinical Interview for the Diagnostic and Statistical Manual; 8 = Minnesota Multiphasic Personality Inventory.*
articles. There were three exclusion criteria for the table. Firstly, studies in which hallucination content was not assessed in relation to trauma were excluded. (For example, Dorahy et al. (2009) investigated content of hallucinations in people with schizophrenia with and without trauma, but the aspects of content they assessed (e.g., “content related to someone influential in your life”; “voices were replays of memories of things previously said to you”) were not explicitly identified as being related to people/memories associated with a traumatic experience.) Secondly, studies in which only cursory remarks were made by the authors about how symptom content appeared to be related to trauma were excluded (e.g., Butler, Mueser, Sprock, & Braff, 1996). Thirdly, studies that assessed the content of both hallucinations and delusions but did not report on hallucinations and delusion content separately were excluded (e.g., Read, Agar, Argyle, & Aderhold, 2003; Reiff, Castille, Muenzenmaier, & Link, 2012).

To assess the content of traumatic experiences and hallucinations, six of the eight studies in the table used structured interviews (Hamner, 1997; Hardy et al., 2005; Jessop, Scott, & Nurcombe, 2008; Mueser & Butler, 1987; Raune, Bebbington, Dunn, & Kuipers, 2006; Scott, Nurcombe, Sheridan, & McFarland, 2007), one used chart review (thus relying on clinicians’ incidental descriptions of trauma and psychotic symptom content; Read & Argyle, 1999), and one used records of clinical formulations of hallucinations that had been developed by patients in conjunction with their clinicians as part of a treatment program (Corstens & Longden, 2013).

All eight studies in Table 3.2 found at least some evidence for relationships between hallucination content and traumatic experiences. Two studies examined the occurrence of hallucinations in adolescents who had either PTSD or psychosis diagnoses (Jessop et al., 2008; Scott et al., 2007), two examined hallucinations in war veterans with PTSD (Hamner, 1997; Mueser & Butler, 1987) and three examined hallucinations in psychiatric patients in samples where
the majority of diagnoses were psychotic disorders (Corstens & Longden, 2013; Hardy et al., 2005; Raune et al., 2006; Read & Argyle, 1999).

In the two studies that used adolescent samples with PTSD or psychosis diagnoses, observations were made about the content of hallucinations in the PTSD patients, and it was reported that a notable proportion of people with PTSD (25% and 43% in each of the studies respectively) had hallucinations that appeared to be related to their trauma. The authors reported that these relationships were primarily at the level of themes rather than direct representations of traumatic experiences although how this was assessed for was unclear (Jessop et al., 2008; Scott et al., 2007). In one of these studies, the authors noted that unlike the PTSD patients, the psychosis patients’ hallucinations did not appear to be related to trauma (Scott et al., 2007). In the other study, no remark was made about the content of hallucinations in relation to trauma in patients with a primary diagnosis of psychosis (Jessop et al., 2008). In the study that assessed trauma and symptom content of psychiatric inpatients using chart reviews, it was found that where trauma and hallucination content were reported, 43% the instances of hallucinations were related to trauma (Read & Argyle, 1999). These authors noted that there were several cases where symptom content appeared to be directly related to trauma (rather than only at the level of themes). None of these studies included clear definitions of direct or thematic relationships of hallucinations with trauma; these assessments were made based on the researchers’ informal judgments.

The two studies in Table 3.2 that assessed hallucinations in war veterans with PTSD found that the content of hallucinations was often related to trauma content, and was also usually accompanied by content unrelated to the trauma (Hamner, 1997; Mueser & Butler, 1987). Hamner (1997) reported that of the nine patients in their study who had chronic PTSD and psychotic symptoms, two (22%) had hallucinations with content related directly to their trauma, while seven
(78%) had at least some hallucinations that were unrelated in content to the trauma. In Mueser and Butler’s (1987) study, all five participants with PTSD and auditory hallucinations reported that the voices they heard belonged to fellow soldiers or soldiers they had killed (but the voices typically contained novel phrases not heard during combat, such as commands to commit suicide). Two of these participants had ongoing hallucinations (auditory, visual or olfactory) that included some content representing exact sensory snapshots of combat-related experiences, as with flashbacks (e.g., sounds of wounded soldiers’ groans, gunfire, helicopters, and odours present during combat). Similar descriptions of these types of hallucinations have been given in case studies of war veterans with PTSD; for example, one study (not included in Table 3.2 due to the exclusion of studies with fewer than five participants) found that the content of the hallucinations was often congruent with the trauma but did not appear to be a direct re-experiencing of the traumatic event (Ivezic, Oruc, & Bell, 1999). In one of Ivezic et al.’s case studies, an ambulance driver whose close friend had been wounded and died in his ambulance before he could reach the hospital subsequently developed auditory hallucinations of voices criticising him for not driving fast enough during that incident. None of these PTSD studies reported on the extent to which hallucinations occurred in or out of the context of re-experiencing episodes (they only noted that at times hallucinations were unrelated to re-experiencing).

The most comprehensive study from Table 3.2, which systematically defined and assessed trauma and hallucination content as the primary research aim, found that some hallucinations were direct representations of traumatic experiences but more often they were related to trauma at the level of themes, or not related at all (Hardy et al., 2005). Hardy et al. investigated the relationship between trauma and the content of hallucinations in people with non-affective psychosis and explored four types of hypothesised associations: direct (hallucinations as manifestations of trauma...
memories), indirect (hallucinations arising as a result of the effect of trauma on emotion, beliefs and anomalous experiences), stress (trauma as a trigger of hallucinatory vulnerability, in line with traditional stress-vulnerability models) and the possibility of no association. Of the total sample of 75 participants, 55% had experienced trauma. Of this subgroup, 13% had hallucinations with content directly related to their trauma, 45% had hallucinations that were thematically related to their trauma, and 43% had no identifiable association between their hallucinations and trauma. (An example of a directly-related hallucination was visual hallucinations of a gun experienced by a participant who had been threatened by a gun; an example of a thematically-related hallucination was auditory hallucinations of being criticised by a neighbour in a person who had been emotionally abused by her mother.) Raune et al. (2006) also systematically assessed trauma and hallucination content in psychosis patients as part of their primary research aim, however their study was not specifically designed to identify content similarities – they measured trauma attributes of threat, loss, danger, humiliation, intrusiveness, self-esteem, and measured hallucination and delusion attributes as being persecutory, depressive or grandiose. They found that intrusive trauma was associated with persecutory and depressive hallucinations. While some inferences may be able to be drawn about content similarities from these results (e.g., themes of intrusiveness in trauma might promote the intrusive content present in many persecutory hallucinations), hallucinations and traumas were not measured on the same themes, so conclusions cannot be made about the extent to which hallucination content matched traumatic experiences.

Reiff et al.’s (2012) study (not included in Table 3.2 as hallucination and delusion content was analysed together) also systematically defined and assessed trauma and psychotic symptom content as their primary research aim. They explored associations between childhood abuse and the content of hallucinations and delusions in people with severe mental illness (primarily
psychosis). They found that of 21 participants who had trauma (most of whom experienced at least some hallucinations, although it is unclear how many), two (10%) had direct associations between hallucinations and trauma. Fourteen (67%) had some level of indirect correspondence between trauma and psychotic symptom content (e.g., childhood experience of rape corresponding with adult psychotic symptom content including being held against one’s will, experiencing others as threatening, characters that “want my body” and feeling helpless and afraid). Eleven (52%) cases of abused participants had themes of ‘being hurt’, ‘forceful’ or ‘threatened’ for both trauma and psychotic symptom content. Of eight non-abused participants, only one described perceiving that others wanted to hurt him. Reiff et al.’s study is the only known study to date that set out to systematically compare the content of psychotic symptoms between those with and without trauma. They found that overall, the hallucinations and delusions of those with trauma contained more negative content (e.g., themes of threat, fear, or malevolence) compared to those without trauma.

3.4 Evidence for the Models

The studies reviewed in Table 3.2 all found evidence for relationships between hallucinatory content and previous traumatic experiences (Corstens & Longden, 2013; Hardy et al., 2005; Hamner, 1997; Jessop et al., 2008; Mueser & Butler, 1987; Raune et al., 2006; Read & Argyle, 1999; Scott et al., 2007). There was consistency in the findings of the studies in that the most common association between traumatic experiences and hallucination content was thematic, with a smaller subset of hallucinations appearing to be direct representations of past trauma. These findings lend some support for both models outlined in section 3.1. The varying types of relationships that appear to exist between trauma and hallucination content may suggest that
multiple trauma-related cognitive processes underlie the development of hallucinations from traumatic experiences.

The primary pool of evidence supporting the model conceptualising hallucinations as variants of post-traumatic intrusive memories comes from accounts of explicit content similarities between hallucinations and experiences of trauma. The model’s assertion that hallucinations and post-traumatic intrusions are phenomenologically identical leads to the prediction that, like post-traumatic intrusions, the content of hallucinations should represent exact depictions of the traumatic experience. Four of the studies reviewed in Table 3.2 found some evidence for direct content relationships between hallucinations and trauma (Corstens & Longden, 2013; Hardy et al., 2005; Hamner, 1997; Mueser & Butler, 1987). However, the quality of these studies varied, with only one investigating trauma and symptom content in a manner in which direct content relationships were investigated and distinguished from thematic content relationships in a systematic manner (Hardy et al., 2005). The other studies primarily relied on authors’ informal interpretations of content links, or brief remarks about the nature of the relationship between trauma and hallucination content.

The studies in Table 3.2 found that links at the level of themes were more common than direct content links, and several studies have also shown that hallucinations in trauma survivors are often not related in content to the trauma experienced (Butler et al., 1996; Hamner et al., 2000; Hardy et al., 2005; Scott et al., 2007). The finding that some hallucination content can be congruent with previous traumatic experience but clearly not a direct representation of the traumatic event (e.g., in the example of the ambulance driver described in the previous section) has been interpreted as pointing to the possibility that trauma plays a role in generating these hallucinations but that they still differ from re-experiencing symptoms such as flashbacks (Braakman, Kortmann, & van
den Brink, 2009; Ivezic et al., 1999), and that processes other than those associated with intrusive re-experiencing are contributing to the content of hallucinations. Ivezic et al. (1999) suggested that the distinction between post-traumatic intrusions and psychotic symptoms can be clearly made. This was based on observations of symptoms in people who have PTSD with additional psychotic symptoms (e.g., veterans exposed to extreme combat stress); these patients had clear post-traumatic flashback episodes in addition to hallucinations that were seemingly unrelated to the trauma (or may have been related at the level of the emotional theme, but were not re-experiencing episodes of actual events) (Ivezic et al., 1999). Furthermore, theorising that likens hallucinations to intrusive re-experiencing symptoms of PTSD has often focused on certain phenomenological attributes (such as the fact that both have a strong visual/auditory quality or that both contain elements of direct trauma memories; Morrison et al., 2003). However there is no research that has systematically or empirically compared the phenomenology and content of post-traumatic intrusions with hallucinations in people with psychosis who have experienced trauma.

The consistent finding that there are more often strong thematic links between a person’s traumatic experience and the content of their hallucinations (rather than direct links where trauma and hallucination content are identical) provides stronger evidence for the ‘schema/emotion’ model, which emphasises the role of trauma-driven schemas and emotional processes as the key mechanisms in the aetiology of hallucinations. Five of the studies in Table 3.2 indicated that hallucinations that were thematically related to trauma were present (Corstens & Longden, 2013; Hardy et al., 2005; Jessop et al., 2008; Mueser & Butler, 1987; Scott et al., 2007). People who have experienced childhood sexual abuse have been found to experience psychotic symptoms with characteristics related to aspects of the abuse, e.g., sexual and/or malevolent themes (Read & Argyle, 1999; Thompson et al., 2010) and similarities in social interactions between actual and
hallucinated experiences (Birchwood, Meaden, Trower, Gilbert, & Plainstow, 2000). Jones (2010) points out several qualities of auditory hallucinations that do not appear to fit with memory-based models; voice-hearers commonly report that hallucinated voices engage in regulating their daily activities, that they can engage in dialogue with their voices, and that these dialogues can become increasingly detailed over time (Nayani & David, 1996). Auditory hallucinations have been observed to frequently involve critical comments directed at the hearer or running-commentary style remarks about the person’s daily life (Fowler et al., 2006; Leudar, Thomas, McNally, & Glinski (1997). This dynamic quality of hallucinations, which often involves novel content and negative themes appears to fit better with the idea that other, more dynamic, trauma-related processes such as schema development and emotional processes might facilitate the relationship between trauma and hallucinations.

3.5 PTSD-Related Intrusive Symptoms, Cognitions and Schemas

3.5.1 Types of Intrusive Re-experiencing

In most of the studies discussed above, the designation of post-traumatic intrusive symptoms as ‘intrusive re-experiencing symptoms’ appears to be restricted purely to intrusive symptoms involving a direct, intrusive re-living of trauma (i.e., flashback-type phenomena). However, a range of intrusive symptoms are known to occur in people who have experienced trauma, and are identified in the DSM-IV and DSM-5 diagnostic criteria for PTSD (American Psychiatric Association, 2000; 2013). The DSM-5 criterion for re-experiencing symptoms of PTSD (Criterion B) includes a range of symptoms: intrusive, distressing recollections of the event; dreams related to the event; dissociative reactions (e.g., flashbacks) in which the person feels or
acts as if the event is reoccurring; intense psychological distress and/or physiological reactivity at exposure to internal/external cues resembling an aspect of the trauma (American Psychiatric Association, 2013). The DSM-5 ‘intrusive recollections’ symptom has been altered from DSM-IV in that it is now restricted to the experience of intrusive ‘here and now’ sensory (e.g., visual, auditory, tactile), emotional, physiological or behavioural memories, (as distinct from abstract thoughts and appraisals about the trauma; Friedman, 2013). A new criterion ‘Negative alterations in cognition and mood’ (Criterion D) has been created in DSM-5 to account for these abstract, evaluative thoughts and appraisals pertaining to the trauma, the self and others that can occur following traumatic experiences. These are further discussed in the sections below.

### 3.5.2 Post-Traumatic Cognitions

Various changes in an individual’s thoughts and beliefs following a trauma have been the subject of attention in many trauma theories (Ehlers & Clark, 2000; Foa & Riggs, 1993; Horowitz, 1986; Resick & Schnicke, 1992). Common post-traumatic cognitions that fall into three main categories have been identified; negative cognitions about the self, negative cognitions about the world, and self-blame for the trauma (Foa, Ehlers, Clark, Tolin, & Orsillo, 1999). These abstract, evaluative thoughts and appraisals pertaining to the trauma appear in the DSM-5’s new criterion ‘Negative alterations in cognition and mood’ (Criterion D). This criterion highlights the changes in appraisals of self and others, as well as changes in mood, which begin or worsen after the experience of a traumatic event. Criterion D2 relates to ‘the persistent belief that a person’s self, world, and/or future has been irrevocably altered due to the traumatic experience’, and criterion
D3 relates to ‘distorted beliefs pertaining to blame of self or others about the causes or consequences of the trauma’.

### 3.5.3 Post-Traumatic Cognitions and Schemas

As described above, the types of cognitive changes that occur after a trauma include thoughts and appraisals that pertain to a variety of things, ranging from cognitions that relate to broad and general qualities of the self and the world (e.g., “I am vulnerable”; “the world is a dangerous place”) to more specific appraisals about the trauma itself (e.g., “the event happened because of the way I acted”; “someone else would have stopped the event from happening”). The first, more general type of cognition fits well within the concept of maladaptive schemas, particularly those that develop from trauma that occurs in childhood and/or is prolonged in nature (e.g., ongoing childhood sexual abuse). As described previously, maladaptive schemas are conceptualised as broad, pervasive underlying frameworks consisting of memories, emotions, cognitions and bodily sensations; they can be regarded as self-defeating emotional and cognitive patterns that drive a person’s thinking and behaviour. General maladaptive beliefs about the self and the world that form as part of a schema shaped by trauma give rise to negative cognitions coherent with these beliefs (i.e., the first type of cognition mentioned above). The more broad, pervasive nature of schema-based post-traumatic cognitions ties them closely to the emotional changes that occur following a trauma. The second type of post-traumatic cognition, involving appraisals and evaluations of the trauma itself, contain an added component of memory of the trauma and an evaluative element about that particular event. The distinction between the content of these two types of post-traumatic cognitions (those pertaining to broad/general schema-related
themes about the self and others, and those pertaining to the trauma itself) may have parallels in the differences that can be observed in trauma-related content of hallucinations (further explored in section 3.6.1). (From this point forward, these two types of post-traumatic cognitions will be referred to as ‘schemas’ and ‘post-traumatic cognitions about the trauma’.)

3.5.4 Degree of Correspondence Between PTSD-Related Processes and Trauma

The three types of post-traumatic processes outlined above (post-traumatic intrusions, post-traumatic cognitions and schemas) are all key elements in prominent theories of the development and maintenance of PTSD (e.g., Ehlers & Clark, 2000; Foa & Riggs, 1993), and can be considered in terms of the degree of the correspondence between the symptom content and the actual experience of the trauma. Intrusive sensory re-experiencing episodes are partially defined by the fact that the content of these symptoms is directly related to the sensory experiences the person had during the traumatic event (i.e., sensory memory processes are involved). Maladaptive schemas formed by traumatic events are not explicitly related in content to the person’s experience of trauma, but are characterised by the way aspects/themes of the trauma (e.g., the level of threat involved) were processed by the person, and the extent to which fundamental beliefs about the self and the world were formed/ altered to be coherent with the themes of the traumatic experience. For example, threatening, victimising experiences might lead to the development of a mistrust/abuse schema, characterised by fundamental beliefs that are in line with the theme that others cannot be trusted and are likely to hurt or abuse. Post-traumatic cognitions about the trauma itself (e.g., self-blaming thoughts about the trauma) could be conceptualised as containing elements of direct memories of the trauma, as well an appraisal/evaluative component pertaining to the trauma. Like
intrusive re-experiencing symptoms, these post-traumatic cognitions about the trauma can be intrusive in nature. They are also likely to be underpinned by fundamental maladaptive schematic beliefs about the self and others that would facilitate appraisals of the traumatic event (e.g., thoughts relating to self-blame for the trauma). The content of these post-traumatic cognitions about the trauma can be characterised as having some memory-related elements directly related to the trauma, alongside elements that may be related to the trauma in a more indirect manner.

3.6 Multiple Mechanisms Underlying the Relationship Between Trauma and Hallucinations

The studies on hallucination content in relation to trauma (reviewed in section 3.3) provide evidence for the occurrence of hallucinations that are related to trauma in various ways (directly, at the level of broader emotional/schema-based themes, or not at all; e.g., Hardy et al., 2005; Reiff et al., 2012). The relationships (which will be referred to as ‘direct’ and ‘thematic’ links) between trauma and hallucination content offer evidence supporting both prominent models of the effect of trauma on the development of hallucinations. Directly related hallucinations can potentially be interpreted as alternative forms of intrusive re-experiencing symptoms, while thematically-related hallucinations have been proposed to support the notion that trauma-related schema and emotional changes drive the development of hallucinations. It is proposed here that there is a third type of hallucination content not addressed by these two models, and that hallucinations with content of this type might be underpinned by post-traumatic cognitions specifically related to the trauma.
3.6.1 ‘Indirect’ Hallucinations and Post-Traumatic Cognitions about Trauma

Hardy et al. (2005) identified four broad emotional/schematic themes often present in traumatic experiences and hallucination content, and that relate specifically to schemas (i.e., rules about the self and others); humiliation, intrusiveness, guilt/culpability and threat. Other more specific thematic links between trauma and hallucinations are common and include those that are indirectly related in content (i.e., content of hallucinations is similar but not identical to that of trauma - e.g., sexual abuse victims having hallucinations with a sexual theme. This type of link will be referred to as an ‘indirect’ link.) In cases like this, the hallucination may contain components of trauma memories but is not a direct ‘snapshot’ memory of the traumatic event. Both of these types of relationships between trauma and hallucination content (thematic relationships, and indirect relationships) have been put forward as evidence for the schema model of the aetiology of hallucinations from trauma. However, indirect content links (which are more specific, memory-based content links) may not necessarily only reflect underlying schema-related processes driving the trauma-hallucination link. Schemas are broad, pervasive themes that underlie a person’s thoughts, emotions and behaviour in a global sense. Indirect content relationships between trauma and hallucinations appear to be more specifically related to content characteristics of the trauma (such as in the example of sexual abuse above – the themes are specifically of a sexual nature). In this sense, it appears that other, more dynamic intrusive processes such as post-traumatic cognitions (particularly post-traumatic cognitions about the trauma itself) may actually be relevant to the aetiology of some hallucinations with indirect content links to trauma.

Many studies that have examined content links between trauma and hallucinations have found (or at least commented on) the occurrence of hallucinations that are indirectly linked to the content of trauma in the manner described above (Corstens & Longden, 2013; Ivezic et al., 1999;
Mueser & Butler, 1987; Reiff et al., 2012). Anecdotal descriptions of hallucination content in some studies provide some examples of post-traumatic cognitions about the trauma being evident in hallucination content, e.g., in the previously described example of the ambulance driver (whose friend died in his ambulance on route to the hospital), self-blaming thoughts for his role in his friend’s death are present in the critical hallucinatory voices he heard (Ivezic et al., 1999). In this sense, the content of his hallucinations could be considered to be an alternative type of expression of these post-traumatic cognitions about the trauma.

3.6.2 Multiple PTSD-Related Processes Underpinning Different Types of Hallucinations Within Individuals

From the evidence reviewed above, it is possible that several different types of relationships between trauma and hallucination content can exist; 1) direct content relationships, where the content of hallucinations directly matches that of the trauma; 2) indirect content relationships, where the content of hallucinations is clearly related, but not identical to, that of the trauma; 3) thematic relationships, where the content of hallucinations is related to trauma at the level of broader schema-related emotional themes; and 4) no relationship. Hallucinations that fall into the first three categories will be referred to as ‘direct’, ‘indirect’ and ‘thematic’ hallucinations.

It is suggested here that the development of these types of hallucinations may proceed from symptoms, thoughts and beliefs that are known to occur in many individuals following traumatic experiences and that are explained by cognitive theories of PTSD. Ehlers and Clark’s (2000) model of PTSD suggests that two key processes explain the aetiology of PTSD. The first process concerns the nature of traumatic memories; the trauma memory is poorly elaborated and inadequately contextualised in time and place. The disrupted encoding and retrieval processes are proposed to
underlie the development of post-traumatic intrusions. The second process concerns the individual’s appraisal of the trauma and/or its sequelae. Ehlers and Clark (2000) suggest that those who develop PTSD fail to recover from traumatic events partially because they make idiosyncratic appraisals of the event that result in the perception of current, ongoing threat. It is proposed here that the first process (leading to intrusions) may be closely linked with the aetiology of direct hallucinations; that is, the relationship between trauma and direct hallucinations may be primarily driven by intrusive memories of trauma. The second process (concerning the appraisal of the trauma and/or its sequelae) is heavily influenced by post-traumatic cognitions that develop as a result of the trauma. It is proposed that post-traumatic cognitions about the trauma underlie the formation of indirect hallucinations. Similarly, maladaptive schemas that are formed as a result of the trauma are proposed to underlie the formation of thematic hallucinations. This is illustrated in Figure 3.1.
Figure 3.1. Diagram showing the proposed relationships of three types of hallucinations (those with direct, indirect and thematic content relationships with trauma) with symptoms of PTSD, based on Ehlers and Clark’s (2000) cognitive model of PTSD.

It is well established that in people who have experienced trauma, many of the characteristic symptoms, thoughts and beliefs that can develop after a traumatic experience can co-occur in a single individual. The major theories of PTSD (e.g., Ehlers & Clark, 2000; Foa & Riggs, 1993) have suggested that the individuals most likely to develop PTSD are those with the strongest negative appraisals of the trauma and/or its sequelae. These excessively negative
appraisals (post-traumatic cognitions) contribute to an ongoing sense of threat that the individual experiences, which in turn is accompanied by increased intrusive re-experiencing symptoms, arousal and negative emotions. The experience of intrusive memories themselves may be interpreted by an individual in such a way that further contributes to the ongoing sense of threat (i.e., a person may not identify these symptoms as a normal part of the recovery process and may interpret them as signs that they have been permanently detrimentally affected by the trauma, or as a threat to their mental or physical wellbeing (Ehlers & Clark, 2000; Foa & Riggs, 1993). These interpretations of intrusions often give rise to avoidance of stimuli associated with the trauma, which also acts to maintain a sense of threat (Ehlers & Clark, 2000). The co-occurrence of intrusions, post-traumatic cognitions and schemas have been empirically demonstrated; studies have shown that PTSD-related symptomatology (i.e., intrusions, avoidance and hyperarousal) are associated with experiencing more post-traumatic cognitions (Foa et al., 1999; Kaur & Kearney, 2015) and maladaptive schemas (Nixon, Resick, & Nishith, 2004; Price, 2007). It would therefore be expected that if these multiple post-traumatic processes do facilitate the development of hallucinations and their content, that different types of hallucination content (i.e., direct, indirect and thematic) would be observed within single individuals. It would also be expected that if certain hallucinations are underpinned by post-traumatic processes, hallucinations would co-occur with post-traumatic symptoms within individuals. For example, if direct hallucinations are in fact alternative forms of post-traumatic intrusions and are underpinned by similar cognitive mechanisms, it would be expected that direct hallucinations might co-occur alongside post-traumatic intrusions within individuals. Furthermore it might be expected that the content of post-traumatic intrusions would be related to that of hallucinations. This has not been investigated in any study to date.
In Hardy et al.’s (2005) sample, there was data supporting both of the major models of the aetiology of psychosis following trauma; the ‘intrusions’ model (evidenced by people with direct hallucinations) and the ‘schema/emotion’ model (evidenced by people with thematic links between their trauma and hallucinations). In Hardy et al.’s study, only the single most salient hallucination experienced by participants were analysed to determine the proportion of participants who experienced direct, thematic or no content relationships between their hallucinations and trauma. Expanding on this to examine not only the most salient but multiple hallucinations experienced by each participant (i.e., to determine for each individual whether they experience symptoms with direct, indirect, thematic, or no association with trauma content - or a combination of any/all of these possible associations) would provide more detailed evidence for the extent to which single individuals may be experiencing multiple post-traumatic processes that facilitate hallucinatory experiences.

3.7 Summary of Models and Evidence Pertaining to PTSD-Related Processes Underlying the Link Between Trauma and Hallucinations

In summary, the close associations between trauma, hallucinations and PTSD have led to the development of cognitive models of the aetiology of hallucinations from trauma. The ‘intrusions’ model conceptualises hallucinations and post-traumatic intrusions as extensions of the same phenomenon (Morrison, 2001; Morrison et al., 2003) while the ‘schema/emotion’ model suggests that the major route through which trauma impacts hallucinations are maladaptive schemas and emotional processes (Garety et al., 2001). These two models have not been thoroughly tested. Post-traumatic intrusions are implicated to some degree in both models (primarily the intrusions model), but their relationship with hallucinations is largely under-
researched. The few existing studies examining quantitative relationships between hallucinations and intrusions point towards a relationship in both clinical and non-clinical groups.

In terms of hallucination content, the intrusions model predicts direct/identical relationships between the content of hallucinations, traumatic experiences and post-traumatic intrusions. The schema/emotion model predicts hallucination content to be related to trauma at the level of broader schema-related themes. The few studies to date that have examined hallucination content in relation to trauma have all found at least some evidence for relationships (primarily thematic), however only one study has systematically distinguished between hallucination content directly or thematically related to traumatic experiences (Hardy et al., 2005). No previous studies have investigated the relationship between the content of hallucinations and the content of post-traumatic intrusions.

The finding that different types of content relationships can exist between hallucinations and trauma points towards the possibility that multiple post-traumatic processes may be underpinning the experience of hallucinations in people who have experienced trauma. Three types of content relationships between hallucinations and trauma are highlighted in this chapter - direct, indirect and thematic. These are proposed to be underpinned by different PTSD-related processes (post-traumatic intrusions, post-traumatic cognitions about the trauma, and maladaptive schemas respectively). The co-occurrence of direct, indirect and thematic relationships between trauma and hallucination content within individuals may be indicative of several of these different PTSD-related processes driving the development of hallucinations.
Chapter 4. Models and Evidence Pertaining to PTSD-Related Processes Underlying the Link Between Trauma and Delusions

Chapter 2 of this thesis concluded that there is evidence for associations between trauma, PTSD, hallucinations and delusions in people with psychosis. The two prominent models described in Chapter 3 outline pathways by which both hallucinations and delusions develop together as a result of trauma (Garety et al., 2001; Morrison, 2001; Morrison et al., 2003). These models and their supporting evidence were discussed in Chapter 3 with reference to the aetiology of hallucinations. In the current chapter, aspects of the models that pertain to the aetiology of delusions are highlighted in order to explore possible relationships between trauma symptoms and delusions. Studies investigating the relationship between delusions, post-traumatic intrusions and maladaptive schemas are then reviewed, as well as studies that have investigated the content of delusions in relation to traumatic experiences.

4.1 Models of Trauma and Delusions

The two major models outlined in Chapter 3 include accounts of the aetiology of both hallucinations and delusions from trauma (Garety et al., 2001; Morrison, 2001; Morrison et al., 2003). Both models implicate post-traumatic intrusions and maladaptive schemas in the aetiology of delusions. The first model emphasises the role of post-traumatic intrusions, and conceptualises positive psychotic symptoms as intrusions into awareness that are often phenomenologically identical to the post-traumatic intrusions characteristic of PTSD (Morrison, 2001; Morrison et al., 2003). Similar qualities between psychotic symptoms and post-traumatic intrusions are highlighted in the model, e.g., both hallucinations and post-traumatic flashbacks being intrusive...
sensory experiences happening in the here and now, and usually associated with fear and threat. This model proposes that delusional beliefs (particularly paranoia and suspicion about others) begin as a way to cope with distressing post-traumatic intrusions and as a means of protecting the self against the possibility of further trauma/abuse. The model emphasises the involuntary, intrusive nature of delusional thoughts, and proposes that trauma-related faulty self and social knowledge (e.g., beliefs about the self as vulnerable, others as untrustworthy/hostile and the world as dangerous) are facilitators of paranoid interpretations of ambiguous experiences and events. Aspects of this model overlap with models of anxiety disorders (e.g., Wells & Matthews, 1994) and cognitive models of PTSD (Ehlers & Clark, 2000) in that a person’s maladaptive interpretations of intrusive thoughts/images/memories are seen key factors maintaining their current symptoms. The key difference between psychotic disorders and PTSD is proposed to be the nature of these interpretations; interpretations of intrusions as representations of prior trauma would result in a diagnosis of PTSD, while culturally unacceptable interpretations of intrusions lead to a psychosis diagnosis (Morrison et al., 2003).

The second model described in Chapter 3 emphasises the role of maladaptive schemas and negative emotion in the aetiology of psychosis from trauma (Garety et al., 2001). Based on this model, Freeman, Garety, Kuipers, Fowler and Bebbington (2002) outlined a specific model of the mechanisms by which trauma may facilitate the development of persecutory delusions. This model proposes three major processes resulting from a precipitating event that are key to the aetiology of persecutory delusions: 1) the experience of internal ‘anomalous experiences’ (e.g., intrusions from memory, perceptual anomalies, racing thoughts, thoughts experienced as voices), 2) maladaptive schema-based beliefs about the self, others and the world, and the negative emotions associated with these beliefs (primarily anxiety), and 3) cognitive biases typically associated with psychosis
(e.g., jumping to conclusions, an external attribution bias, and a theory of mind dysfunction associated with misreading the intentions of others). The second and third processes (schema/emotional processes and cognitive biases) are proposed to also contribute to the intensity of the anomalous internal experiences and increased arousal. An individual’s delusional beliefs are formed in the process of their search for an explanation for these anomalous experiences, and their heightened state of arousal contributes to the incorporation of external events into this search for explanation and meaning. Pre-existing trauma-related negative beliefs about the self as vulnerable and others as hostile, as well as pre-existing anxiety (the cognitive element of which is an impending sense of threat) increase the likelihood of the formation of persecutory beliefs. The anxiety-related sense of ongoing threat, as well as the negative beliefs about the self and others are proposed to drive the delusional content, which takes on persecutory themes.

There is considerable overlap between these two models in terms of the proposed mechanisms involved in the pathway leading from trauma to delusions. Both suggest that commonly experienced post-traumatic processes such as intrusions, anxiety, arousal, and maladaptive cognitions about the self, others and the world all play an important role. Both models also suggest that trauma-related beliefs about the self and others are facilitators of delusional explanations of internal experiences and external events. The primary difference between the models relates to the specific processes conceptualised as the key drivers of the pathway to delusions. The first model gives prominence to post-traumatic intrusions as the crucial symptom to which delusional interpretations are applied (Morrison et al., 2003). The second model suggests that trauma-related schemas and emotion are the primary facilitators of the development of delusional interpretations of internal anomalous experiences (Garety et al., 2001; Freeman et al., 2002). In the second model, intrusive processes resulting from earlier adversity may play a role in
predisposing an individual to later anomalous experiences, but are not necessary for the process and do not directly lead to the development of delusions (Garety et al., 2001).

4.2 Delusions and Post-Traumatic Intrusions

4.2.1 Overview of Studies Investigating Delusions and Post-Traumatic Intrusions

Intrusions

Both models discussed above include intrusive experiences as one of the mechanisms in the pathway leading from trauma to delusions. The first model suggests that post-traumatic intrusions play a central role in delusion development, and conceptualises post-traumatic intrusions as interchangeable with hallucinations (Morrison, 2001; Morrison et al., 2003). The second model proposes that in predisposed individuals, a triggering event leads to a basic cognitive disturbance which may include intrusive memories, and that these intrusions play a role in precipitating the anomalous experiences to which schema-driven delusional interpretations are then applied (Garety et al., 2001). Despite the fact that intrusions play a role in both models (and are the predominant mechanism in Morrison’s model), the relationship between delusions and post-traumatic intrusions has not been adequately tested. Six studies to date have investigated the relationship between delusions and intrusions, and are shown in Table 4.1 (Alsawy et al., 2015; Bendall et al., 2013; Gracie et al., 2007; Lysaker & LaRocco, 2008; Morrison et al., 2002; Schulze, Freeman, Green, & Kuipers, 2013). Anxiety is also a key element for delusion development in both models, and proponents of these models have drawn attention to the role of intrusive mental images that are commonly accepted as maintaining factors in
<table>
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<th>Author (Year)</th>
<th>Sample</th>
<th>Age in Years Mean (SD)</th>
<th>Gender (% female)</th>
<th>Trauma (Measure)</th>
<th>Intrusions (Measure)</th>
<th>Delusions (Measure)</th>
<th>Key Results</th>
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| Alsawy et al. (2015)  | 7403 adults from Adult Psychiatric Morbidity Survey (UK)    | 16 years and older     | 57%               | Trauma present/absent (SCID-IV Checklist) | Post-traumatic intrusions (TSQ) | Paranoia (PSQ)      | - Post-traumatic intrusions (particularly intrusive bodily reactions) were associated with greater odds of paranoia.  
- Dose-response relationship was found |
| Bendall et al. (2013) | 13 patients with first episode psychosis and childhood sexual abuse | 20.6 (3.1)             | 54%               | Childhood sexual abuse (CTQ)      | Post-traumatic intrusions (IES) | Any delusions (PANSS) | - Post-traumatic intrusions correlated with delusions                                                                                     |
| Schulze et al. (2013) | 40 patients with persecutory delusions                      | 41.1 (10.3)            | 38%               | Trauma not assessed              | Intrusive images (Authors’ interview) | Persecutory delusions were selection criteria (PANSS, PSYRATS, GPTS)            | - 73% experienced intrusive images  
- 61% of those with intrusions related them to memories of life events  
- 75% of life events reported were rated as traumatic                                                                                     |
| Lysaker & LaRocco (2008) | 68 patients with schizophrenia spectrum disorders          | 48.4 (7.9)             | 16%               | Any trauma over the lifetime (TAA) | Post-traumatic intrusions (TSI) | Any delusions (PANSS) | - Post-traumatic intrusions correlated with delusions                                                                                     |
| Gracie et al. (2007)  | 228 students (non-clinical)                                 | 28.9 (8.7)             | 71%               | Any trauma over the lifetime (TLEQ) | Post-traumatic intrusions (SRS-PTSD) | Paranoia (PS)   | - Post-traumatic intrusions correlated with paranoia  
- Post-traumatic intrusions were not a predictor of paranoia in multiple regression                                                      |
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<th>Author (Year)</th>
<th>Sample</th>
<th>Age in Years Mean (SD)</th>
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<th>Intrusions (Measure)</th>
<th>Delusions (Measure)</th>
<th>Key Results</th>
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| Morrison et al. (2002) | 35 patients with schizophrenia spectrum disorders engaged in cognitive therapy | 33.7 (10.2)            | 34%               | Trauma not assessed | Intrusive images (Authors’ interview) | Assessed for any delusions (Authors’ interview) | • 74% experienced intrusive images  
• 54% of those with intrusive images had delusions  
• 57% of those with intrusions and delusions related their intrusions to memories of life events |

*Note: 1 = Structured Clinical Interview for DSM-IV, non-patient version; 2 = Trauma Screening Questionnaire; 3 = Psychosis Screening Questionnaire; 4 = Childhood Trauma Questionnaire; 5 = Impact of Events Scale; 6 = Positive and Negative Syndrome Scale; 7 = Psychotic Symptom Rating Scales; 8 = Green et al. Paranoid Thoughts Scale; 9 = Trauma Assessment for Adults; 10 = Trauma Symptom Inventory; 11 = Traumatic Life Events Questionnaire; 12 = Self-Report Scale - PTSD; 13 = Paranoia Scale.*
many anxiety disorders (Freeman et al., 2002; Morrison, 2001; Morrison et al., 2003). This has led to explorations of the prevalence and content of intrusive images (not necessarily post-traumatic) in patients with delusions in two studies (Morrison et al., 2002; Schulze et al., 2013). The four other studies investigated quantitative relationships between post-traumatic intrusions and delusional severity (Alsawy et al., 2015; Bendall et al., 2013; Gracie et al., 2007; Lysaker & LaRocco, 2008).

4.2.2 Studies Investigating Delusions and Intrusion Content

Two studies in Table 4.1 investigated intrusion content in people with delusions (although these intrusions were not necessarily post-traumatic) (Morrison et al., 2002; Schulze et al., 2013). Schulze et al. interviewed 40 patients with persecutory delusions and obtained information about the content of recurrent intrusive images that participants felt were related to persecutory beliefs, and any memories of life events that they associated with these images. It was found that 73% of the sample experienced paranoia-related intrusive images, and 61% of those experiencing intrusive images related their images to previous life events. Seventy-five percent of these life events were rated by the interviewer as involving actual or perceived threat, harm or humiliation towards the participant. (It was not explicitly stated in this study whether or not the events associated with memories and intrusive images occurred prior to or after the onset of psychosis.) Participants were asked to rate the levels of anxiety associated with their intrusive images. It was found that image anxiety was related to delusional distress, but not to delusional conviction. When participants were divided into groups with and without intrusive images, there was no difference in severity of delusions, but the group with intrusive images experienced higher levels of distress associated with
their persecutory beliefs. While it was not part of the authors’ research aim to investigate content relationships between intrusions and delusions, they reported brief content descriptions for the intrusions, delusions, and associated memories (where present) for each of their participants. Of the subset of 16 participants who had intrusions that they related to memories of previous life events, 14 had delusions that were clearly related in content to their intrusive images. For example, one participant had intrusive images of being “at the devil’s house; there is a naked woman and an evil eye above the door”. This participant related their intrusive image to a memory of people believing them to be possessed at age eight and being subject to a frightening ceremony to exorcise the devil. Their persecutory delusions included beliefs that people related to the devil were intending to poison them. The findings of this study may lend support for both models of trauma and delusions discussed in section 4.1. Most participants experienced intrusive images, supporting Morrison’s (2001) model for the role of intrusions in the development of delusions. The observation that the content of participants’ intrusive images often had similar themes to their delusions may indicate a role for maladaptive schemas, and the finding that image-related anxiety was associated with delusional distress suggests an important role for emotion in delusion development. This supports Freeman et al.’s (2002) model emphasising the role of schemas and emotion in the aetiology of delusions.

Morrison et al. (2002) (described in Chapter 3, section 3.2.2) investigated the content and meaning of intrusive images in 35 patients experiencing hallucinations and/or delusions who were in the course of cognitive therapy. They found that 26 (74%) of their participants experienced intrusive images alongside their hallucinations and/or delusions, and that of these 26, 71% were able to relate their images to memories of past events. Fourteen (54%) of the 26 patients with intrusive images experienced delusions (primarily persecutory), and of these, eight (57%) related
their intrusive images to memories of past events. The authors likened these intrusive images to PTSD re-experiencing symptoms. The content of participants’ hallucinations and delusions were not reported in this study. In both Morrison et al. (2002) and Schulze et al.’s (2013) studies the interviewers asked participants to describe intrusions that they felt were related to their psychotic symptoms; they therefore may not have captured other intrusions that participants could have experienced but not considered to be connected to their hallucinations or delusions.

4.2.3 Empirical Studies Investigating Delusions and Post-Traumatic Intrusions

The four studies in Table 4.1 that investigated quantitative relationships between post-traumatic intrusions and delusional severity all found at least some evidence for a relationship (Alsawy et al., 2015; Bendall et al., 2013; Gracie et al., 2007; Lysaker & LaRocco, 2008). These studies were described in Chapter 3 (section 3.2.2), with reference to their results pertaining to hallucinations. Lysaker and LaRocco (2008) investigated the relationship between a range of trauma-related symptoms (defensive avoidance, intrusive re-experiencing, dissociation, anxious arousal and anger/irritability) and hallucination and delusion severity in 68 patients with schizophrenia spectrum disorders who all had reported at least one significant lifetime traumatic event (as part of the selection criteria). They found that intrusive re-experiencing symptoms were correlated with delusions but not with hallucinations. Similarly, in Bendall et al.’s (2013) investigation of the role of post-traumatic intrusions and selective attention bias towards trauma-related stimuli in first episode psychosis patients with childhood sexual abuse, it was found that post-traumatic intrusions were significantly correlated with delusions, and correlated with hallucinations at trend levels. Gracie (2007) investigated the relationship between trauma and predisposition to paranoia and hallucinations in a non-clinical sample of 228 students. They found
that post-traumatic re-experiencing symptoms were correlated with both paranoia and hallucinations, but in subsequent multiple regressions (in which comorbidity of hallucinations and delusions were controlled for), re-experiencing symptoms were only independently associated with hallucinations; negative schematic beliefs about the self and others were the strongest independent predictors of paranoia. In Alsawy et al.’s (2005) large population study (also described in Chapter 3, section 3.2.2), associations between psychotic experiences (auditory hallucinations and paranoia) and PTSD symptoms (post-traumatic intrusions and hyperarousal) were investigated. Both post-traumatic intrusions and hyperarousal were found to be associated with greater odds of experiencing paranoid delusions. Analyses of the different types of intrusions showed that only intrusive bodily reactions were associated with paranoia, but upsetting memories, upsetting dreams, feeling the event is happening again, and upsetting reminders of trauma were not. The relationship between paranoia and hyperarousal was stronger than the relationship between paranoia and post-traumatic intrusions, and it may be that the ‘intrusive bodily reactions’ associated with paranoia correspond more to hyperarousal than to the other post-traumatic intrusions, which are more cognitive in nature. However, a clear dose-response relationship was found between post-traumatic intrusions and paranoia; the greater the number of intrusion types experienced, the greater the odds of having paranoid delusions.

Two studies found no evidence for a relationship between post-traumatic intrusions and positive psychotic symptoms (Resnick et al., 2003; Schafer et al., 2011). Resnick et al. (2003) did not find a relationship between positive symptoms (hallucinations and delusions analysed together) and post-traumatic intrusions in patients with schizophrenia, and Schafer et al. (2011) found that positive symptoms (hallucinations, delusions and thought disorder together) were negatively correlated with intrusions in people with first episode psychosis. As neither of these studies
analysed hallucinations and delusions separately, it was not possible to determine whether there was a specific relationship between delusions and post-traumatic intrusions. Kilcommons and Morrison (2005) found that hallucinations but not delusions were related to post-traumatic symptoms (intrusions, avoidance and hyperarousal analysed together) in their sample of patients with schizophrenia spectrum disorders. Again the combination of different symptoms into a single variable makes relationships between specific psychotic symptoms and post-traumatic symptoms unable to be determined.

4.2.4 Summary of Studies Investigating Delusions and Intrusions

There are very few studies that have investigated the relationship between delusions and post-traumatic intrusions. All six studies that analysed both delusions and intrusions as individual variables found at least some evidence for a relationship (Alsawy et al., 2015; Bendall et al., 2013; Gracie et al., 2007; Lysaker & LaRocco, 2008; Morrison et al., 2002; Schulze et al., 2013). The four studies that investigated quantitative relationships between delusion severity and post-traumatic intrusion severity all found relationships (Alsawy et al., 2015; Bendall et al., 2013; Gracie et al., 2007; Lysaker & LaRocco, 2008), which may support Morrison et al.’s (2003) model emphasising the role of post-traumatic intrusions in delusion development. However, the two studies that performed regression analyses found that negative beliefs about the self and others (Gracie et al., 2007) and hyperarousal (Alsawy et al., 2015) were more strongly related to paranoia than post-traumatic intrusions were, which may lend support for models proposing schemas and emotional processes as the primary mechanisms (Garety et al., 2001; Freeman et al., 2002). The two studies that examined the prevalence and content of intrusive images in people with delusions found that the majority of their participants experienced intrusions, and the intrusions described
by participants were related to previous (usually traumatic) life events (Morrison et al., 2002; Schulze et al., 2013). However, these studies were not explicitly investigating intrusions that were post-traumatic, and did not determine whether the previous life events associated with the intrusions occurred prior to the onset of psychosis. Consideration of the potential for publication bias is also important here, as null results may have been less likely to be published. Some studies found no relationship between hallucinations, delusions and post-traumatic intrusions (but these studies either analysed hallucinations and delusions together as one variable, or analysed several post-traumatic symptoms together) (Kilcommons & Morrison, 2005; Resnick et al., 2003; Schafer et al., 2011). The majority of studies also did not investigate how delusions and intrusions were related independently of hallucinations. Overall, the relationship between delusions and post-traumatic intrusions has not been thoroughly tested. Only one study to date has explored the content of delusions in relation to intrusions (Schulze et al., 2013), but no studies have examined content relationships between delusions and post-traumatic intrusions specifically.

4.3 Delusions and Maladaptive Schemas

Recent research has drawn attention to the potential specificity of relationships between types of traumatic experiences, cognitive mechanisms, and individual psychotic symptoms (Bentall et al., 2014; Hardy et al., 2016). The role of maladaptive schemas and emotion as a specific mechanism in the development of delusions from trauma is receiving increasing support, with several studies finding clear relationships between trauma, delusions and negative beliefs about the self and others (e.g., Gracie et al., 2007; Hardy et al., 2016). Gracie et al. (2007) (described above in section 4.2.3) found in their non-clinical sample that maladaptive schemas about the self and others, as well as number of traumatic events, perceptual anomalies and hallucinations, were
independently associated with delusions (but post-traumatic intrusions, avoidance and hyperarousal were not). In Hardy et al.’s (2016) large clinical study with psychosis patients, childhood emotional abuse was found to be specifically associated with persecutory (OR = 2.21) and referential (OR = 2.43) delusions. Negative-other beliefs mediated the relationship between childhood emotional abuse and persecutory delusions (but post-traumatic stress symptoms, negative-self beliefs and depression did not). Kesting and Lincoln (2013) reviewed 52 studies that investigated self-esteem and self-schemas in relation to persecutory delusions. They found that both clinical and non-clinical studies reported consistent findings of low global self-esteem, and negative schemas pertaining specifically to the self in people with persecutory delusions. It was also consistently found that low self-esteem and negative self-schemas were related to perceived deservedness of persecution.

Both of the models discussed above implicate maladaptive schemas in delusion development in people with trauma, though to differing degrees. This, as well as the two models’ implications for the content of delusions, is further discussed in section 4.4 below.

4.4 Trauma and the Content of Delusions

Both of the models discussed above suggest that post-traumatic processes (either intrusive or schema-based) are the key pathways though which trauma confers a risk for delusions. Both have implications for predicting at least some aspects of the content of delusions in people who have experienced trauma. The post-traumatic intrusions central to Morrison et al.’s (2003) model (flashbacks, intrusive thoughts and memories of the trauma) are by definition related in content to the person’s traumatic experiences. As this model conceptualises delusions as beliefs formed as a means of coping with these trauma-specific intrusions, it might be expected that the content of
these beliefs would be related to the person’s traumatic experiences. Similarly, the anomalous experiences, maladaptive schemas, anxiety and other negative emotion central to Freeman et al.’s (2002) model of delusions are proposed to result from traumatic experiences; in terms of content, it would be expected that similar emotional and schema-related themes would exist between a person’s trauma and subsequent delusional beliefs.

Most of the research that has investigated the content of psychotic symptoms in relation to trauma has focused on hallucinations; there has been very little examination of delusions. Only three studies to date have specifically measured and reported on delusion content and its relationship to previous traumatic experiences (Beck & van der Kolk, 1987; Raune et al., 2006; Read & Argyle, 1999). All three of these studies found relationships between trauma and delusion content. Raune et al. (2006) (described in Chapter 3, section 3.3) used structured interviews with a sample of 41 first episode psychosis patients to investigate attributes of hallucinations and delusions in relation to trauma. They measured trauma attributes of threat, loss, danger, humiliation, intrusiveness, self-esteem, and measured hallucination and delusion attributes as being persecutory, depressive or grandiose. They found that intrusive trauma was associated with persecutory delusions, danger-related trauma was associated with depressive delusions, and loss-themed trauma was negatively associated with grandiose delusions. As mentioned in Chapter 3, this study was not specifically designed to detect content similarities between trauma and psychotic symptoms, and while some content similarities may be able to be inferred (e.g., intrusive traumas possibly influencing intrusive themes present in many persecutory delusions), delusions and traumas were measured on different attributes, allowing limited comparisons to be made between delusion content and trauma in terms of similarities. In Beck and van der Kolk’s (1987) study of chronically institutionalised women with psychotic disorders, a combination of chart review and
interviews with clinical staff were used to obtain information about the content of patients’ delusions. Of their 26 participants, 12 had experienced childhood incest. Five of these 12 patients had delusions with sexual content, compared with none of the 11 patients who had not experienced incest. One example relating to symptom content that was given in this study was a patient from the incest group experiencing ongoing delusions of having sexual relations with public figures. There was no comment made by the authors as to what extent any of the delusional content might have been direct representations of actual incest-related events experienced previously and how much involved novel content with sexual themes. Read and Argyle (1999) used chart reviews to assess content of trauma, hallucinations and delusions of 22 psychiatric inpatients with histories of sexual abuse, 17 of whom reported experiencing hallucinations, delusions or thought disorder. It was found that of five reported instances of delusions recorded in patient charts, three contained content that was thematically related to the person’s trauma. Both of these studies that used chart reviews had several methodological limitations (acknowledged by the authors); they primarily relied on clinicians’ incidental reports on content in patient charts, and also relied on the researchers’ informal judgments in assessing content links (rather than using a clearly defined framework for what constituted a content relationship between trauma and delusions) (Beck & van der Kolk, 1987; Read & Argyle, 1999).

Three other studies have investigated both hallucination and delusion content in groups with psychotic symptoms, two with clinical samples (Read et al., 2003; Reiff et al., 2012) and one sub-clinical (Thompson et al., 2010), but these three studies reported on overall psychotic symptom content in relation to trauma or abuse rather than reporting on hallucinations and delusions separately. These studies all found relationships between trauma and overall psychotic symptom content. Reiff et al.’s study (described in Chapter 3, section 3.3) found that two thirds of
participants with trauma had some level of indirect correspondence between their traumatic experiences and psychotic symptom content (e.g., childhood experience of rape corresponding with adult psychotic symptom content including being held against one’s will, experiencing others as threatening) and more than half of those with trauma had themes of ‘being hurt’, ‘forceful’ or ‘threatened’ in both trauma and psychotic symptom content. Read et al.’s (2003) study reviewing medical records found that sexual content in psychotic symptoms was seven times more likely to be found in those with combined child sexual and physical abuse compared to those without abuse. (However participants in this study had a range of psychiatric diagnoses, and only 20% of the sample had psychotic disorders). Thompson et al. (2010) found that in people at ‘ultra high risk’ for developing psychosis, having attenuated psychotic symptoms with sexual content was related to previous sexual trauma (OR = 7.17).

One other study in which sexual content of hallucinations and delusions were recorded in a sample of psychotic inpatients found that those who had been victims of child abuse (sexual and/or physical) were no more likely to experience sexual delusions than those who had not experienced child abuse (Goff, Brotman, Kindlon, Waites, & Amico, 1991).

Overall, the paucity of studies examining delusion content and its relationship to previous traumatic experiences (and the significant methodological limitations in the few existing studies) make it difficult to assess whether theories of trauma and delusions are supported. However the findings of the three main studies to date all contain some evidence for a content relationship between trauma and delusions (Beck & van der Kolk, 1987; Raune et al., 2006; Read & Argyle, 1999).
4.5 Summary of Models and Evidence Pertaining to PTSD-Related Processes

Underlying the Link Between Trauma and Delusions

Models of the aetiology of delusions from trauma implicate both post-traumatic intrusive processes as well as negative schemas and emotion as two driving mechanisms (Morrison, 2001; Morrison et al., 2003; Freeman et al., 2002; Garety et al., 2001). Models advocating post-traumatic intrusions as a primary mechanism would be supported by findings of quantitative relationships between post-traumatic intrusions and delusions. As delusions and hallucinations frequently co-occur, and post-traumatic intrusions are more heavily implicated in the aetiology of hallucinations, it is important to establish quantitative relationships between delusions and intrusions independent of hallucinations. Both models of trauma and delusions advocate a relationship between post-traumatic intrusions and delusions that is less direct than the proposed relationship between post-traumatic intrusions and hallucinations. Literature reviews in the current chapter point towards evidence for intrusions and also maladaptive schemas in the aetiology of delusions. Both major models of trauma and delusions have implications for the content of delusions in relation to trauma, and would predict thematic similarities between traumatic experiences and delusion content. Very few studies have specifically investigated the relationship between trauma and the content of delusions; exploring this relationship is important in order to further understand the impact of trauma on delusions.
Chapter 5. Trauma, Avoidance and the Aetiology of Psychosis

In addition to the potential role of the intrusive symptoms of PTSD in the aetiology of psychosis, avoidance symptoms of PTSD may also be a key factor. Cognitive theories of PTSD suggest that intrusive symptoms of PTSD, combined with an ongoing sense of threat, lead an individual to engage in a variety of strategies (primarily avoidant strategies) aimed at reducing their perceived threat and distress (Ehlers & Clark, 2000). These avoidant strategies range from internal/mental strategies such as thought suppression, to external/behavioural strategies such as substance use and social avoidance. Temporally, in people with psychosis who have experienced trauma, post-traumatic intrusions may occur first, followed by avoidant thinking and behaviour, and subsequently the development of hallucinations and/or delusions.

While the focus of the current chapter is on the potential role of PTSD avoidance symptoms, it is important to note that other responses to trauma (e.g., dissociation, and also threat-biased information processing driven by hyperarousal) may also be important factors contributing to the development of psychotic symptoms. There is some overlap between the constructs of avoidance and dissociation – in the DSM-IV avoidance criterion mild dissociative symptoms (e.g., feelings of detachment or estrangement from others) are included. The reformulation of the PTSD diagnostic categories in DSM-5 is such that the avoidance cluster now reflects more active avoidant processes, and more passive, automatic avoidance (i.e., dissociation) is categorised as numbing experiences under the ‘negative alterations to cognitions and mood’ criterion.

There is currently very little research specifically examining the relationship between post-traumatic avoidance and positive psychotic symptoms. Most studies investigating psychosis and avoidance have been conducted relatively recently and have primarily focused on experiential
avoidance (Goldstone, Farhall, & Ong 2012; 2011a & b; Langer, Cangas, Perez-Moreno, Carmona, & Gallego, 2010; Udachina et al., 2009; Varese, Udachina, Myin-Germeyns, Oorschot, & Bentall, 2011).

5.1 Experiential Avoidance

Experiential avoidance has been the focus of much of the recent research on avoidance and psychopathology. Experiential avoidance is defined as the “phenomenon that occurs when a person is unwilling to remain in contact with particular private experiences and takes steps to alter the form or frequency of these events and the contexts that occasion them” (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996). It has been conceptualised as ‘psychological inflexibility’ and can be seen as a process involving excessive negative evaluations of thoughts, emotions and sensations, where an individual makes deliberate effort to control or escape these experiences. Recent studies have shown an association between experiential avoidance and a variety of psychopathology including the development and maintenance of anxiety disorders (Begotka, Woods, & Wetterneck, 2004; Hayes, Luoma, Bond, Masuda, & Lillis, 2006) and depression (Cribb, Moulds, & Carter, 2006). Experiential avoidance can be manifested in several ways, for example, detachment from the situation or inhibited emotional expression (Kashdan, Barrios, Forsyth, & Seger, 2006). Several factors are proposed to account for its adverse effects. It is suggested that it is used relatively inflexibly (at the expense of a wider range of coping strategies), and to require considerable cognitive resources, where large amounts of time, effort and energy are expended in order to control or struggle with unpleasant internal experiences (Gross, 2002; Kashdan et al., 2006). It has also been suggested that experiential avoidance interferes with reappraisals of
maladaptive thought patterns and schema, thereby maintaining the distorted beliefs that can contribute to psychopathology (Hayes et al., 1996; Hayes, Strosahl, & Wilson, 1999).

Hayes et al. (1996) have proposed several different pathways by which experiential avoidance might functionally impact psychopathology. One possible pathway is that deliberate efforts to avoid certain internal experiences can paradoxically make the unwanted experiences more accessible. For example, the thought ‘I will not think about using heroin today’ includes the specific to-be-avoided thought about heroin. As deliberate avoidant strategies are often verbal and involve attention being directed towards the unwanted experience, the experience may inadvertently become more salient and may negatively affect other thoughts and behaviours (Gross, 2002; Wenzlaff & Wegner, 2000).

A second possible pathway for the effect of experiential avoidance on psychopathology centres on the idea that deliberate, verbal avoidant strategies may be ineffective at controlling or reducing unpleasant internal experiences, because these internal experiences may be more akin to non-verbal, classically conditioned fear responses. Verbal control strategies, underpinned by activity in cortical areas of the brain, may not be successful in influencing classically conditioned processes that have their basis in subcortical regions. It has been shown that higher cortical areas involved in verbal processing are not necessary for the formation of classically conditioned fear, and there are more neuronal projections going from subcortical areas to the cortex compared with those going from the cortex to the subcortex (Le Doux, 1996).

A third possible pathway is that even if avoidant strategies are effective, they often result in secondary problems that in turn will impact psychopathology, for example, problems related to periods of social isolation in socially phobic individuals, or an inability to adapt to newly occurring challenges during the course of one’s life.
5.2 Experiential Avoidance and PTSD

There are several studies that have investigated experiential avoidance as a potential mediator in the relationship between trauma exposure and PTSD symptoms. Previous research has found a relationship between PTSD symptoms and experiential avoidance (Marx & Sloan, 2002, 2005; Plumb, Orsillo, & Luterek, 2004) as well as evidence that experiential avoidance mediates the relationship between traumatic exposure and PTSD symptoms in sexual assault survivors (Merwin, Rosenthal, & Coffey, 2009), children subject to maltreatment (Shenk, Putnam, & Noll, 2012), and victims of interpersonal violence (Orcutt, Pickett, & Pope, 2005). Experiential avoidance has been shown to be associated with all three PTSD symptom clusters (Shenk et al., 2012).

Four studies have investigated experiential avoidance as a predictor of PTSD symptom severity (Boeschen, Koss, Figueredo, & Coan, 2001; Orcutt et al., 2005; Plumb et al., 2004; Tull, Gratz, Salters, & Roemer, 2004). Two of these studies found experiential avoidance to be a predictor of PTSD symptomatology (Orcutt et al., 2005; Plumb et al., 2004) and two did not (Boeschen et al., 2001; Tull et al., 2004). Orcutt et al. assessed the response styles (experientially avoidant or forgiving) of 229 undergraduate students who reported experiencing a past interpersonal trauma. They found that both response styles partially mediated the relationship between interpersonal trauma and PTSD (a forgiving style was negatively related to PTSD symptoms and an experientially avoidant style was positively related). Plumb et al. (2004) assessed post-trauma functioning in three samples: 1) undergraduates who had experienced a stressful life event, 2) undergraduates who had experienced a significant traumatic event according to the DSM-IV PTSD criterion, and 3) combat veterans with PTSD. Experiential avoidance predicted PTSD.
symptom severity in the second and third samples, over and above the severity of trauma exposure. However experiential avoidance accounted for more of the unique variance in depression and general psychological distress than in PTSD symptom severity. This is somewhat in line with Tull et al.’s (2004) finding that experiential avoidance predicted the general psychiatric symptoms of depression, anxiety and somatisation (but did not predict PTSD symptom severity) in their sample of women exposed to multiple traumas. Boeschen et al. (2001) assessed experiential avoidance qualitatively in rape victims, based on participants’ descriptions of the rape. Blocking of thoughts and memories about the rape and rationalisation of the rape were used as indicators of experiential avoidance. Participants’ narratives and responses to questions about the meaning of their experience of rape were coded for either the presence or absence of avoidance, and it was found that experiential avoidance was not a significant predictor of PTSD. However, as Chawla and Ostafin (2007) point out in their review, it is difficult to draw conclusions about the results of this particular study due to the absence of data pertaining to the validity of this measure of experiential avoidance.

Overall, the majority of these studies demonstrate a relationship between experiential avoidance and PTSD symptomatology. All of the studies discussed above are cross-sectional in design and therefore do not allow for the determination of causal directions. The studies that have investigated the mediational role of experiential avoidance have conceptualised a causal pathway in which initial trauma leads to experiential avoidance, which in turn leads to the development of PTSD symptomatology. This involves the assumption that following trauma, experiential avoidance precedes PTSD symptoms (including post-traumatic avoidance), or that experiential avoidance is a pre-existing risk factor for PTSD development. However, it may be the case that following trauma, a person initially avoids trauma-specific thoughts and stimuli, and this post-
traumatic avoidance later evolves into avoidance that is applied more generally to a broader range of aversive internal experiences. That is, the causal pathway may be one that begins with trauma, leads to post-traumatic avoidance and then subsequently to experiential avoidance. Prospective studies that have investigated the role of experiential avoidance in PTSD have also held the assumption that PTSD symptomatology (including post-traumatic avoidance) is impacted by prior levels of experiential avoidance. For example, Marx and Sloan (2005) showed that greater experiential avoidance at initial assessment predicted PTSD symptom severity at assessments four and eight weeks later, even after controlling for initial PTSD symptom severity. However they did not analyse or report on whether initial levels of post-traumatic avoidance may have predicted experiential avoidance at later assessments. Given that the onset of PTSD symptoms commonly occurs soon (or immediately) after the experience of trauma, it may be that trauma-specific avoidance occurs prior to general experiential avoidance, and is an important factor impacting the development of further psychopathology.

5.3 Avoidance and the Positive Symptoms of Psychosis

5.3.1 Literature Review: Avoidance, Hallucinations and Delusions

There are few studies that have specifically examined the relationship between avoidance and psychotic symptoms. Studies in which the association between avoidance and the positive symptoms of psychosis were investigated are shown in Table 5.1. Most of these studies focus on experiential avoidance. Of the ten studies in total, six examined the relationship between avoidance and hallucinations (Andrew, Gray, & Snowden, 2008; Goldstone et al., 2012; Hardy et al., 2016; Langer et al., 2010; Lysaker & LaRocco, 2008; Varese et al., 2011), four examined the relationship between avoidance and delusions (Goldstone et al., 2011a & b; Lysaker & LaRocco 2008;
Table 5.1
*Studies Examining the Relationship Between Avoidance and Positive Psychotic Symptoms*

<table>
<thead>
<tr>
<th>Author (Year)</th>
<th>Sample</th>
<th>Trauma Assessed?</th>
<th>Psychotic Symptoms Assessed in Relation to Avoidance (Measure)</th>
<th>Type of Avoidance (Measure)</th>
<th>Association Between Psychotic Symptoms and Avoidance?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardy et al. (2016)</td>
<td>228 people with relapsing psychosis</td>
<td>Yes</td>
<td>Auditory Hallucinations (SAPS)</td>
<td>Post-Traumatic Avoidance (SRS-PTSD)</td>
<td>Yes</td>
</tr>
<tr>
<td>Goldstone et al. (2012)</td>
<td>233 (100 clinical psychosis patients and 133 non-clinical)</td>
<td>Yes</td>
<td>Hallucinations (general) and Auditory Hallucinations (LSHS-R)</td>
<td>Experiential Avoidance (AAQ)</td>
<td>Yes</td>
</tr>
<tr>
<td>Goldstone et al. (2011a &amp; b)</td>
<td>233 (100 clinical psychosis patients and 133 non-clinical)</td>
<td>Yes</td>
<td>Delusions (PDI)</td>
<td>Experiential Avoidance (AAQ)</td>
<td>Yes</td>
</tr>
<tr>
<td>Lin et al. (2011)</td>
<td>813 adolescents (non-clinical)</td>
<td>No</td>
<td>Subclinical positive psychotic experiences (CAPE)</td>
<td>Avoidance-Focused Coping (CISS)</td>
<td>No</td>
</tr>
<tr>
<td>Varese et al. (2011)</td>
<td>65 (42 patients with schizophrenia, 23 healthy controls)</td>
<td>No</td>
<td>Auditory Verbal Hallucinations (PANSS) and Paranoia</td>
<td>Experiential Avoidance (AAQ)</td>
<td>Yes</td>
</tr>
<tr>
<td>Langer et al. (2010)</td>
<td>265 students (non-clinical)</td>
<td>No</td>
<td>Auditory and visual hallucination-like experiences (RHS)</td>
<td>Experiential Avoidance (AAQ)</td>
<td>Yes</td>
</tr>
<tr>
<td>Udachina et al. (2009)</td>
<td>Non-clinical students; 427 in cross-sectional study, 32 in experience sampling study</td>
<td>No</td>
<td>Paranoia (PaDS)</td>
<td>Experiential Avoidance (AAQ)</td>
<td>Yes</td>
</tr>
<tr>
<td>Author (Year)</td>
<td>Sample</td>
<td>Trauma Assessed?</td>
<td>Psychotic Symptoms Assessed in Relation to Avoidance (Measure)</td>
<td>Type of Avoidance (Measure)</td>
<td>Association Between Psychotic Symptoms and Avoidance?</td>
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</tr>
<tr>
<td>Andrew et al. (2008)</td>
<td>22 clinical and 21 non-clinical voice-hearers</td>
<td>Yes</td>
<td>Auditory Verbal Hallucinations (PSYRATS-AH)¹²</td>
<td>Post-Traumatic Avoidance (IES)¹³</td>
<td>Possibly</td>
</tr>
<tr>
<td>Lysaker &amp; LaRocco (2008)</td>
<td>68 patients with schizophrenia spectrum disorders and trauma</td>
<td>Yes</td>
<td>Hallucinations and Delusions (PANSS)⁸</td>
<td>Defensive Avoidance (TSI)¹⁴</td>
<td>No</td>
</tr>
<tr>
<td>Resnick et al. (2003)</td>
<td>47 patients with schizophrenia</td>
<td>Yes</td>
<td>Positive symptoms (PANSS)⁸</td>
<td>Post-Traumatic Avoidance (CAPS)¹⁵</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*Note. 1 – Scale for the Assessment of Positive Symptoms; 2 – Self-Report Scale for Posttraumatic Stress Disorder; 3 – Launay Slade Hallucinations Scale-Revised; 4 – Acceptance and Action Questionnaire; 5 – Peters Delusions Inventory; 6 – The Community Assessment of Psychic Experience; 7 – Coping Inventory for Stressful Situations; 8 – Positive and Negative Syndrome Scale; 9 – Paranoia was measured with the authors’ own three questions; 10 – Revised Hallucinations Scale; 11 – Persecution and Deservedness Scale; 12 – Psychotic Symptom Rating Scales-Auditory Hallucinations; 13 – Impact of Events Scale; 14 – Trauma Symptom Inventory; 15 – Clinician-Administered PTSD Scale.*
Udachina et al., 2009; Varese et al., 2011), and two examined the relationship between avoidance and both hallucinations and delusions together as ‘positive symptoms’ (Lin et al., 2011; Resnick, Bond, & Mueser, 2003).

5.3.1.1 Avoidance and Hallucinations

Three of the six studies examining the relationship between avoidance and hallucinations measured experiential avoidance, and all three of these studies found at least some evidence for an association. Langer et al. (2010) used a non-clinical sample and investigated the relevance of several clinical symptoms to hallucination-like experiences. They found that experiential avoidance was a common factor in predicting both auditory and visual hallucinations; experiential avoidance and depression best predicted predisposition to auditory hallucinations, while experiential avoidance, obsessive compulsion and phobic anxiety best predicted predisposition to visual hallucinations. Goldstone et al. (2012) found that experiential avoidance was correlated with hallucinations in both their non-clinical and clinical samples. In their non-clinical sample, hallucinations were predicted by childhood emotional abuse and subsequent life hassles and that this relationship was partially mediated by negative metacognitions. In their clinical sample they found that childhood sexual abuse and subsequent life hassles predicted hallucinations, and this was partially mediated by experiential avoidance. Varese et al. (2011) investigated the relationship between hallucinations, dissociation, daily life stressors and experiential avoidance using an experience sampling method with schizophrenia patients and healthy controls. They found that among patients who hallucinated during the assessment period, auditory hallucinations were predicted by dissociation and experiential avoidance, although only dissociation remained a significant predictor after controlling for comorbid paranoia. This was the only study that
investigated the interrelationships between hallucinations, delusions and experiential avoidance. In this study, the relationship between experiential avoidance and paranoia accounted for the correlation between experiential avoidance and auditory hallucinations. More research is needed to further investigate how avoidance might impact the relationship between hallucinations and delusions.

Three studies that examined the relationship between avoidance and hallucinations used measures of post-traumatic avoidance, and found mixed results. One found that post-traumatic avoidance mediated the relationship between childhood sexual abuse and auditory hallucinations (Hardy et al., 2016). Another found no relationship between defensive avoidance (a measure of post-traumatic avoidance including efforts to avoid aversive trauma-related internal experiences, thoughts, memories and other reminders of trauma) and hallucinations (Lysaker & LaRocco, 2008). The third study analysed all three PTSD symptom clusters together, so the relationship between hallucinations and post-traumatic avoidance specifically was not able to be determined (Andrew et al., 2008). These three studies are discussed in more detail in section 5.3.2 below.

5.3.1.2 Avoidance and Delusions

Three of the four studies that investigated the relationship between avoidance and delusions found an association (Goldstone et al., 2011a & b; Udachina et al., 2009; Varese et al., 2011). All three of these studies used measures of experiential avoidance. Goldstone et al. (2011a & b: both utilised the same sample) found that in both clinical and non-clinical groups, experiential avoidance mediated the relationship between life hassles and both delusions and delusional distress. They also found two relevant pathways predicting vulnerability to delusions in a non-clinical
sample: 1) Childhood emotional trauma combined with subsequent experiences of life hassles (partially mediated by experiential avoidance); 2) Heredity combined with experiential avoidance. These pathways were replicated in a clinical sample, with childhood sexual trauma replacing emotional trauma for this group.

Udachina et al. (2009) examined the relationship between self-esteem, experiential avoidance and paranoia. Using a student sample, they found in the initial (cross-sectional) phase of their experiment that paranoid participants had lower self-esteem and reported higher levels of experiential avoidance than non-paranoid participants. They found that low self-esteem partially mediated the relationship between experiential avoidance and paranoia. Data from the second (experience sampling) phase of their experiment cross-validated and extended the data from phase 1 and showed that stress moderated the relationship between experiential avoidance and negative self-esteem: the higher the level of stress, the more experiential avoidance augmented negative beliefs about the self. In contrast with this, experiential avoidance and stress both contributed independently toward predicting future positive self-views: greater experiential avoidance and greater stress lead to a less positive self-esteem. High negative self-esteem did not predict future experiential avoidance, but low positive self-esteem did. There was no evidence for a direct temporal association between self-esteem and paranoia, but experiential avoidance predicted paranoid ideation.

5.3.1.3 Avoidance and ‘Positive Symptoms’ Analysed Together

Two studies from Table 5.1 analysed hallucinatory and delusional experience together in relation to avoidance (Lin et al., 2011; Resnick et al., 2003). Lin et al. investigated the relationship between subclinical positive psychotic experiences and different coping styles over three years in
a large adolescent general population sample. They found that persistence of psychotic experiences was associated with a greater use of emotion-focused coping, but found no meaningful results for avoidance-focused coping. It was suggested that avoidance-focused coping only begins to play a role when psychotic experiences become more pathological, i.e. in the clinical range of the psychosis continuum. Goldstone et al. (2012) and Varese et al.’s (2011) research may be considered evidence for this in terms of the aetiology of hallucinations; they both found that experiential avoidance was the best cognitive predictor of hallucinations in clinical but not the non-clinical groups. (However, Goldstone et al. (2011a & b) found that for delusions, experiential avoidance was a significant predictor in both their clinical and non-clinical samples.) While Lin et al.’s study used a well-validated measure of avoidance-focused coping (the Coping Inventory for Stressful Situations (CISS); Endler & Parker, 1999), the conceptualisation of avoidance-focused coping represented in this measure might be questioned in terms of the extent to which it is actually maladaptive. Certain aspects of avoidance-focused coping represented in the CISS such as distraction in the form of exercise or socialising with others have been shown to have positive effects on psychological wellbeing and mood states across a range of populations (Penedo & Dahn, 2005; Ybarra et al., 2008) and have been linked with improved mental health in people with psychosis (Ellis, Crone, Davey, & Grogan, 2010; Lim, Gleeson, Jackson, & Fernandez, 2014). Maladaptive forms of distraction such as drug use or binge eating are not measured in the CISS. These issues may account for Lin et al.’s null results.

The other study that investigated avoidance and positive psychotic symptoms together as one variable used a measure of post-traumatic avoidance, and found some evidence for an association (Resnick et al., 2003). This study is discussed in further detail in section 5.3.2.
5.3.1.4 Summary of Avoidance, Hallucinations and Delusions Data

Taken together, the studies in Table 5.1 largely demonstrate a relationship between avoidance, hallucinations and delusions. All five studies that investigated experiential avoidance found an association with psychotic symptoms (Goldstone et al., 2012; 2011a & b; Langer et al., 2010; Udachina et al., 2009; Varese et al., 2011). The two studies that did not find a relationship between avoidance and psychotic symptoms used measures of avoidance-focused coping and defensive avoidance (Lin et al., 2011; Lysaker & LaRocco, 2008). Potential problems with the measure of avoidance-focused coping that may have affected Lin et al.’s (2011) results have been discussed in the previous section. The four studies that used measures of post-traumatic avoidance found mixed results and are further discussed in section 5.3.2 below.

The one study that investigated experiential avoidance, hallucinations and delusions found that experiential avoidance was associated with both hallucinations and delusions (Varese, Udachina, Myin-Germeys, Oorschot & Bentall, 2011). In this study, paranoia was conceptualised as a confounding variable in the relationship between experiential avoidance and hallucinations. This was done in light of other research that has shown that metacognitive beliefs such as negative appraisal of thoughts, beliefs about the uncontrollability and danger of thoughts, or the need to control thoughts (much of which overlaps with the construct of experiential avoidance) were more strongly related to paranoia than to hallucination-proneness in a series of meta-analyses (Varese & Bentall, 2011). These researchers have pointed out that much of the research linking metacognitive beliefs or experiential avoidance to hallucinations often fails to control for other comorbid symptoms such as paranoia (Varese, Barkus, & Bentall, 2011). The studies reviewed here points towards a possible role for experiential avoidance in both hallucination and delusion.
development, and there is more research needed that further investigates the complex interrelationships between experiential avoidance, hallucinations and delusions.

5.3.2 Trauma, Avoidance, Hallucinations and Delusions

Six of the studies that investigated the relationship between avoidance and hallucinations and delusions (i.e., the studies in Table 5.1) included a measure of trauma. These six studies are shown in Table 5.2.

Lysaker and LaRocco’s (2008) sample of patients with schizophrenia spectrum disorders all had reported at least one significant lifetime traumatic event (as part of the selection criteria). They investigated the relationship between hallucinations and delusion severity and five trauma-related symptoms (defensive avoidance, intrusive re-experiencing, dissociation, anxious arousal and anger/irritability). They did not find defensive avoidance to be related to either hallucination or delusion severity; hallucinations were related to irritability and the total number of elevated trauma symptoms, and delusions were related to intrusive re-experiencing, dissociation, and the total number of elevated trauma symptoms.

Goldstone et al.’s (2012) research (described in section 5.3.1.1) investigated childhood trauma and avoidance as possible predictors of hallucinations. Hallucinations were predicted by childhood sexual abuse and childhood emotional abuse in the clinical and non-clinical samples respectively; experiential avoidance mediated the relationship between childhood sexual abuse and hallucinations in the clinical group. The same group of researchers investigated the relationship between ‘life hassles’ (rather than childhood trauma) and delusions, finding experiential avoidance to be a mediator in this relationship in both their clinical and non-clinical samples (Goldstone et al., 2011a & b).
<table>
<thead>
<tr>
<th>Authors</th>
<th>Sample</th>
<th>Psychotic Symptoms Assessed in Relation to Avoidance (Measure)</th>
<th>Type of Trauma (Measure)</th>
<th>Type of Avoidance (Measure)</th>
<th>Key Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardy et al. (2016)</td>
<td>228 people with relapsing psychosis</td>
<td>Auditory Hallucinations (SAPS)¹</td>
<td>Childhood Sexual Abuse (THQ)²</td>
<td>Post-Traumatic Avoidance (SRS-PTSD)³</td>
<td>• Post-traumatic avoidance and numbing mediated the relationship between childhood sexual abuse and auditory hallucinations.</td>
</tr>
<tr>
<td>Goldstone et al. (2012)</td>
<td>233 (100 clinical psychosis patients and 133 non-clinical)</td>
<td>Hallucinations (general) and Auditory Hallucinations (LSHS-R)⁴</td>
<td>Childhood Trauma (ETI-SR)⁵ and Life Hassles (SRLE)⁶</td>
<td>Experiential Avoidance (AAQ)⁷</td>
<td>• Clinical group: Childhood sexual abuse predicted hallucinations. Experiential avoidance mediated the relationship.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Non-clinical group: Childhood emotional abuse predicted hallucinations. Experiential avoidance not a mediator.</td>
</tr>
<tr>
<td>Goldstone et al. (2011a &amp; b)</td>
<td>233 (100 clinical psychosis patients and 133 non-clinical)</td>
<td>Delusions (PDI)⁸</td>
<td>Life Hassles (SRLE)⁶</td>
<td>Experiential Avoidance (AAQ)⁷</td>
<td>• Experiential avoidance mediated the relationship between life hassles and both delusions and delusional distress, in both the clinical and non-clinical groups.</td>
</tr>
<tr>
<td>Andrew et al. (2008)</td>
<td>22 clinical and 21 non-clinical voice-hearers</td>
<td>Auditory Verbal Hallucinations (PSYRATS-AH)⁹</td>
<td>Any traumatic event over the lifetime (PDS)¹⁰</td>
<td>Current Trauma Symptoms (including Post-Traumatic Avoidance) (IES)¹¹</td>
<td>• More trauma and avoidance in clinical group</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Current trauma symptoms (intrusions, avoidance, hyperarousal together) predicted beliefs about voices and anxiety. (Contribution of avoidance alone not calculated.)</td>
</tr>
<tr>
<td>Lysaker &amp; LaRocco (2008)</td>
<td>68 patients with schizophrenia spectrum disorders and trauma</td>
<td>Hallucinations and Delusions (PANSS)¹²</td>
<td>Any traumatic event over the lifetime (TAA)¹³</td>
<td>Defensive Avoidance (TSI)¹⁴</td>
<td>• Defensive avoidance not related to hallucinations or delusions; was related to depression and disturbance of volition.</td>
</tr>
<tr>
<td>Authors (Year)</td>
<td>Sample</td>
<td>Psychotic Symptoms Assessed in Relation to Avoidance (Measure)</td>
<td>Type of Trauma (Measure)</td>
<td>Type of Avoidance (Measure)</td>
<td>Key Results</td>
</tr>
<tr>
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</tbody>
</table>
| Resnick et al. (2003) | 47 patients with schizophrenia | Positive symptoms (PANSS) \(^{12}\) | Trauma that included threat of harm or life threat (CAPS) \(^{15}\) | Post-Traumatic Avoidance (CAPS) \(^{15}\) | • 74% experienced trauma  
• In the total sample, post-traumatic avoidance correlated with positive symptoms (but not in the trauma group). |

*Note. 1 – Scales for the Assessment of Positive Symptoms; 2 – Trauma History Questionnaire; 3 – Self-Report Scale for Posttraumatic Stress Disorder; 4 - Launay Slade Hallucinations Scale-Revised; 5 – Early Trauma Inventory-Self Report; 6 - Survey of Recent Life Experiences; 7 - Acceptance and Action Questionnaire; 8 – Peters Delusions Inventory; 9 - Psychotic Symptom Rating Scales-Auditory Hallucinations; 10 - Post-traumatic Diagnostic Scale; 11 – Impact of Events Scale; 12 – Positive and Negative Syndrome Scale; 13 - Trauma Assessment for Adults-Brief Revised Version; 14 - Trauma Symptom Inventory; 15 - Clinician-Administered PTSD Scale.*
In Hardy et al.’s (2016) large clinical study, post-traumatic avoidance and numbing was investigated as a potential mediating mechanism in the relationship between childhood sexual abuse and auditory hallucinations. Both post-traumatic avoidance/numbing as well as hyperarousal were found to be mediators (intrusive trauma memory, negative beliefs and depression were not).

Andrew et al. (2008) compared groups of psychiatric and non-psychiatric voice-hearers and found that the proportion of people who had experienced at least one traumatic event in their lifetime was high (over 75%) in both groups, with no significant difference between the groups on the number of people who had experienced trauma. However, the psychiatric group had experienced a significantly greater number of types of traumatic events over the course of their lifetime, had experienced significantly more childhood sexual abuse, and were experiencing more post-traumatic avoidance and intrusions (measured on the Impact of Events Scale (IES); Horowitz, Wilner, & Alvarez, 1979) compared to the non-psychiatric group. When investigating predictors of beliefs and associated distress relating to voices, post-traumatic avoidance was not measured as an individual predictor. Greater total score on the IES (i.e., current trauma-related symptoms of intrusions, avoidance and hyperarousal) was found to predict beliefs about voices being more omnipotent, more malevolent and less benevolent. Greater score on the IES also predicted distress in terms of anxiety, but not depression.

Resnick, Bond, and Mueser (2003) measured post-traumatic avoidance in their sample of patients with schizophrenia. They found that 74% of their sample had experienced at least one trauma that involved threat of harm or life threat. They investigated the association between post-traumatic avoidance and positive symptoms (rather than hallucinations and delusions individually). They found that in their entire sample, post-traumatic avoidance was correlated with positive symptoms, but this
correlation was weaker and did not reach significance in the group with trauma. This study was the only study to perform these analyses for males and females separately, finding a strong correlation between post-traumatic avoidance and positive symptoms for males but no significant results for females.

The four studies that measured post-traumatic avoidance used different measures (the Impact of Events Scale (IES; Horowitz et al., 1979), the Trauma Symptoms Inventory (TSI; Briere, Elliott, Harris, & Cotman, 1985), the Self-Report Scale for PTSD (SRS-PTSD; Carlier, Lamberts, van Uchelen, & Gersons, 1998), and the Clinician-Administered PTSD Scale (CAPS; Blake et al., 1995) (Andrew et al., 2008; Hardy et al., 2016; Lysaker & LaRocco, 2008; Resnick et al., 2003). The IES, the TSI and the SRS-PTSD are all simple self-report measures of post-traumatic avoidance. Resnick et al.’s study was the only study to utilise an in-depth, clinician-administered measure of post-traumatic avoidance (the CAPS).

Overall, these studies provide evidence for a relationship between trauma, avoidance and psychotic symptoms in both clinical and non-clinical groups. The low number of studies that investigated the relationship between trauma, experiential or post-traumatic avoidance, and hallucinations or delusions as individual symptoms makes it difficult to draw conclusions about the role of avoidance in impacting these symptoms in the context of trauma. The results of the four studies that investigated trauma, avoidance and hallucinations were inconsistent, with some studies finding associations (Goldstone et al., 2012; Hardy et al., 2016), and others finding either no association (Lysaker & LaRocco, 2008) or inconclusive results (Andrew et al., 2008). Similarly inconsistent results were found in the two studies that assessed delusions; delusions were related to trauma and experiential avoidance (Goldstone et al., 2011a & b) but not defensive (post-traumatic) avoidance (Lysaker & LaRocco, 2008). Clearly
there is a need for more research taking a symptom-specific approach and investigating trauma, avoidance (post-traumatic and experiential) and hallucinations and delusions.

The two studies that investigated experiential avoidance had large sample sizes and showed that experiential avoidance may have a key mediational role in the relationship between trauma and both hallucinations and delusions (Goldstone et al., 2012; 2011a & b). The findings from the studies investigating post-traumatic avoidance were mixed, with one finding that post-traumatic avoidance was related to psychotic symptoms in their entire sample (with and without trauma) (Resnick et al., 2003), two finding that post-traumatic avoidance was not related to psychotic symptoms in their groups with trauma (Lysaker & LaRocco, 2008; Resnick et al., 2003), and one finding that post-traumatic avoidance played a mediational role between childhood sexual abuse and hallucinations (Hardy et al., 2016). Measures that were used to assess post-traumatic avoidance were varied, and the only study that used a well validated, clinician-administered measure (the CAPS) did not investigate the relationship between post-traumatic avoidance and hallucinations and delusions separately (Resnick et al., 2003). No study to date has used an in-depth clinician-administered measure of post-traumatic avoidance to examine specific relationships between post-traumatic avoidance and hallucinations and delusions. Further research using a comprehensive assessment of post-traumatic avoidance and its relationship to these individual symptoms is needed.

5.4 Post-Traumatic Avoidance, Experiential Avoidance and the Development of Hallucinations and Delusions

The research reviewed thus far points to a role for both experiential avoidance and post-traumatic avoidance in the experience of hallucinations and delusions.
Experiential avoidance is a broad construct, and the most commonly used measure of experiential avoidance (the Acceptance and Action Questionnaire; AAQ) captures psychological inflexibility in terms of the extent to which a person negatively evaluates their feelings and avoids negative thoughts and feelings (Bond et al., 2011). The AAQ contains items such as “I’m afraid of my feelings” and “My painful experiences and memories make it difficult for me to live a life that I would value”. Certain elements of post-traumatic avoidance fall under this general umbrella and would be captured by the AAQ, for example, the negative evaluation and/or avoidance of aversive thoughts or memories specifically related to a trauma. Measures of post-traumatic avoidance focus on avoidance of trauma-specific thoughts, emotions or stimuli. For example, the CAPS contains items such as “Have you ever tried to avoid thoughts or feelings about [the traumatic event]?” and “Have you ever tried to avoid certain activities, places or people that reminded you of [the traumatic event]?” The items measuring post-traumatic avoidance on the Impact of Events Scale include statements such as “I tried to remove it (the trauma) from my memory” and “I tried not to think about it (the trauma)”. 

Comparatively more research has been done investigating experiential avoidance than post-traumatic avoidance in terms of the relationship with symptoms of psychosis. Given the high rates of trauma and PTSD found in people with psychosis, post-traumatic avoidance may be a factor impacting psychotic symptoms; identifying and distinguishing it from general experiential avoidance may be important for determining whether it is a more specific potential mechanism through which trauma influences the development of hallucinations and delusions. The studies reviewed in section 5.3.2 above point to some potential evidence for post-traumatic avoidance impacting positive psychotic symptoms but no study has used a well-validated clinician-administered measure of post-traumatic avoidance to investigate its
relationship with hallucinations and delusions as separate symptoms. As discussed in Chapter 3, the intrusive cognitive and emotional processes that commonly occur following trauma (intrusive memories, post-traumatic cognitions in the form of negative thoughts about the self and others and self-blame for the trauma) may constitute an array of trauma-specific aversive internal experiences to which a person may apply avoidant strategies. Post-traumatic avoidance of this nature may act to ultimately increase these aversive experiences in the longer term. For example, thought suppression strategies (an aspect of experiential avoidance) are known to paradoxically increase the frequency of intrusive threat-related cognitions (Abramowitz, Tolin, & Street, 2001). In the case of hallucinations, post-traumatic avoidance in the form of avoiding intrusive memories, cognitions and anomalous sensory experiences that constitute the prodrome to psychosis may increase the frequency and intensity of these experiences and facilitate the emergence of fully developed hallucinations. Udachina et al. (2009) has suggested that for paranoid delusions, avoidance in response to trauma may increase the volume of unwanted intrusive experiences that may be interpreted as threatening, as well as negative beliefs about the self as vulnerable and danger posed by others. This may lead to misinterpretations of situations and a predisposition to developing full paranoid delusional ideation.

Therapeutically, targeting avoidant strategies in individuals with psychosis (much of which has been done with Acceptance and Commitment Therapy, which focuses on experiential avoidance) has been shown to decrease frequency of psychotic symptoms, symptom-associated distress and believability, and increase social functioning (Bach & Hayes, 2002; Gaudiano & Herbert, 2006). If post-traumatic avoidance is potentially impacting psychotic symptom aetiology and severity, interventions are needed that are designed to specifically address the avoidance of
trauma-related aversive internal experiences, painful memories and thoughts, and events or environmental stimuli that are reminders of traumatic events.

In summary, avoidant processes have been linked to a variety of psychopathology, including hallucination and delusion severity. The high prevalence of trauma and PTSD in people with psychosis points towards the possibility that avoidant strategies may be related to hallucinations and delusions. Post-traumatic avoidance is one of the key PTSD diagnostic criteria and experiential avoidance has been linked to PTSD symptom severity, although the causal pathway leading from trauma to post-traumatic avoidance, experiential avoidance and psychotic symptoms is unclear. Thus far, research has typically focused on either trauma and/or PTSD in relation to psychotic symptoms, or experiential avoidance in relation to psychotic symptoms. The role of post-traumatic avoidance and its relationship to psychotic symptoms and experiential avoidance in the context of trauma is important in order to further understand how these processes may be interacting and contributing to the development and severity of psychotic symptoms. There is currently no research that has investigated post-traumatic avoidance, experiential avoidance, hallucinations and delusions in people with first episode psychosis, and more research is needed using well validated, in-depth measures of post-traumatic avoidance to determine how it might be impacting the experience of hallucinations and delusions.
Chapter 6. Rationale, Aims and Hypotheses

6.1 Rationale

The literature reviewed in this thesis comprised key areas in trauma and psychosis research, including the relationship between trauma, PTSD, hallucinations and delusions in groups of people with psychosis (Chapter 2), a review of dominant cognitive models of trauma and psychotic symptoms, and of the relationship between post-traumatic intrusions, maladaptive schemas and hallucinations and delusions (Chapters 3 and 4), and recent investigations into the role of avoidance and its relationship with hallucinations and delusions (Chapter 5). This provides the research and theoretical underpinnings for the current study, which aims to advance the understanding of the role of key trauma-related cognitive mechanisms in the aetiology of psychotic symptoms, and of phenomenological links between trauma and psychotic symptoms.

Chapter 2 of this thesis concluded that there is evidence for associations between trauma, PTSD, hallucinations and delusions in people with psychosis. Particularly high prevalence of both trauma and PTSD are consistently found in these groups. Chapters 3 and 4 described the two most widely accepted models of the cognitive processes and mechanisms by which trauma may impact the aetiology and maintenance of hallucinations and delusions - the ‘intrusions’ model (Morrison, 2001; Morrison et al., 2003) and the ‘schema/emotion’ model (Garety et al., 2001; Freeman et al., 2002). The intrusions model proposes that post-traumatic intrusions are the primary mechanism driving hallucination and delusion development (Morrison, 2001; Morrison et al., 2003). The schema/emotion model suggests that hallucinations and
delusions have their origins in anomalous sensory-perceptual experiences resulting from trauma, and that the primary pathway through which full-blown hallucinations and delusions develop is via maladaptive trauma-related schemas and emotion (Garety et al., 2001; Freeman et al., 2002). Neither of the models has been extensively tested. One pool of evidence for the models comes from findings of similarities between people’s traumatic experiences and the content of their hallucinations and delusions. While relatively little research has been done in this area, the studies that have investigated hallucination and delusion content in relation to trauma have provided valuable insight to the nature of the possible connections between psychotic symptoms and traumatic life events.

Chapter 3 discusses different types of relationships between trauma and hallucination content, which are characterised by differing degrees of salience between the trauma and hallucination content. Direct content links are proposed to be underpinned by post-traumatic intrusive processes; indirect links are proposed to be underpinned by post-traumatic cognitions about the trauma; and thematic links are proposed to be underpinned by trauma-related maladaptive schemas and accompanying negative emotion. The current study seeks to explore these potential relationships so that the role of these trauma-related symptoms in the development of hallucinations can be better understood. If post-traumatic intrusive processes are the primary mechanism through which trauma impacts hallucinations, it would be expected that hallucination content in people who have experienced trauma would be directly related to their traumatic experience. If post-traumatic cognitions about the trauma are a key mechanism, hallucinations with content indirectly linked to trauma would be expected to be found. If trauma-related schemas and emotion are the primary pathway leading from trauma to hallucinations, it would be expected that hallucination content would
be thematically related to their traumatic experience. Chapter 4 discusses delusion content in relation to trauma. Research in this area is scarce. Delusion content reflecting themes associated with trauma are proposed by both models to implicate the role of trauma-related maladaptive schemas and emotion in delusion development (Morrison et al., 2001; Freeman et al., 2002).

The current study also focuses specifically on the role of post-traumatic intrusions in hallucination and delusion development, an area of study that is notably under-researched. Previous research has indicated a potentially stronger role for schemas and emotion compared with post-traumatic intrusions in terms of possible trauma-related mechanisms impacting hallucinations and delusions (Hardy et al., 2016; Hardy et al., 2005). However, the role of post-traumatic intrusive processes in psychosis is not well understood and requires clarification. Post-traumatic intrusions are implicated by both cognitive models of the aetiology of hallucinations and delusions from trauma. The intrusions model proposes that hallucinations and post-traumatic intrusions are variants of the same phenomenon, and that intrusions are the key driving symptom to which delusional interpretations are applied (Morrison, 2001; Morrison et al., 2003). The schema/emotion model conceptualises intrusions as one of a variety of anomalous experiences that are an important, but not a central part of the pathway to hallucinations and delusions from trauma, which proceeds primarily through maladaptive trauma-related schemas and accompanying negative emotional states (Garety et al., 2001; Freeman et al., 2002). The suggestion by proponents of the intrusions model that post-traumatic intrusions and hallucinations are phenomenologically identical has implications for the relationship between post-traumatic intrusion and hallucination content. It would be expected that post-traumatic intrusion and hallucination content would be identical if these symptoms are variants
of the same phenomenon. The content of post-traumatic intrusions in relation to hallucinations has not been tested in previous studies.

Chapter 5 reviewed literature pertaining to the relationship between avoidance, hallucinations and delusions in the context of trauma, and concluded that evidence points towards relationships between experiential avoidance, post-traumatic avoidance, and hallucinations and delusions. Studies in this area are few in number, and most have focused on experiential avoidance. Experiential avoidance has been shown to be related to PTSD symptomatology, and overlaps as a construct with post-traumatic avoidance. As a result, it would be expected that people with more severe trauma would have more severe experiential avoidance, and that the severity of experiential avoidance and post-traumatic avoidance would be positively correlated with each other. Little is known, however, about the role of post-traumatic avoidance – the avoidance specifically of trauma-related stimuli – in terms of its relationship to hallucination and delusion development and severity. In light of the literature reviewed, it would be expected that both experiential and post-traumatic avoidance would be related to hallucination and delusion severity.

In summary, while research to date indicates a potential role for several post-traumatic cognitive processes (post-traumatic intrusions, maladaptive schemas/emotion, and post-traumatic avoidance) in the pathway from trauma to psychosis, further research is needed to refine our knowledge of how these processes are related to hallucinations and delusions. A sample of people with first episode psychosis was deemed the most appropriate to investigate the relationship between childhood trauma and psychosis because the duration between childhood traumatic events and the onset of hallucinations and delusions is shorter. This means that recall of trauma and cognitive changes associated with trauma would be less likely to be
influenced by ongoing psychotic symptoms and adulthood trauma. Furthermore, the nature and content of hallucinations and delusions change with time, so investigating psychotic symptom content in a first-episode sample allows for assessment of symptom content that is less likely to be contaminated by other factors associated with psychotic symptoms occurring over longer durations.

The current study had three main aims. Based on the reviewed evidence, a series of research questions and hypotheses were developed. Hypotheses were derived where sufficient evidence was present. Where there was insufficient evidence to generate a hypothesis, research questions were formulated.

6.2 Aim 1

The first aim is to investigate relationships between the severity of trauma, post-traumatic intrusions, and psychosis.

Hypotheses for Aim 1

It is hypothesised that higher levels of trauma severity (as measured by the CTQ) will be correlated with:

1. More severe hallucinations (as measured by the PANSS).

2. More severe delusions (as measured by the PANSS).

It is hypothesised that more severe post-traumatic intrusions (as measured by the CAPS) will be correlated with:

3. More severe hallucinations (as measured by the PANSS).

4. More severe delusions (as measured by the PANSS).
6.3 Aim 2

The second aim is to examine the associations between trauma and psychotic symptom content, and post-traumatic intrusion and hallucination content in first episode psychosis patients with trauma.

6.3.1 Aim 2 Part A - Hallucinations

For those with hallucinations and childhood trauma:

5. What proportion have direct, indirect, thematic, and no associations between their trauma and the content of their hallucinations? (And what proportion have one, two, three, or all four of these types of associations present in their symptoms?)

For those with hallucinations who also experience post-traumatic intrusions:

6. What proportion have direct, indirect, thematic and no associations between the content of their intrusions and the content of their hallucinations? (And what proportion have one, two, three, or all four of these types of associations present in their symptoms?)

6.3.2 Aim 2 Part B – Delusions

For those with delusions and childhood trauma:

7. What proportion have thematic associations and what proportion have no associations between their trauma and the content of their delusions? (And what proportion have both of these types of associations present in their symptoms?)
6.4 Aim 3

The third aim of this research is to investigate the relationships between avoidance, hallucinations and delusions in people with trauma.

Hypotheses for Aim 3

For the entire sample:

8. It is hypothesised that higher levels of trauma severity (as measured by the CTQ) will be correlated with higher levels of experiential avoidance (as measured by the AAQ).

9. It is hypothesised that higher levels of post-traumatic avoidance (as measured by the CAPS) will be correlated with higher levels of experiential avoidance (as measured by the AAQ).

10. It is hypothesised that higher levels of post-traumatic avoidance (as measured by the CAPS) and experiential avoidance (as measured by the AAQ) will be correlated with more severe hallucinations and delusions (as measured by the PANSS).
Chapter 7. Methodology

7.1 Participants

7.1.1 Participant Recruitment

Seventy young people with first episode psychosis aged between 15 and 24 years were recruited for the study. All participants were clients of the Orygen Youth Health EPPIC clinic (Early Psychosis Prevention and Intervention Centre). Orygen Youth Health is a mental health service specialising in providing early intervention and treatment for people aged 15 to 24 years who are experiencing mental health issues and who reside in the western and north-western regions of Melbourne, Australia. The EPPIC clinic is a specialised clinical program within Orygen Youth Health which provides a service for young people experiencing a first episode of psychosis. Participants were recruited between May 2014 and February 2016.

Participants were recruited by inviting case managers in the EPPIC clinic to refer clients to the study. Case managers were made aware of the study’s aims, procedure and inclusion/exclusion criteria, and were therefore able to refer clients from their caseload who were eligible for the study. The potential participants were then contacted by phone by the researcher and given information about the study. Written informed consent was given by those people who agreed to participate in the study (and by parents/guardians of those people under the age of 18). Young people were recruited when they were clinically stabilised (i.e., engaged with the service, had some insight into their illness, and had made improvement in symptoms and functioning). This method enabled participants to be recruited at a time when they were well enough to cope with assessment of trauma symptoms, but also so that a wide enough variability in positive symptoms would still be seen. It was stressed to case managers that the study
required participants who had experienced trauma as well as those who had not, in order
to gain a representative sample.

A total of 76 participants were referred by their case managers as eligible for
the study. Of these, six people opted not to participate after the explanation of the study
by the researcher.

7.1.2 Inclusion and Exclusion Criteria

To be eligible for the study, participants must have been given a Diagnostic and
Statistical Manual of Mental Disorders (DSM-IV, American Psychiatric Association,
1994) diagnosis of schizophrenia, schizophreniform disorder, schizoaffective disorder,
delusional disorder, psychotic disorder not otherwise specified, or an affective disorder
with psychotic features. All participants were required to be able to give informed
consent for participation in the study. For participants who were under 18 years old,
further informed consent from parents or guardians was required. Exclusion criteria
were inability to speak fluent English and/or having an intellectual disability (IQ < 70).
Case managers were made aware of the inclusion and exclusion criteria, and assessment
of IQ was left to their judgment regarding who was appropriate for the study.

7.1.3 Description of the Sample

Of the 70 participants recruited for the study, four completed less than 50% of
the overall assessment and therefore their results were discarded from the analysis. The
final sample size included in the analysis was 66. Overall, males comprised 42% of the
sample \( n = 28 \); females, 55% \( n = 36 \) and 3% \( n = 2 \) identified as female-to-male
transgender. The mean age of the participants was 20.18 years \( (SD = 2.69) \). Diagnoses
of sample were based on DSM-IV-TR criteria. The majority of the sample met criteria
for a psychotic disorder (83%) while 17% presented with an affective disorder with psychotic features. The most common diagnosis was schizoaffective disorder (29%).

Additional demographic and diagnostic information for the sample are presented in Table 7.1.

Table 7.1
Descriptive Information for the Sample (n = 66)

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<td></td>
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<tr>
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<td>0</td>
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<tr>
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<tr>
<td>Used Antipsychotic Medication in Last 6 months</td>
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<td>74</td>
</tr>
</tbody>
</table>
7.2 Design

This is a cross-sectional study involving an assessment using semi-structured interviews and pen-and-paper questionnaires.

7.3 Ethics Approval and Ethical Considerations

7.3.1 Ethics Approval

Ethics approval was received from the Melbourne Health Human Research Ethics Committee (see Appendix A) and the University of Melbourne Human Research Ethics Committee. All participants received a written information and consent form describing in plain language the rationale, aims and procedure of the study and stating that they were free to withdraw from the study at any time (see Appendix B). It included a document that participants signed to formalise their consent to participate in the study.

7.3.2 Managing Safety and Privacy

As a significant portion of the assessment involved participants answering questions about trauma and its related symptoms, safety procedures were put in place to ensure that any distress experienced by participants when recounting incidences of trauma was managed appropriately. The two researchers who conducted the assessment sessions were both postgraduate clinical psychology students who had completed all or almost all of their clinical training. During the assessment session times, research supervisor Dr Sarah Bendall who is a registered clinical psychologist with extensive experience in trauma assessment and therapy was available on call. There were no instances in which the discussion of trauma was significantly distressing for the participant. Case managers had referred clients who were interested in participating, and as such all participants were comfortable discussing their trauma.
During the process of obtaining informed consent, confidentiality and privacy were discussed with each participant. Participants’ permission for the interviewer to communicate information disclosed in the assessment to their case managers was obtained. All participants agreed to this. The boundaries of confidentiality were discussed, and it was clearly communicated to the participants that in the event that the interviewer deems the participant or someone they know to be at risk, this may require confidentiality to be breached.

The assessment involved some brief questions about suicidality, and both interviewers were equipped to manage this through their clinical training. In the event that suicidality was disclosed during an interview, a procedure for further assessing this was in place. This involved assessing for preoccupation with suicidal thoughts, any suicidal behaviour, and the presence of any intentions/plans. Participants’ case managers would be informed of anything concerning that arose in this regard.

Each participant was given a number code and these were used in place of names on all completed interview schedules and questionnaires. All paperwork was kept in a locked filing cabinet. Data was also kept electronically without participant names and with the same number codes.

7.4 Measures

7.4.1 Demographics

Demographic Questionnaire

This questionnaire included age, gender, living arrangements, occupation, health information, medication use and any known family history of mental illness.
7.4.2 Diagnostic Measures

Structured Clinical Interview for DSM-IV Disorders (SCID-I/P; Psychosis and Mood Sections).

The SCID-I (First, Spitzer, Gibbon, & Williams, 2002) is a semi-structured interview instrument used in this study to establish the primary psychotic diagnosis and any mood diagnoses. Only the psychosis and mood modules were used. Assessment questions are based on DSM-IV (American Psychiatric Association, 1994) diagnostic criteria for psychiatric disorders. Zanarini et al. (2000) assessed the inter-rater and test-retest reliability of the DSM-IV version of the SCID-I using 84 rater pairs and a 7-10 day test-retest interval. They found that for the ten most commonly diagnosed Axis I disorders in their sample, inter-rater reliability kappa ($k$) scores ranged from .57 to 1.0 (representing good to excellent agreement) and test-retest reliability $k$ scores ranged from .35 to .78 (all but one representing fair to excellent agreement).

Structured Clinical Interview for DSM-IV Disorders (SCID-II; Borderline and Antisocial Personality Disorder Sections).

The SCID-II (First, Spitzer, Gibbon, Williams, & Benjamin, 1997) is a semi-structured interview instrument used in this study to establish Borderline and/or Antisocial Personality Disorder diagnoses. Assessment questions are based on DSM-IV (American Psychiatric Association, 1994) diagnostic criteria for personality disorders. Maffei et al. (1997) and Lobbestael, Leurgans, and Arntz (2010) found excellent agreement in their assessments of the inter-rater reliability of the DSM-IV version of the SCID-II. Both these studies found $k$ scores of .91 for Borderline Personality Disorder. Antisocial Personality Disorder $k$ scores were .95 (Maffei et al., 1997) and .78 (Lobbestael, Leurgans, & Arntz, 2010).
7.4.3 Psychotic Symptom Measure

Positive and Negative Syndrome Scale (PANSS)

The PANSS (Kay, Fiszbein, & Opler, 1987) is a widely utilised, 30-item interviewer rated measure that assesses the presence of both positive (e.g. delusions, hallucinatory behaviour) and negative psychotic symptoms (e.g. blunted affect, emotional withdrawal) as well as general psychopathological symptoms such as depression, somatic concerns etc. Symptoms are rated as present if they were experienced within the last two weeks. The interview takes approximately 30-40 minutes and information is gathered on the presence and the severity of the various symptoms. The items are rated on a 7-point rating scale from 1 = absent to 7 = extreme. The PANSS is scored by summing item ratings across the positive and negative subscales, (both with a potential score range of 7-49) as well as the general psychopathology scale (potential score range 16-112). A composite score can also be derived by subtracting the negative symptoms scale score from the positive scale score. The composite score provides information regarding the dominance of either the positive or negative syndrome in a particular patient. Raw scores are converted to percentile ranks. Studies of the psychometric properties of the PANSS have reported inter-rater reliability across the subscales ranging on average from Pearson \( r = .83 \) to \( .87 \). Results also support the PANSS criterion-related and construct validity (Kay, Opler, & Lindenmayer, 1988).
7.4.4 Trauma and PTSD Measures

*Childhood Trauma Questionnaire- Short Form (CTQ)*

The CTQ (Bernstein et al., 2003) is a 28-item, self-report inventory of childhood abuse and neglect. Items on the scale pertain to physical, emotional and sexual abuse (e.g. ‘When I was growing up people in my family hit me so hard it left me with bruises or marks’; ‘People in my family said hurtful or insulting things to me’; ‘Someone molested me’). The scale also includes items relating to emotional and physical neglect (e.g., ‘My parents were too drunk or high to take care of the family’; ‘I didn’t have enough to eat’). There are three items on the scale that assess minimisation/denial and can be used to detect false negative reports of trauma. The scale has demonstrated good criterion validity as well as measurement invariance across four different sample groups (Bernstein et al., 2003). It is designed to capture single instances of trauma as well as prolonged, multiple traumas. Responders rate each item on a 5-point Likert scale, with higher scores indicating a higher degree of traumatic experience. The level of maltreatment can also classified as absent, low, moderate or severe-extreme based on threshold scores outlined in the manual. Previously validated cutoff scores distinguishing those with scores ranging from low to severe-extreme from those in the absent range have been used to divide and compare groups with and without trauma.

*Clinician-Administered PTSD Scale (CAPS)*

The CAPS (Blake et al., 1995) is used to assess PTSD diagnosis, symptom clusters (intrusive re-experiencing, avoidance/numbing, and hyperarousal) as well as symptom severity. The CAPS is a semi-structured interview widely used in PTSD
research and is considered the ‘gold standard’ in PTSD assessment. The CAPS assesses symptom severity in two dimensions (frequency and intensity), has clear anchors and descriptors for ratings, and includes detailed follow-up questions (Weathers et al., 2001). Psychometric studies have validated both dichotomous (meets or does not meet criteria for a symptom, or for a diagnosis) and continuous (severity of disorder or symptom cluster) data yielded by the CAPS (Weathers et al., 2001). Initial studies of combat veterans using the CAPS indicated excellent inter-rater reliability ($r = .92$ to $.99$) and good internal consistency coefficients with alpha ranging from $.73$ to $.85$ for the symptom clusters (Blake et al., 1990). In the same study, good convergent validity, indicated by strong, significant correlations ranging from $r = .70$ to $.84$ between the CAPS and other self-reported measures of PTSD. Similar levels of inter-rater reliability, internal consistency and convergent validity were shown in other studies of PTSD in combat veterans (Hovens et al., 1994; Weathers et al., 2001). Hovens and colleagues (1994) further found strong reliability coefficients ranging from alpha = $.59$ to 1.00, with a mean of $.92$ for the frequency scores and alpha = $.52$ to 1.00, with a mean of $.86$ for intensity scores.

More recently the reliability and validity of the CAPS was tested for use with people diagnosed with schizophrenia. The internal consistency of the total severity score (both frequency and intensity) was excellent with alpha = $.94$. The internal consistency for the symptom clusters was also strong with scores ranging from alpha = $.67$ to $.88$. The same study of patients with schizophrenia found good test-retest reliability over 10 days, with a kappa coefficient of $.82$. Excellent inter-rater reliability of both symptoms severity and clusters was also shown using intraclass coefficients with coefficients ranging from $.97$ to $.99$ (Gearon, Bellack & Tenhula, 2004).
For the present study, scoring rules for the CAPS Intrusions subscale were to sum the frequency and intensity scores on the five items on the subscale. Participants were designated as experiencing intrusions if they scored at least 1 on any of the five Intrusions subscale items.

*Post-Traumatic Cognitions Inventory (PTCI)*

The PTCI (Foa, Clark, Tolin, & Osillo, 1999) is a 36-item scale measuring trauma-related thoughts and beliefs. Each item is rated on a Likert scale from 1 (totally disagree) to 7 (totally agree). The PTCI consists of items pertaining to three factors: negative cognitions about the self (e.g., ‘I have permanently changed for the worse’), negative cognitions about the world (e.g., ‘The world is a dangerous place’), and self-blame for the trauma (e.g., ‘The event happened because of the way I acted’) (Foa et al., 1999). Good internal consistency (alpha = .97) and test-retest reliability (.74 for 1-week retest interval and .85 for 3-week retest interval) have been shown (Foa et al., 1999).

### 7.4.5 Experiential Avoidance Measure

*Acceptance and Action Questionnaire (AAQ-II)*

The AAQ-II (Bond et al., 2011) scale measures experiential avoidance and psychological flexibility. It consists of 7 items rated on a scale ranging from 1 to 7, where 1 = never and 7 = always true. Examples of items include ‘I’m afraid of my feelings’ and ‘My painful memories prevent me from having a fulfilling life’. Scores range between 10 and 70, with higher scores indicating more psychological flexibility and lower scores indicating more experiential avoidance. The AAQ-II appears to have
adequate structure, reliability (mean alpha = .83; test-retest reliability for 3 months = .80 and for 1 year = .78) and validity (Bond et al., 2012).

7.5 Procedure

7.5.1 Assessment

7.5.1.1 Structure of the Assessment

The assessment consisted of semi-structured interviews and the completion of self-report questionnaires. The total assessment time was approximately three hours. Participants were given the option to split the assessment into two 1.5 hour sessions if they felt that three hours was too long. At the end of the assessment session participants were debriefed and given the opportunity to ask questions.

7.5.1.2 Obtaining Details of the Content of Trauma, Psychotic Symptoms and Post-Traumatic Intrusions

In order to elicit as much detail as possible of the content of traumas, hallucinations, delusions and post-traumatic intrusions, interviewers were trained to use particularly careful probing questions during the relevant sections of the SCID-IV and the PANSS (for hallucinations and delusions), and the CAPS (for trauma and post-traumatic intrusions). General probes were provided to assist the interviewers to obtain details of the traumatic events and symptoms. For example, Section A of the CAPS contains questions about the experience of traumatic events (e.g., ‘What happened?’ ‘Who else was involved?’ ‘Were you very anxious or frightened?’) to which further probing questions were added to obtain details of sensory experiences the person had during the trauma (‘What were you seeing/hearing/feeling at the time?’ ‘Can you give examples?’ ‘Anything else?’). These probing questions were also used in Section B of
the CAPS (assessing post-traumatic intrusions), and during the PANSS and SCID-IV (for the assessment of hallucinations and delusions). The probing questions allowed sufficient detail to be elicited in order to rate the traumas and symptoms on the four themes of threat, humiliation, culpability, and intrusiveness (see the description of the coding frame in section 7.5.2 for details about the thematic ratings).

7.5.1.3 Recording Details of the Content of Trauma, Psychotic Symptoms and Post-Traumatic Intrusions

At the conclusion of the assessment session, the interviewer entered onto four separate coding sheets the descriptions of 1) the traumas, 2) hallucinations, 3) delusions and 4) post-traumatic intrusions. The descriptions were entered onto separate sheets so that raters were blind to any association of the traumas, psychotic symptoms and intrusions.

7.5.2 The Coding Frame for Assessing Trauma and Symptom Content

7.5.2.1 Description of the Coding Frame

A modified version of Hardy et al.’s (2005) coding frame for examining phenomenological associations between trauma and hallucinations was used in this study (see Appendix C).

As Hardy et al.’s study did not examine the content of delusions, ‘indirect’ psychotic symptoms or post-traumatic intrusions, the coding frame was adapted to include these as well. This study’s version of the coding frame was designed to measure direct, indirect and thematic associations between 1) trauma and hallucinations, and 2) hallucinations and post-traumatic intrusions, and thematic relationships between
trauma and delusions. In addition, this study included the assessment of multiple traumas, hallucinations, delusions and post-traumatic intrusions for each person. For every participant, up to five of these were included in the coding and analysis.

The coding frame contained: 1) precise definitions and examples of direct and indirect content correspondences; 2) definitions and examples of the four themes; and 3) instructions for raters on how to rate the content of traumas, hallucinations, delusions and post-traumatic intrusions on the four themes.

7.5.2.2 Ratings

1) Content ratings for direct associations were made according to whether there was a literal correspondence between the content of the hallucination and trauma/post-traumatic intrusion. For example, where a person who had been verbally abused by being told “you’re a failure” by the abuser, and subsequently hears voices saying “you’re a failure” would receive a direct content rating. Hardy et al.’s (2005) original coding frame allowed for four possible ratings pertaining to the presence of a direct association; ‘yes’, ‘no’, ‘possibly’, or ‘don’t know’. However, during the process of establishing inter-rater reliability for these ratings (detailed in section 7.5.2.4), neither of the two raters required the use of the ‘possibly’ or ‘don’t know’ options, as the descriptions of traumas and symptoms were sufficiently detailed to allow for clear ‘yes’ or ‘no’ responses. Therefore, for all of the ratings in the current study, there were two possible ratings; ‘yes’ (present) or ‘no’ (absent).

2) Content ratings for indirect associations were made according to whether there was specific trauma-related content present in the relationship between hallucinations and trauma/post-traumatic intrusions, but it was not a direct, literal representation of the
trauma. For example, a person who suffered childhood sexual abuse and subsequently experiences hallucinations with sexual themes. As above, there were two possible ratings; ‘yes’ (present) or ‘no’ (absent).

3) Content ratings for thematic associations were made according to whether there was congruence between the trauma and the hallucination/delusion (or the hallucination and post-traumatic intrusion) on the ratings on the four themes used by Hardy et al. (2005). These themes were largely based on event dimensions used in the Life Events and Difficulties Schedule (LEDS) (Brown and Harris, 1989). This study used Hardy et al.’s definitions of the four themes (with amendments made from their original LEDS definitions):

- **Threat:** Threat was rated according to whether the trauma/symptom involved the participant thinking that they or someone else may be killed or injured, receiving actual injury or witnessing someone else receiving injury or being killed. Threat ratings were restricted to threats to physical integrity; other types of (e.g., psychological and social) were addressed in other themes and so were not included here.

- **Humiliation:** Humiliating traumas/symptoms involve the person being socially devalued in relation to self or others. A rating of humiliation would require one or more of the following elements:

  1) **Interpersonal humiliation:** this refers to an apparently permanent separation in a relationship where the other person took the initiative in breaking off the relationship or the participant was “forced” into ending the relationship
(e.g. following the discovery of infidelity). Some element of rejection or failure must be involved.

2) Social humiliation: This refers to events of a socially unacceptable nature carried out by someone else, which reflect on the participant in a socially devaluing way.

3) Personal humiliation: This refers to acts against the participant in a way that affects a central aspect of self-identity (e.g. rape, physical violence or public reprimands by authority figures). It also refers to trauma/hallucinations that involve personal failure e.g. infertility.

Note: Hardy et al. (2005) did not count psychological abuse from a family member as rating on humiliation as their definition required social devaluation to occur with others present (e.g., in public); however the current study counted childhood emotional abuse from a parent/guardian/caregiver as rating on humiliation due to the devaluing nature of this type of abuse and its negative effects on self-identity.

- Culpability: Culpability was rated according to whether there was an indication that the person feels responsible for the trauma or whether their symptoms reflect content indicating that they are in some way at fault for something occurring.

- Intrusiveness: Intrusive traumas/symptoms involve interference and attempted control of the participant by others. Intrusive traumas/symptoms also often involve intent to harm.

Each individual trauma, hallucination, delusion and post-traumatic intrusion was rated on each of the four themes as ‘yes’ (theme present) or ‘no’ (theme absent). Of
particular note is that any instances of childhood sexual abuse rated all four of the themes (as outlined in the Glossary; see Appendix C).

### 7.5.2.3 Procedure for Coding

Upon completion of all 70 assessment sessions, the raters were given the coding sheets and rated each participant’s traumas, hallucinations, delusions and post-traumatic intrusions on the four themes. The researcher later compared the ratings and ascertained whether thematic correspondences were present.

The raters were also presented with the descriptions of: 1) the traumas and hallucinations together; 2) the traumas and delusions together; and 3) the hallucinations and post-traumatic intrusions together. They used these to indicate on the coding sheets whether there were direct or indirect content correspondences present.

A step-by-step summary of the coding procedure is as follows:

- For each participant, up to five traumatic experiences were rated on four themes (threat, humiliation, culpability, and intrusiveness; each theme being present or absent).
- For each participant, up to five hallucinations and delusions were each rated on the four themes.
- For each participant, up to five post-traumatic intrusions were each rated on the four themes.
- Each hallucination was compared to the trauma described and rated as direct, indirect, thematic or not related to trauma.
- Each delusion was compared to the trauma described and rated as thematically or not related to the trauma.
Each hallucination was compared to the post-traumatic intrusion(s) content and rated as direct, indirect, thematic or not related to post-traumatic intrusions. (Note that these ratings were between the content of the hallucination and any of the post-traumatic intrusions).

Therefore the coding frame consisted of: 1) thematic ratings of trauma, hallucinations, delusions and post-traumatic intrusions 2) direct, indirect and thematic correspondence ratings between trauma and hallucinations, 3) thematic correspondence ratings between trauma and delusions, and 4) direct, indirect and thematic correspondence ratings between hallucinations and post-traumatic intrusions.

### 7.5.2.4 Establishing Inter-Rater Reliability for Coding

Data from 15 randomly selected participants were used to establish inter-rater reliability using two independent raters. The data from these participants contained 112 descriptions of traumatic events, hallucinations, delusions and post-traumatic intrusions.

Prior to completing the rating forms, the raters were extensively trained on the definition of the modified LEDS themes using the Glossary (see Appendix C). The student investigator studied the LEDS themes alongside the raters; the precise definition of each theme, as well as examples of descriptions of traumatic events, hallucinations, delusions and post-traumatic intrusions were discussed. The two raters then rated the descriptions for five participants together (a total of 25 descriptions) where there was opportunity to discuss any differences in rating style. When a common understanding for the manner in which all four themes were to be rated was reached, each rater independently rated the 112 descriptions from the randomly selected 15 participants on each of the four themes. The raters also indicated whether or not there
was a direct or indirect content correspondence between descriptions of trauma and hallucinations/delusions, and between hallucinations and post-traumatic intrusions.

Inter-rater reliability was established for each of the four themes separately. Neither of the raters rated any description as ‘P’ (theme possibly present) or ‘DK’ (don’t know) – i.e., both raters clearly indicated ‘Y’ (theme present) or ‘N’ (theme not present) for all of the descriptions.

Percentage agreement between the two raters was very high for all four of the themes; 96% agreement for threat ratings, 96% agreement for humiliation ratings, 100% agreement for culpability ratings, and 97% agreement for intrusiveness ratings.

In indicating the presence or absence of direct and indirect correspondences between 1) hallucinations and trauma, and 2) hallucinations and post-traumatic intrusions, there was complete agreement between the two raters. Among the trauma and symptom descriptions for the 15 test participants, both raters indicated that there were two indirect correspondence ratings and four direct correspondence ratings.

7.6 Data Analysis

7.6.1 Power Analysis

Previous studies have shown trauma severity to be related to psychotic symptom severity with a moderate effect size as per Cohen’s (1992) guidelines (e.g., Kilcommons & Morrison, 2005). Similarly, studies have reported moderate to large effect sizes when investigating the relationship between psychotic symptom severity and PTSD symptoms (Lysaker & LaRocco, 2008; Resnick, Bond, & Mueser, 2003) and trauma severity and experiential avoidance (Goldstone, Farhall, & Ong, 2012; 2011a & b) in clinical groups. To detect the hypothesised correlations between trauma severity, psychotic symptom severity, post-traumatic intrusions and avoidance, setting alpha
at .05, power (1-β) at .80 and anticipating a moderate effect size (.30), a sample size of 82 would be required (Cohen, 1992).

The exploration of frequencies of people in the sample who had relationships between the content of their psychotic symptoms, post-traumatic intrusions and trauma necessitated that a sufficient number of participants would experience trauma and post-traumatic intrusions in order to obtain meaningful results. In a previous study using similar participants from the EPPIC clinic at Orygen Youth Health, the rate of childhood trauma was 64% (Bendall et al. 2012). Therefore, of our 70 recruited participants, we expected approximately 44 to have experienced trauma. In Hardy et al.’s (2005) study, 55% had experienced trauma (and of that 55%, 13% had direct hallucinations and 43% had thematic hallucinations). In line with this, of our estimated 44 participants with trauma, we expected approximately seven to have direct psychotic symptoms and 19 to have thematic (including indirect) symptoms. Bendall et al.’s (2012) study reported a childhood trauma-related PTSD rate of 39%; we therefore expected approximately 28 participants to have childhood trauma-related PTSD in our study.

7.6.2 Analyses

All data was entered into a Statistical Package for the Social Sciences (SPSS) 22 for Windows (IBM Corp., 2013) database, and all statistical analyses were performed using SPSS. All data was tested for skewness and kurtosis with the Shapiro-Wilk test. Many of the variables were positively skewed. To attempt to correct for this, variables were transformed using square root, log and reciprocal transformations, however these transformations were not successful in normalising the data. Non-
parametric tests were therefore used where appropriate. These analyses were also conducted with bootstrapping, the results of which have been included in Appendix D.

7.6.2.1 Aim 1

Correlational analyses (non-parametric) were used to test the relationships between trauma severity (on the CTQ), post-traumatic intrusion severity (on the CAPS Criterion B scale), and hallucination and delusion severity (on the PANSS).

7.6.2.2 Aim 2

The proportion of the sample who experienced childhood trauma was determined on the basis of widely used cut-off scores shown to have acceptable levels of sensitivity and specificity (outlined in the CTQ manual; Bernstein et al., 1997). Childhood trauma was defined as obtaining a CTQ score in at least the mild to moderate range of any of the five subscales (childhood sexual abuse, childhood emotional abuse, childhood physical abuse, childhood emotional neglect, or childhood physical neglect).

Data for the investigation of the content of hallucinations, delusions, traumatic experiences and post-traumatic intrusions was analysed by looking at proportions.

- The number of people with hallucinations with content correspondences (direct, indirect, and thematic) with the trauma were determined.
- The number of people with delusions with content correspondences (thematic) with the trauma were determined.
- The number of people with hallucinations with content correspondences (direct, indirect, and thematic) with post-traumatic intrusions were also determined.
7.6.2.3 **Aim 3**

Correlational analyses (non-parametric) were used to test the relationships between the variables of interest pertaining to Aim 3; trauma severity (on the CTQ), experiential avoidance (on the AAQ), post-traumatic avoidance (on the CAPS Criterion C Avoidance Scale) and hallucination and delusion severity (on the PANSS).

7.6.2.4 **Post-Hoc Regression Analyses**

Due to the finding that hallucination and delusion severity were correlated with childhood trauma, experiential avoidance, post-traumatic avoidance and post-traumatic intrusions, a series of hierarchical multiple linear regressions were performed to determine whether these variables might be independently associated with hallucination and delusion severity. (Note that although the correlation between hallucination severity and childhood trauma only approached significance ($\rho = .21, p = .089$) this was treated as a significant correlation as the failure to reach significance is likely to be due to low power.) As maladaptive schematic beliefs are key components of the major models of the aetiology of both hallucinations and delusions from trauma (Freeman et al., 2003; Garety et al., 2001; Morrison, 2001; Morrison et al., 2003) this was also included in the regression analyses as an independent variable. Maladaptive schemas were measured by the summed score of items on the Post-Traumatic Cognitions Inventory (PTCI) that pertained to negative beliefs about the self, others and the world. These scores on the PTCI were found to be correlated with both hallucinations ($\rho = .40, p < .01$) and delusions ($\rho = .50, p < .01$).
Prior to conducting the hierarchical regression, tests of the relevant assumptions concerning the analysis were performed. The assumption of singularity was met, as the independent variables were not a combination of other independent variables. An examination of residuals and scatter plots indicated that assumptions of linearity and homoscedasticity were met. Several variables were positively skewed. Log and square root transformations were not successful in normalising the data, so the regression analyses were carried out using the untransformed data. Three cases in the dataset were identified as multivariate outliers according to Mahalanobis distance values, and these were excluded from the regression analyses. None of the independent variables were highly correlated, however it was found that there was significant multicollinearity between post-traumatic intrusions and post-traumatic avoidance. Mean-centring these variables had no effect on the multicollinearity, and separate regressions were therefore performed so that these two variables were not included in the same model. Each regression model had five independent variables, which is acceptable given the sample size ($n = 63$) according to commonly used guidelines of two subjects per independent variable (Austin & Steyerberg, 2014).
Chapter 8. Results

The results from this study are presented in six main sections. The first section (8.1) deals with data screening and analysis. The second (8.2) presents the rates of childhood trauma and PTSD found in the study. The third section (8.3) contains results corresponding with Aim 1, pertaining to the relationship between childhood trauma, post-traumatic intrusions and positive psychotic symptoms (hypotheses 1-4). The fourth section (8.4) contains results corresponding to Aim 2. Aim 2 Part A pertains to the relationship between the content of hallucinations, traumatic experiences and post-traumatic intrusions (research questions 5 and 6). Aim 2 Part B pertains to the relationship between the content of delusions and traumatic experiences (research questions 7). The fifth section (8.5) contains results for Aim 3, pertaining to the relationship between childhood trauma, avoidance, hallucinations and delusions (hypotheses 8 - 10). The sixth section (8.6) contains an investigation of variables independently associated with hallucination and delusion severity with hierarchical multiple regressions.

8.1 Data Screening and Analysis

All data was analysed using the Statistical Package for the Social Sciences (SPSS) version 22 (IBM Corp, 2013). The data was screened for outliers, skewed distributions, and missing data. To assess for normality, the distribution plots of the continuous variables were inspected, and skewness and kurtosis were measured. Several variables were positively skewed. To correct for this, log and square root
transformations were performed on the data that was not normally distributed, however neither transformation improved the distributions of the scores. The analyses were therefore carried on the untransformed data. Where skewness was present, non-parametric correlations (Spearman’s rho) were used. For the analyses, two-tailed significance tests were performed. The strength of the relationships, as indicated by the size of the correlation coefficient, was interpreted using Cohen’s (1992) criteria.

Upon screening for outliers, no cases were found with standardised scores (z scores) above 3.26 for the variables of interest. As per Tabachnick and Fidell’s (2007) guidelines, cases with z scores above 3.29 ($p < .001$) are considered to be potential outliers.

8.2 Rates of Childhood Trauma and PTSD

65% of the sample (44 people) reported the experience of childhood abuse or neglect (defined as scoring in at least the low to moderate range for at least one of the five trauma subtypes on the CTQ). Of those participants who reported childhood trauma on the CTQ, the majority (60%) experienced multiple types of trauma. The frequencies of the CTQ trauma subtypes for the sample are shown in Table 8.1.
Table 8.1
*Frequency, Mean Severity and Range for Each CTQ Trauma Subtype (n = 66)*

<table>
<thead>
<tr>
<th>Trauma Subtype</th>
<th>n</th>
<th>%</th>
<th>Mean Severity</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotional Abuse</td>
<td>23</td>
<td>35</td>
<td>11.3</td>
<td>5-25</td>
</tr>
<tr>
<td>Physical Abuse</td>
<td>12</td>
<td>18</td>
<td>7.6</td>
<td>5-19</td>
</tr>
<tr>
<td>Sexual Abuse</td>
<td>16</td>
<td>24</td>
<td>7.4</td>
<td>5-25</td>
</tr>
<tr>
<td>Emotional Neglect</td>
<td>16</td>
<td>24</td>
<td>7.2</td>
<td>5-25</td>
</tr>
<tr>
<td>Physical Neglect</td>
<td>16</td>
<td>24</td>
<td>6.2</td>
<td>3-17</td>
</tr>
<tr>
<td>Childhood Trauma (any abuse or neglect)</td>
<td>44</td>
<td>65</td>
<td>39.7</td>
<td>18-99</td>
</tr>
</tbody>
</table>

Of the total 66 participants, 18 met criteria for PTSD (26% of the entire sample; 41% of those with childhood trauma).

8.3 Statistical Associations Between Trauma, Post-Traumatic Intrusions and Psychosis

The results in this section pertain to Aim 1, hypotheses 1-4.

*It is hypothesised that more severe childhood trauma will be correlated with:*

1) *more severe hallucinations,* and 2) *more severe delusions.*

These hypotheses were tested by correlating the total score on the CTQ with 1) PANSS item P3 (hallucinatory behaviour), and 2) the sum of PANSS items P1 and P6 (delusions and suspiciousness/persecution). Correlation analysis using Spearman’s rho revealed a positive association between childhood trauma severity and hallucination severity, with a small effect size and a trend towards significance ($\rho = .21, p = .09$). For delusions, there was a significant positive association between
childhood trauma severity and delusion severity with a moderate effect size ($\rho = .29$, $p < .05$).

*It is hypothesised that more severe post-traumatic intrusions will be correlated with:*

3) *more severe hallucinations*, and 4) *more severe delusions*.

These hypotheses were tested by correlating the CAPS Criterion B (Intrusions Scale) score with PANSS item P3 (hallucinatory behaviour), and the sum of PANSS items P1 and P6 (delusions and suspiciousness/persecution). Correlation analysis using Spearman’s rho revealed a significant positive association between post-traumatic intrusion severity and hallucination severity, with a medium effect size ($\rho = .44, p < .01$).

For delusions, correlation analysis using Spearman’s rho revealed a significant positive association between post-traumatic intrusion severity and delusion severity, with a large effect size ($\rho = .46, p < .01$).

### 8.4 The Content of Psychotic Symptoms in Relation to Trauma

#### 8.4.1 Proportion of People with Childhood Trauma Reporting the Experience of Hallucinations, Delusions and Post-Traumatic Intrusions

Table 8.2 below shows the proportion of the 44 people who experienced childhood trauma who also reported experiencing hallucinations, delusions and post-traumatic intrusions. The experience of post-traumatic intrusions were rated as present
if the participant endorsed any CAPS Criterion B item and scored at least a 1 for frequency and intensity.

Table 8.2
Proportions of People with Childhood Trauma (n = 44) who Experienced Hallucinations, Delusions and Post-Traumatic Intrusions

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Proportion who experienced the symptom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hallucinations</td>
<td>81.8%</td>
</tr>
<tr>
<td>Delusions</td>
<td>86.4%</td>
</tr>
<tr>
<td>Post-Traumatic Intrusions</td>
<td>54.5%</td>
</tr>
</tbody>
</table>

8.4.2 Number of Hallucinations, Delusions, and Post-Traumatic Intrusions Described by Participants

The content of up to five hallucinations, five delusions and five post-traumatic intrusions was recorded for each participant (as outlined in the Method section). Figure 8.1 shows the frequency of people with trauma who described the content of between one and five of each symptom type. On average, participants described the content of 3.4 hallucinations, 2.5 delusions, and 1.7 post-traumatic intrusions.
Figure 8.1. Frequency of participants with trauma ($n = 44$) who reported between 1 and 5 distinct hallucinations, delusions and post-traumatic intrusions.

**8.4.3 Content Associations Between Trauma, Post-Traumatic Intrusions and Psychotic Symptoms**

Aim 2 was to investigate associations between trauma and psychotic symptom content, and post-traumatic intrusion and hallucination content.

**8.4.3.1 Content Associations Between Trauma and Hallucinations**

Research Question 5: For those with childhood trauma and hallucinations, what proportion have direct, indirect, thematic, and no associations between their trauma and the content of their hallucinations? (And what proportion have one, two, three, or all four of these types of associations present in their symptoms?)
Of the 44 people who experienced childhood trauma, 36 experienced hallucinations. Of these 36 people, 28 (78%) experienced at least some hallucinations that were related to their trauma (directly, indirectly or thematically). Conversely, eight people (22%) only experienced hallucinations that were unrelated to their trauma. Nine people (25%) experienced hallucinations directly related to their trauma, three (8%) experienced hallucinations indirectly related to their trauma, 24 (67%) experienced hallucinations thematically related to their trauma, and 29 (81%) experienced hallucinations with no relationship to their trauma.

Examples of participants’ descriptions of directly, indirectly and thematically related traumas and hallucinations are shown in Table 8.3. The table shows descriptions of trauma and hallucination content from the nine participants who had direct relationships and the three participants who had indirect relationships. It also shows four examples of thematic relationships (one example of each of the four themes; threat, humiliation, culpability and intrusiveness).
### Table 8.3
Examples of Participants’ Descriptions of Trauma and Hallucination Content Where Content was Directly, Indirectly or Thematically Related

<table>
<thead>
<tr>
<th>Relationship</th>
<th>Trauma</th>
<th>Hallucination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct</td>
<td>My older sister called me names a lot. E.g., “You’re fat and ugly”. My mother was always yelling at me, she called me names like “stupid”, “useless”, “hopeless”, “pathetic”. I was bullied in high school: One girl always verbally abused and threatened me. She would say things like “If you don’t do what I say I’ll bash you”. I was always scared she would hurt me. Dad often punished me physically, very badly. He used different things like belts, anything that would hurt me. He always yelled at me and called me ‘useless’ and ‘ugly’ and told me I’d never amount to anything. When I was 13 my mum’s friend took me to a hotel room where a man was waiting for us. Mum’s friend went into the other room and the man pushed me up against the wall and touched me and fingered my vagina. In primary and high school I was bullied and called names by other kids. E.g., “You’re fat”. Members of my family call me fat all the time too. My mother and her boyfriend abused me verbally and swore at me all the time. E.g., “You fat piece of s<strong>t” and “You useless c</strong>t”. My father verbally abused me – he swore at me all the time. My dad would verbally abuse me and my mother and brother. Calling us insulting names like telling us we are stupid.</td>
<td>The voices criticise me, E.g., “You’re fat and ugly”. I hear three male voices, always critical and negative. They say things like “you’re hopeless” and “you’re pathetic”. I hear the voices of three guys and one girl. Saying very threatening things, e.g.: [when trying to sleep]: “You have to stay awake or I’ll bash you.” I hear lots of voices in my head, yelling at me and commenting on what I’m doing. Sometimes some of them sound a bit like my dad, they tell me to go kill myself and that I’m ugly. I had to stop working because they criticised everything I did – I was just trying to work and they would be yelling “What the hell are you doing, you’re useless” at me. I feel like there are hands touching me all over, and touching my vagina. I hear the sound of my own voice but it’s coming from outside my head. It’s very critical and puts me down all the time and comments on what I’m doing. E.g. [when I’m putting on makeup] “You’re fat and ugly, do you really think makeup is going to make you better?” I hear voice swearing at me, calling me a “fat piece of s<strong>t” and “useless c</strong>t”. I heard a voice swearing at me - the exact same swear words my father used to say but it wasn’t his voice. I hear voices that are always negative. They call me things like “stupid”.</td>
</tr>
</tbody>
</table>
### Indirect

Dad was always drunk when I was growing up – he would beat me up all the time. He hit, kicked and strangled me.

I was raped by my first boyfriend, and by two other men as well. I remember being forced to have anal sex but I was drunk and couldn’t think or move or fight back.

I was assaulted on the train. I was alone in a carriage when a man who was drunk leant over me and tried to grab me, I could smell the alcohol on his breath I kicked him and ran away crying and told the inspectors. It was so unexpected. I felt panicked, physically sick and nauseous, I felt fearful and couldn’t calm down.

I have continual visions of a man who looks almost identical to my father – same height, hair colour, eye colour, and the face is almost exactly the same. I see him attack and hurt people around me. I’ve seen him attack a child and murder people in front of me.

I hear many voices of demons all around me, constantly talking. When this happens I get the feeling that I have been paralysed by the demons and then the feeling that I’m being raped by them.

I heard the voices of older men in their 50s or 60s. They often are insulting and make negative comments towards me. They say things like “You’re going to get assaulted.”

### Thematic

**Threat:** My mother’s ex-boyfriend was often out of control with alcohol and drugs. He was very physically abusive towards her and I witnessed this all the time. I was scared he would hurt me too.

I hear three male voices all telling me that I’m going to get hurt.

**Humiliation:** I was bullied in primary school by a teacher. The teacher used to get me up in front of the class and single me out to embarrass me. For example she accused me of pretending I had a back disorder when I really did have one, and she called me a liar in front of everyone.

I hear very critical voices insulting me. They tell me things like “you’re not good enough”.

**Culpability:** I’ve been sexually assaulted a number of times by different people. These people were friends of my friends. They would touch me inappropriately and threaten to hurt me if I didn’t do what they wanted.

I hear voices telling me that I’m a bad person.

**Intrusiveness:** On two separate occasions I was sexually assaulted by strangers. These events happened very close together and I felt scared, dirty and horrible.

I hear voices that are very negative. It feels like they are controlling my body and making me do things. They tell me to hit people, hurt myself or others and sometimes tell me to kill myself.
The extent to which participants experienced multiple, overlapping types of relationships between the content of their hallucinations and their traumatic experiences is illustrated in Figure 8.2. The figure shows the proportions of people who experienced hallucinations with direct, indirect, thematic and no relationship to their traumatic experiences, and shows proportions of people who experienced hallucinations with multiple types of these relationships. Hallucinations with direct or indirect relationships to trauma were combined into one category (‘direct/indirect relationship’) here.

Figure 8.2. Proportions of people with childhood trauma and hallucinations (n = 36) whose hallucinations were directly/indirectly, thematically, and/or not related to their trauma.
8.4.3.2 Content Associations Between Post-Traumatic Intrusions and Hallucinations

Research Question 6: For those with hallucinations who also experience post-traumatic intrusions, what proportion have direct, indirect, thematic and no associations between the content of their intrusions and the content of their hallucinations? (And what proportion have one, two, three, or all four of these types of associations present in their symptoms?)

Of the 36 people who experienced childhood trauma and hallucinations, 22 experienced post-traumatic intrusions. Of these 22 people, 16 (73%) experienced at least some hallucinations that were related to their post-traumatic intrusions (directly, indirectly or thematically). Six people (27%) only experienced hallucinations that were unrelated to their post-traumatic intrusions. Three people (14%) experienced hallucinations directly related to their post-traumatic intrusions, three (14%) experienced hallucinations indirectly related to their post-traumatic intrusions, 12 (55%) experienced hallucinations thematically related to their post-traumatic intrusions, and 11 (50%) experienced hallucinations with no relationship to their post-traumatic intrusions. (It is of note is that the three people who had direct relationships between their hallucinations and their post-traumatic intrusions also had direct relationships between their hallucinations and trauma.)

Examples of participants’ descriptions of directly, indirectly and thematically related hallucinations and post-traumatic intrusions are shown in Table 8.4. The table shows descriptions of hallucination and intrusion content from the three participants who had direct relationships and the three participants who had indirect relationships. It also shows four examples of thematic relationships (one example of each of the four themes; threat, humiliation, culpability and intrusiveness).
Table 8.4  
Examples of Participants’ Descriptions of Hallucination and Post-Traumatic Intrusion Content Where Content was Directly, Indirectly or Thematically Related

<table>
<thead>
<tr>
<th>Relationship</th>
<th>Hallucination</th>
<th>Post-Traumatic Intrusion</th>
</tr>
</thead>
</table>
| **Direct**   | I hear lots of voices in my head, yelling at me and commenting on what I’m doing. Sometimes some of them sound a bit like my dad, they tell me to go kill myself and that I’m ugly. I had to stop working because they criticised everything I did – I was just trying to work and they would be yelling “What the hell are you doing, you’re useless” at me.  
I feel like there are hands touching me all over, and **touching my vagina**.  
I hear voice swearing at me, calling me a “fat piece of s**t” and “useless c**t”. | I have a lot of nightmares and bad memories that won’t go away of Dad belting me, and yelling at me, calling me **useless**.  
I sometimes have flashbacks of being in the hotel room. I see and hear everything that was happening when I was in there – the man’s face, him pushing me up against the wall and **fingerling my vagina**.  
Memories of my mum and her boyfriend and how they treated me are always there, popping into my head. E.g., memories of the sound of them swearing at me – “You fat piece of s**t”. “You useless c**t”. |
| **Indirect** | I have continual visions of a man who looks almost identical to my father – same height, hair colour, eye colour, and the face is almost exactly the same. I see him attack and hurt people around me. I’ve seen him attack a child and murder people in front of me.  
I hear many voices of demons all around me, constantly talking. When this happens I get the feeling that I have been paralysed by the demons and then the feeling that I’m being raped by them.  
I heard the voices of older men in their 50s or 60s. They often are insulting and make negative comments towards me. They say things like “You’re going to get assaulted.” | Images of my dad are always there in my mind – physically attacking me and beating me up.  
I have dreams all the time of being raped by strangers. Being held down and not able to fight back or get the men off of me.  
Sometimes if the door is rattling or it’s windy, I feel panicked and then feel like I am being assaulted again. I have to make sure it is locked. |
**Thematic**

**Threat:** I heard voices threatening me. They say things like “I’m coming to get you and your family”, “I’m going to bash you”, and “If you don’t do what I tell you I’m going to hurt you”.

I sometimes get pictures coming into my head of my dad bashing my mum. I can see blood from where he hurt her and hear her crying.

**Humiliation:** I hear voices of demons saying “die you slutty bitch”.

I see pictures in my head of the time I was made to do oral sex on two men [at age 6]. The pictures flash by one after the other.

**Culpability:** I hear voices telling me that I’m a bad person.

I frequently feel as if I am back in the situation of the sexual assaults. It feels really real. [Friends of a friend assaulted me and touched me inappropriately and threatened me if I didn’t do what they wanted.]

**Intrusiveness:** I hear a male voice saying “hurt yourself”.

I have really strong memories of what those guys did to me in the student accommodation when they sexually assaulted me. There are lots of thoughts that race through my mind, similar to what I was thinking then. I also have nightmares of the assaults where it feels like I’m reliving it again in my dreams. I’ve had flashbacks where I feel like it’s happening all over again and I’m panicked and seeing the guys do what they did at the time.
The extent to which participants experienced multiple, overlapping types of relationships between the content of their hallucinations and the content of their post-traumatic intrusions is illustrated in Figure 8.3. The figure shows the proportions of people who experienced hallucinations with direct, indirect, thematic, and no relationships to their post-traumatic intrusions, and shows proportions of people who experienced hallucinations with multiple types of these relationships. Hallucinations with direct or indirect relationships to post-traumatic intrusions were again combined into one category (‘direct/indirect relationship’).

*Figure 8.3. Proportions of people with childhood trauma, hallucinations and post-traumatic intrusions (n = 22) whose hallucinations were directly/indirectly, thematically, and/or not related to their post-traumatic intrusions.*
8.4.3.3 Content Associations Between Trauma and Delusions

Research Question 7. For those with childhood trauma and delusions, what proportion have thematic associations and what proportion have no associations between their trauma and the content of their delusions? (And what proportion have both of these types of associations present in their symptoms?)

Of the 44 people who experienced childhood trauma, 38 had delusions. Of these 38, 34 (89%) had delusions thematically related to their trauma, and 26 (68%) had delusions that were unrelated to their trauma. Twelve people (32%) only had delusions thematically related to their trauma, and 4 people (11%) only had delusions unrelated to their trauma. The majority (22 people; 58%) had a mixture of delusions thematically related and unrelated to their traumatic experiences.

Examples of participants’ descriptions of traumatic experiences and delusion content that was thematically related are shown in Table 8.5. Four examples are shown, one of each of the four themes; threat, humiliation, culpability and intrusiveness.
<table>
<thead>
<tr>
<th>Theme</th>
<th>Trauma</th>
<th>Delusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threat</td>
<td>I was in an abusive relationship for years. My girlfriend would hit me</td>
<td>I thought there were cameras in my bedroom and they were filming what</td>
</tr>
<tr>
<td></td>
<td>and punch me in the face. She would stand over me and try to suffocate</td>
<td>I was doing in my spare time. I thought a guy I knew was the ringleader</td>
</tr>
<tr>
<td></td>
<td>me with pillows.</td>
<td>behind the cameras filming me and that he wanted to hurt me.</td>
</tr>
<tr>
<td>Humiliation</td>
<td>I was bullied all the time in Year 7. I was bashed many times by the</td>
<td>Sometimes I feel like people are talking about me behind my back and</td>
</tr>
<tr>
<td></td>
<td>bullies and called many names. At the time I was stressed and worried.</td>
<td>they say horrible things. For instance, disclosing personal information</td>
</tr>
<tr>
<td></td>
<td>Worried that people would laugh at me all the time and call me names.</td>
<td>about me to others, for example about my past self-harm.</td>
</tr>
<tr>
<td>Culpability</td>
<td>My boyfriend would call me names and hit me so hard it left bruises.</td>
<td>I thought I had done something terrible and that I’d be punished for it</td>
</tr>
<tr>
<td></td>
<td>He would manipulate me and make me feel like I was always in the wrong,</td>
<td>and go to jail because of it. I don’t know what it was that I had done. I</td>
</tr>
<tr>
<td></td>
<td>and keep me away from my family and friends. I felt guilty and</td>
<td>thought other people knew that I was guilty and was going to be</td>
</tr>
<tr>
<td></td>
<td>embarrassed and confused all the time.</td>
<td>punished and were smiling knowingly at me.</td>
</tr>
<tr>
<td>Intrusiveness</td>
<td>A male ‘friend’ of mine sexually assaulted me when I was sleeping. I</td>
<td>I believed that someone had hacked into my computer and taken over</td>
</tr>
<tr>
<td></td>
<td>woke up and he was touching me. I felt very taken advantage of. Also</td>
<td>my Facebook profile and had intruded on all my private stuff.</td>
</tr>
<tr>
<td></td>
<td>when I was 18 my boyfriend touched me sexually when I told him not to.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>He held me down physically and left bruises on my arm.</td>
<td></td>
</tr>
</tbody>
</table>
Figure 8.4 shows the proportions of people who experienced delusions that were thematically related and delusions that were unrelated to their trauma (and the proportion of people who had delusions with both thematic relationships and no relationship to their trauma).

Figure 8.4. Proportions of people with childhood trauma and delusions \((n = 38)\) whose delusions were thematically related or unrelated to their trauma.

8.4.4 Thematic Ratings on Traumas, Post-Traumatic Intrusions, Hallucinations and Delusions

Participants were asked to describe up to five traumatic experiences, hallucinations, delusions and post-traumatic intrusions, and it was possible to have more than one theme present in each of these sets of experiences. Table 8.6 shows the
Table 8.6

*Mean Number of Themes Present, and Proportions of Each of the Four Themes Present in Participants’ Traumas, Hallucinations, Delusions, and Post-Traumatic Intrusions*

<table>
<thead>
<tr>
<th>Trauma/Symptom</th>
<th>Mean Number of Themes Present Per Person</th>
<th>Proportions of Each of the Four Themes Present</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Threat</td>
<td>Humiliation</td>
</tr>
<tr>
<td>Traumas</td>
<td>2.6</td>
<td>31.1%</td>
</tr>
<tr>
<td>Hallucinations</td>
<td>1.7</td>
<td>33.3%</td>
</tr>
<tr>
<td>Delusions</td>
<td>1.3</td>
<td>35.5%</td>
</tr>
<tr>
<td>Post-Traumatic Intrusions</td>
<td>1.8</td>
<td>31.3%</td>
</tr>
</tbody>
</table>

mean number of themes rated as present in each participant’s set of traumas, hallucinations, delusions and post-traumatic intrusions. The table also shows the proportions of the thematic ratings that correspond to each of the four themes (threat, humiliation, culpability and intrusiveness) for participants’ traumas, hallucinations, delusions and post-traumatic intrusions. Threat was the most common theme present in participants’ traumas, delusions and post-traumatic intrusions. Intrusiveness was the most common theme in participants’ hallucinations. Culpability was the least common theme present in participants’ traumas and as well as in all three of the symptoms.
8.5 The Role of Avoidance and Hallucinations and Delusions in People with Trauma

8.5.1 Statistical Associations Between Trauma, Avoidance, Hallucinations and Delusions

Aim 3 was to investigate the relationships between childhood trauma, avoidance, hallucinations and delusions. Hypotheses 8-10 were tested with correlational analyses, the results for which are shown in Table 8.7. Results for each of these hypotheses individually are discussed below.

Table 8.7
Correlations Between Childhood Trauma, Experiential Avoidance, Post-Traumatic Avoidance, Post-Traumatic Intrusions, Hallucinations and Delusions

<table>
<thead>
<tr>
<th>Measure</th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5.</th>
<th>6.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Childhood Trauma</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Hallucinations</td>
<td>.21</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Delusions</td>
<td>.29*</td>
<td>.36**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Post-Traumatic Avoidance</td>
<td>.48**</td>
<td>.41**</td>
<td>.36**</td>
<td>-</td>
<td></td>
<td></td>
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<tr>
<td>5. Experiential Avoidance</td>
<td>.29*</td>
<td>.41**</td>
<td>.36**</td>
<td>.49**</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>6. Post-Traumatic Intrusions</td>
<td>.38**</td>
<td>.44**</td>
<td>.46**</td>
<td>.68**</td>
<td>.51**</td>
<td>-</td>
</tr>
</tbody>
</table>

*p < .05, **p < .01

Note. Correlation coefficients are Spearman’s rho. Correlations pertaining to Hypotheses 8-10 are shown in red.
8.5.2 Statistical Association Between Trauma and Experiential Avoidance

The correlation analysis testing Hypothesis 8, that people with more severe childhood trauma (as measured by the CTQ) would have higher levels of experiential avoidance (as measured by the AAQ), revealed a significant positive association with a moderate effect size.

8.5.3 Statistical Association Between Post-Traumatic Avoidance and Experiential Avoidance

The correlation analysis testing Hypothesis 9, that higher levels of post-traumatic avoidance (as measured by the total score on the CAPS Criterion C Avoidance scale) would be associated with higher levels of experiential avoidance (as measured by the AAQ), revealed a significant positive association with a large effect size.

8.5.4 Statistical Association Between Post-Traumatic Avoidance, Experiential Avoidance, Hallucinations and Delusions

Correlational analyses testing Hypotheses 10, that post-traumatic avoidance (as measured by the CAPS Criterion C Avoidance Scale) would be related to experiential avoidance (as measured by the AAQ), and Hypothesis 11, that post-traumatic avoidance would be related to the severity of hallucinations (as measured by PANSS item P3) and delusions (as measured by PANSS items P1 and P6) revealed the following: Post-traumatic avoidance was found to be significantly positively associated
with both hallucinations and delusions (both with moderate effect sizes), and experiential avoidance was found to be significantly positively associated with both hallucinations and delusions (both with moderate effect sizes).

8.6 Investigating Relationships with Hallucination and Delusion Severity using Hierarchical Multiple Regressions

8.6.1 Independent Relationships with Hallucination Severity

Two hierarchical multiple regressions were performed to investigate whether any of the variables of interest were independently related to hallucination severity. The first step in both regression models included only delusions as an independent variable, as a test of whether the independent variables of interest (childhood trauma, post-traumatic intrusions, post-traumatic avoidance, experiential avoidance and maladaptive schemas) improved the proportion of variance explained in hallucination severity after statistically controlling for delusion severity.

The first model included delusions, childhood trauma, post-traumatic intrusions, experiential avoidance and maladaptive schemas as independent variables. After Step 1, with delusions entered, it was found that delusion severity accounted for 9% of the variation in hallucination severity; $R^2 = .09$, $F(1, 62) = 5.87, p < .05$. At Step 2, adding childhood trauma, post-traumatic intrusions, experiential avoidance and maladaptive schemas into the equation explained an additional 20% of the variation in hallucination severity, and this change in variance explained from Step 1 to Step 2 was significant; $F(4, 59) = 3.76, p < .01$. With all five independent variables included in Step 2, the only variable significantly independently associated with hallucination severity was post-
traumatic intrusions, which accounted for 13% of the variation in hallucination severity.

The summary regression statistics for the two steps are shown in Table 8.8.

Table 8.8
Summary of Hierarchical Regression Analysis for Variables Predicting Hallucinations in Model 1 (n = 63)

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>p</th>
<th>sr² (unique)</th>
<th>R</th>
<th>R²</th>
<th>ΔR²</th>
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</thead>
<tbody>
<tr>
<td><strong>Step 1</strong></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Constant</td>
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<td>.43</td>
<td>.43</td>
<td>.10</td>
<td>.30</td>
<td>.30</td>
<td>.09</td>
<td>.09</td>
</tr>
<tr>
<td>Delusions</td>
<td>.25</td>
<td>.10</td>
<td>.30</td>
<td>.10</td>
<td>.09</td>
<td>.54</td>
<td>.29</td>
<td>.20</td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
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<td>.65</td>
<td>.43</td>
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<td>.54</td>
<td>.29</td>
<td>.20</td>
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<td>-.05</td>
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<td>.00</td>
<td>.00</td>
<td>.00</td>
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<td>.48**</td>
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<td>.13</td>
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<td>Experiential Avoidance</td>
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<td>.00</td>
<td>.00</td>
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<td>.00</td>
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<tr>
<td>Maladaptive Schemas</td>
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<td>.01</td>
<td>.12</td>
<td>.43</td>
<td>.01</td>
<td>.01</td>
<td>.00</td>
<td>.00</td>
</tr>
</tbody>
</table>

*p < .05, **p < .01

*Note: The squared semipartial correlation coefficient (sr²) represents the unique amount of variance the predictor brings to the model.*

The second model included delusions, childhood trauma, post-traumatic avoidance, experiential avoidance and maladaptive schemas as independent variables. As with the first model, after Step 1 with delusions entered, it was found that delusion severity accounted for 9% of the variation in hallucination severity; $R^2 = .09$, $F(1, 62) = 5.87$, $p < .05$. At Step 2, adding childhood trauma, post-traumatic avoidance, experiential avoidance and maladaptive schemas into the equation explained an additional 12% of the variation in hallucination severity, however this change in the proportion of variance explained from Step 1 to Step 2 was not significant; $F(4, 59) = 2.12$, $p = .09$. With all five independent variables included in Step 2, there were no variables significantly independently associated with hallucination severity. The summary regression statistics for the two steps are shown in Table 8.9.
Table 8.9
Summary of Hierarchical Regression Analysis for Variables Predicting Hallucinations in Model 2 (n = 63)

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>p</th>
<th>sr²</th>
<th>R</th>
<th>R²</th>
<th>ΔR²</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>1.27</td>
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<td>.43</td>
<td>.00</td>
<td>.21</td>
<td>.30</td>
<td>.09</td>
<td>.09</td>
</tr>
<tr>
<td>Delusions</td>
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<td>.10</td>
<td>.21</td>
<td>.10</td>
<td>.09</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
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<td></td>
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<td>Maladaptive Schemas</td>
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<td>.01</td>
<td>.13</td>
<td>.55</td>
<td>.01</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: The squared semipartial correlation coefficient (sr²) represents the unique amount of variance the predictor brings to the model.

8.6.2 Independent Relationships with Delusion Severity

Two hierarchical multiple regressions were performed to investigate the independent association of the variables of interest with delusion severity. The first step in both regression models included only hallucinations as an independent variable, as a test of whether the independent variables of interest (childhood trauma, post-traumatic intrusions, post-traumatic avoidance, experiential avoidance and maladaptive schemas) improved the proportion of variance explained in delusion severity after statistically controlling for hallucination severity.

The first model included hallucinations, childhood trauma, post-traumatic intrusions, experiential avoidance and maladaptive schemas as independent variables. After Step 1, with hallucinations entered, hallucination severity accounted for 9% of the variation in delusion severity; $R^2 = .09, F(1, 62) = 5.87, p < .05$. At Step 2, adding childhood trauma, post-traumatic intrusions, experiential avoidance and maladaptive schemas into the equation explained an additional 32% of the variation in delusion severity.
severity, and this change in variance explained from Step 1 to Step 2 was significant; $F(4, 59) = 7.57, p < .01$. With all five independent variables included in Step 2, there were two variables that were independently associated with delusion severity; post-traumatic intrusions, which accounted for 14% of the variation in delusion severity, and maladaptive schemas, which accounted for 5% of the variation in delusion severity.

The summary regression statistics for the two steps are shown in Table 8.10.

<table>
<thead>
<tr>
<th>Step 1</th>
<th>Variable</th>
<th>B</th>
<th>SE B</th>
<th>$\beta$</th>
<th>$p$</th>
<th>$sr^2$ (unique)</th>
<th>$R$</th>
<th>$R^2$</th>
<th>$\Delta R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Constant</td>
<td>2.98</td>
<td>.41</td>
<td>.41</td>
<td>.00</td>
<td>.30</td>
<td>.09</td>
<td>.09</td>
<td>.09</td>
</tr>
<tr>
<td></td>
<td>Hallucinations</td>
<td>.37</td>
<td>.15</td>
<td>.30</td>
<td>.10</td>
<td>.45</td>
<td>.30</td>
<td>.09</td>
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</tr>
<tr>
<td>Step 2</td>
<td>Constant</td>
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<td>.64</td>
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<td></td>
<td>Hallucinations</td>
<td>-.06</td>
<td>.16</td>
<td>-.05</td>
<td>.45</td>
<td>.42</td>
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<td></td>
<td>Childhood Trauma</td>
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<td>.01</td>
<td>-.05</td>
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<td>.98</td>
<td>.00</td>
<td>.14</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Post-Traumatic Intrusions</td>
<td>.56</td>
<td>.16</td>
<td>.51**</td>
<td>.00</td>
<td>.00</td>
<td>.14</td>
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<td></td>
<td>Experiential Avoidance</td>
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<td>.03</td>
<td>-.10</td>
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<td>.42</td>
<td>.01</td>
<td>.14</td>
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<tr>
<td></td>
<td>Maladaptive Schemas</td>
<td>.02</td>
<td>.01</td>
<td>.34*</td>
<td>.02</td>
<td>.02</td>
<td>.05</td>
<td>.14</td>
<td></td>
</tr>
</tbody>
</table>

*p < .05, **p < .01

Note: The squared semipartial correlation coefficient ($sr^2$) represents the unique amount of variance the predictor brings to the model.

The second model included hallucinations, childhood trauma, post-traumatic avoidance, experiential avoidance and maladaptive schemas as independent variables. As with the first model, after Step 1 with hallucinations entered, hallucination severity accounted for 9% of the variation in delusion severity; $R^2 = .09, F(1, 62) = 5.87, p < .05$.

At Step 2, adding childhood trauma, post-traumatic avoidance, experiential avoidance and maladaptive schemas into the equation explained an additional 21% of the variation in delusion severity, and this change in variance explained from Step 1 to Step 2 was significant; $F(4, 59) = 4.13, p = .01$. With all five independent variables included in
Step 2, the only variable independently associated with delusion severity was maladaptive schemas, which accounted for 8% of the variation in delusion severity.

The summary regression statistics for the two steps are shown in Table 8.11.

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE</th>
<th>β</th>
<th>p</th>
<th>sr²  (unique)</th>
<th>R</th>
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*p < .05

Note: The squared semipartial correlation coefficient (sr²) represents the unique amount of variance the predictor brings to the model.
Chapter 9. Discussion

This chapter addresses the findings of this study in relation to the hypotheses and research questions outlined in Chapter 6, and the theories and research reviewed in Chapters 2-5. It then considers the contributions of the study, as well as its limitations and clinical implications. Finally, directions for future research are discussed.

9.1 Prevalence of Trauma and PTSD

9.1.1 Prevalence of Trauma

Sixty-five percent of the entire sample with first episode psychosis reported childhood abuse or neglect. While this study did not include psychiatric or non-psychiatric control groups (and hence this rate of 65% cannot be compared to rates of trauma in people without psychosis), this rate is broadly in line with other studies measuring the prevalence of trauma in people with first episode psychosis (Bendall et al., 2013; Compton et al., 2004; Greenfield et al., 1994; Neria et al., 2002; Trauelsen et al., 2015) and in other groups with psychosis (Bendall, Jackson, Hulbert, & McGorry, 2008). Comparisons between studies on rates of reported childhood trauma are difficult due to different definitions of childhood trauma, different measures used to detect trauma and different study methodologies (Bendall et al., 2008). The current study used the CTQ as a measure of childhood trauma, which assesses only for victimisation trauma and not for other types of childhood adversity. Studies using first episode psychosis samples which also used the CTQ as a trauma measure found rates of childhood trauma of 63% (Bendall et al., 2013), 50% childhood sexual abuse and 61% childhood physical abuse (Compton et al., 2004) and 89% (Trauelsen et al., 2015). Trauelsen et al.’s (2015) study also included measures to detect separation from or death of a parent and institutionalisations, which would account for the higher
prevalence of trauma they found (although they used more stringent cut-off scores to
detect childhood trauma on the CTQ). Studies with first episode psychosis patients
using other trauma measures found rates of 53% (Greenfield et al., 1994) and 69%
(Neria et al., 2002; 5% of these participants reported post-psychotic trauma).

9.1.2 Prevalence of PTSD

Research Question 1 pertained to the prevalence of PTSD in the entire sample
with first episode psychosis. Twenty-six percent of the sample met diagnostic criteria
for PTSD. Studies reviewed in Chapter 2 that examined the rates of PTSD in samples
with psychosis diagnoses found rates between 16% and 55% (Aakre et al., 2014;
Bendall et al. 2012; Calhoun et al., 2007; Chapleau, Bell, & Lysaker, 2014; de Bont et
al., 2015; Gearon et al., 2003; Halász et al., 2013; Hardy et al., 2016; Kilcommons &
Morrison, 2005; Lommen & Restafo, 2009; Mueser et al., 1998; Neria et al., 2002;
Newman, Turnbull, Berman, Rodrigues, & Serper, 2010; Resnick, Bond, & Mueser,
2003; Steel, Doukani, & Hardy, 2017). Most of these studies were done with adult
samples. Only two used first episode samples, and these found rates of PTSD of 39%
(Bendall et al., 2012) and 27% (Neria et al., 2002; some of the PTSD in this study may
have been post-psychotic.) Most of the studies used a general measure of lifetime
trauma and did not differentiate between childhood and adulthood trauma. The studies
that included measures of childhood trauma typically found PTSD rates to be higher in
people who experienced any childhood trauma compared to people who only
experienced adulthood trauma (Calhoun et al., 2007; Gearon et al., 2003). Although the
Clinician-Administered PTSD Scale (CAPS; Blake et al., 1995) is the most well-
validated and accepted measure of diagnosing and assessing severity of PTSD
symptoms (Weathers, Keane & Davidson, 2001), only five studies used the CAPS to
assess PTSD, finding rates between 13% and 48% (Aakre et al., 2014; de Bont et al., 2015; Halász et al., 2013; Neria et al., 2002; Resnick, Bond, & Mueser, 2003). Overall, the prevalence of PTSD found in the current study is broadly in line with that of previous studies, although it is somewhat higher than the prevalence reported in de Bont et al.’s (2015) study which is the most robust assessment of PTSD in psychotic disorders to date. The prevalence found in the present study is notably higher than estimates of PTSD prevalence in the general population of 8 to 9% (Breslau, Davis, Andreski, & Peterson., 1991; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995).

9.2 Trauma, Post-Traumatic Intrusions, Hallucinations and Delusions

9.2.1 Severity Associations Between Trauma, Hallucinations and Delusions

It was predicted that more severe childhood trauma would be correlated with more severe hallucinations (Hypothesis 1) and delusions (Hypothesis 2). Hypothesis 1 was not supported by the finding that childhood trauma severity was positively correlated with hallucination severity, with a small effect size and a trend towards significance. Hypothesis 2 was supported by the finding that childhood trauma severity was significantly positively correlated with delusions severity, with a moderate effect size. It was surprising to find that the association with hallucinations was weaker than that for delusions and did not reach significance, as previous evidence reviewed in Chapter 2 suggests a potentially stronger relationship between trauma and hallucination severity compared with delusions, however there are fewer studies (and fewer methodologically high quality studies) that have examined trauma and delusions specifically. The finding that the correlation between trauma severity and hallucinations
did not reach significance may be due to the study’s low power. Previous studies that examined correlational relationships between childhood trauma and hallucinations found broadly similar (moderate) effect sizes; for example, \( r = .36 \) in Perona-Garcélán et al.’s (2012) study and \( r = .27 \) in Üçok and Bikmaz’s (2007) study.

### 9.2.2 Quantitative Association Between Post-Traumatic Intrusions and Hallucinations

Hypothesis 3 tested the prediction that post-traumatic intrusion severity would be positively correlated with hallucination severity. This hypothesis was supported by the finding that the correlation was significant, with a moderate to large effect size. This is consistent with previous research that examined quantitative relationships between intrusions and hallucinations, the majority of which found a relationship to be present (Bendall et al., 2013; Glazer et al., 2013; Gracie et al., 2007; Hardy et al., 2016; Morrison & Baker, 2000). The subsequent (post-hoc) multiple regression analyses that were performed investigating variables independently associated with hallucination severity (while controlling for comorbid delusions) found that only post-traumatic intrusions were independently associated with hallucinations, but childhood trauma, post-traumatic avoidance, experiential avoidance, and maladaptive schemas were not. Two of the four previous studies that found positive correlations between trauma and intrusions performed further analyses (Gracie et al., 2007; Hardy et al., 2016). In Gracie et al.’s (2007) non-clinical sample, multiple regression analysis showed that intrusive re-experiencing, perceptual anomalies, paranoia, negative beliefs about others and number of traumatic events were independently associated with hallucinations, but post-traumatic avoidance, hyperarousal and negative beliefs about the self were not. Hardy et al. (2016) found in their clinical sample that intrusions did not mediate the
relationship between childhood sexual abuse and hallucinations (although in this study, as mentioned in Chapter 3, post-traumatic intrusions were assessed in relation to traumas that participants reported as still having an effect on them, which was often not their sexual abuse). The current study’s quantitative finding that post-traumatic intrusive processes play an independent role in the experience of hallucinations supports Morrison’s (2001) model, which proposes that post-traumatic intrusions are the primary mechanism through which trauma leads to the development of hallucinations. Morrison (2001) suggests that hallucinations and post-traumatic intrusions may be variations of the same phenomenon. This has implications for what would be expected to be found qualitatively in terms of the content of hallucinations and how it relates to traumatic experiences and post-traumatic intrusion content. This is discussed in section 9.2.3 below.

9.2.3 Quantitative Association Between Post-Traumatic Intrusions and Delusions

Hypothesis 4 tested the prediction that post-traumatic intrusion severity would be positively correlated with delusion severity. This hypothesis was supported by the finding that the correlation was significant, with a large effect size and is consistent with the three previous studies that looked at quantitative (correlational) relationships between post-traumatic intrusions and delusions (Bendall et al., 2013; Gracie et al., 2007; Lysaker & LaRocco, 2008). The subsequent multiple regression analyses that were performed investigating variables independently associated with delusion severity (while controlling for comorbid hallucinations) found that both post-traumatic intrusions and maladaptive schemas were independently associated with delusions, but childhood trauma, post-traumatic avoidance, and experiential avoidance were not. This
may suggest that post-traumatic intrusions and maladaptive schemas work together to confer a risk for delusions, as suggested by Garety et al. (2001) and Freeman et al.’s (2002) models. It may be that post-traumatic intrusions are key contributors to the development and maintenance of maladaptive schemas, which give rise to delusions. The only other study that investigated post-traumatic intrusions as an independent contributor to delusions was Gracie et al.’s (2007) non-clinical study, which found in a regression analysis that maladaptive schemas about the self and others, as well as number of traumatic events, perceptual anomalies and hallucinations, were independently associated with delusions but post-traumatic intrusions, avoidance and hyperarousal were not.

The finding that post-traumatic intrusions and maladaptive schemas were independently associated with delusion severity is also in line with findings from the ‘Treating Trauma in Psychosis’ (TTIP) study, a randomised clinical trial comparing the effects of Prolonged Exposure (PE) vs Eye Movement Desensitization and Reprocessing (EMDR) vs Control conditions on PTSD and psychotic symptoms in people with psychotic disorders (de Bont et al., 2016; van den Berg et al., 2015). It was found in the TTIP trial that both PE and EMDR were associated with less severe paranoia post-treatment and at six month follow-up (de Bont et al., 2015). PE and EMDR both target sensory-perceptual memory (the basis of post-traumatic intrusions) as well as semantic memory (which constitutes schema-based representations of the world). The findings of both the current study and the TTIP trial suggest a role for intrusions and maladaptive schemas as mechanisms in the aetiology and experience of delusions.
9.2.4 Content Relationships Between Trauma, Post-Traumatic Intrusions, and Hallucinations

9.2.4.1 Content Relationships Between Trauma and Hallucinations

The two major models of the relationship between trauma and hallucinations propose different trauma-related cognitive mechanisms as the primary drivers of the aetiology of hallucinations; one conceptualises hallucinations as variants of post-traumatic intrusions (Morrison, 2001; Morrison et al, 2003) and the other proposes that trauma-driven schemas and emotion are central to the process (Garety et al., 2001). Both models have implications for the content of hallucinations in relation to trauma; the intrusions model predicts direct content relationships, while the schema/emotion model would predict relationships at the level of broader schema-related/emotional themes. In Chapter 3, the possibility of a third type of relationship was explored – an ‘indirect’ relationship, where hallucinations contain components of trauma memories but are not a direct ‘snapshot’ memory of the traumatic event. Hallucinations with indirect relationships to trauma were proposed to be potentially underpinned by post-traumatic cognitions about the trauma (e.g., self-blaming thoughts about the trauma). Chapter 3 considered these three well-known post-traumatic processes (intrusive re-experiencing, post-traumatic cognitions about the trauma, and negative schemas/emotional processes) in terms of their degree of content correspondence to a person’s trauma (direct, indirect, and thematic respectively), and proposed that these three processes may underpin hallucinations with direct, indirect and thematic relationships to trauma.

In the current study (Research Question 5), the majority (78%) of people who experienced childhood trauma and hallucinations had at least some hallucinations that were related in some way (directly, indirectly or thematically) to their experiences of
trauma. Twenty-five percent of the participants with trauma had hallucinations with direct content relationships, 8% had indirect relationships, and 67% had hallucinations with thematic relationships. Twenty-two percent had hallucinations none of which were related in content to their trauma. These findings are in line with the one other study that systematically and comprehensively defined and assessed trauma and hallucination content as the primary research aim (Hardy et al., 2005). Hardy et al. found that 13% of their participants had direct hallucinations, 45% had thematic, and 43% had hallucinations unrelated in content to their trauma. The results of both of these studies indicate maladaptive schemas and negative emotion resulting from trauma may be playing a key role in the development and experience of hallucinations for a large proportion of those who experienced trauma (i.e., those with thematic relationships). A smaller (but clinically significant) proportion of people - those with direct relationships - may experience post-traumatic intrusive processes that impact their hallucinations (this is further discussed in section 9.2.3.2 below). The finding that very few participants had hallucinations indirectly related to their trauma suggests that the theory that post-traumatic cognitions about the trauma give rise to indirect hallucinations may only apply in a small number of people.

In terms of hallucinations indirectly related to trauma, there may be potential underlying mechanisms other than post-traumatic cognitions about the trauma, which were the primary underlying mechanism considered in this thesis. Indirect hallucinations may also be underpinned by intrusive memory processes. Involuntary sensory-perceptual intrusions from memory are proposed to be the result of disrupted encoding and retrieval processes that can occur during trauma, potentially due to hyperarousal and dissociation (Hardy et al., 2016; Steel, Fowler, & Holmes, 2005). Autobiographical memory retrieval can be a reconstructive process (particularly for
childhood events) and does not necessarily represent exact snapshots of past events. Therefore it may be that reconstructed, fragmented trauma memories that are distorted representations of traumatic events could underlie the development of hallucinations indirectly related to trauma.

Regarding the high proportion of participants with hallucinations thematically related to their trauma, it is worthy to note that the negative themes present in hallucinations may not necessarily have their origins in traumatic experiences. Given that this study used a clinical sample the content of hallucinations is likely to be distressing, and the limited number of commonly experienced negative themes present in distressing hallucinations (such as threat, humiliation, intrusiveness) are likely to overlap with the themes of trauma. This does not mean that the thematic content of the hallucinations necessarily came from the trauma. This consideration also applies to the thematic relationships between trauma and delusional content.

The current study assessed the content of multiple hallucinations (up to five) per participant, allowing for the exploration of multiple types of trauma-hallucination relationships existing within individuals. On average, each participant reported experiencing three to four different hallucinations, and most (64%) of those with trauma and hallucinations had multiple types of relationships between their trauma and hallucinations. This supports the theory discussed in Chapter 3 pertaining to multiple post-traumatic symptoms (post-traumatic intrusions, post-traumatic cognitions and maladaptive schemas) occurring within individuals, and potentially giving rise to the variety of content relationships observed in hallucinations relative to the person’s traumatic experience. This theory is based on well-supported cognitive theories of PTSD (e.g., Ehlers & Clark, 2000), that explain the aetiology of PTSD in terms of co-occurring memory-related processes (intrusive re-experiencing of trauma) and
processes concerning the appraisal of the trauma and its sequelae (post-traumatic cognitions and maladaptive schemas). This suggests that multiple post-traumatic processes may be underpinning the aetiology of hallucinations within individuals. It also relates well to the work of some researchers who have highlighted the phenomenological diversity of auditory verbal hallucinations, and proposed that different types of auditory verbal hallucinations are likely to be underpinned by different mechanisms (McCarthy-Jones et al., 2014).

9.2.4.2 Content Relationships Between Post-Traumatic Intrusions and Hallucinations

The finding that post-traumatic intrusions were significantly correlated with hallucination severity, and that in subsequent multiple regression analyses post-traumatic intrusions were found to be the only variable independently associated with hallucination severity, indicates that intrusive re-experiencing processes may be playing a key independent role in hallucination development. Research Question 5 explored the content relationships between hallucinations and post-traumatic intrusions. Sixty-one percent of the 36 people with trauma and hallucinations also experienced post-traumatic intrusions. The majority (73%) with hallucinations and post-traumatic intrusions had hallucinations related in some way to their intrusions; of these, 14% had direct relationships, 14% had indirect, and 55% had thematic relationships. Twenty-seven percent experienced hallucinations none of which were related in content to their intrusions.

The finding that 55% of those with hallucinations and intrusions had hallucinations thematically related to their intrusions implies that both post-traumatic intrusive processes and schema-driven processes may be facilitating the development
and occurrence of their hallucinations. The small proportion of people (14%) who had hallucinations directly related to their intrusions provide some evidence that in a clinically significant minority of people, hallucinations may be very difficult to distinguish from post-traumatic intrusions. This lends some support for Morrison et al.’s (2003) model that proposes that post-traumatic intrusions and hallucinations are extensions of the same phenomenon. The people who experience hallucinations directly related to their intrusions also tend to experience other hallucinations related indirectly, thematically or not at all to their intrusions. The predominance of thematic relationships between hallucinations and intrusions lends further support for the role of schema/emotion in addition to the intrusive processes (Garety et al., 2001). This provides further evidence for the co-occurrence of post-traumatic processes (intrusive and schema/emotion-driven) within individuals and giving rise to a variety of content relationships between hallucinations, trauma and intrusions.

Surprisingly, in a post-hoc t-test there was no difference in the post-traumatic intrusion scores of people with trauma when they were divided into two groups: 1) those who experienced direct or indirect hallucinations in relation to their trauma, and 2) those who did not experience direct/indirect hallucinations in relation to their trauma. Those with direct/indirect hallucinations (i.e., those for whom post-traumatic intrusive processes may be underpinning their hallucinations), may have been expected to have more severe post-traumatic intrusions. However, it may also be possible that for these people, post-traumatic intrusions are taking the form of (or are interpreted as) hallucinations, and therefore are not rating on the intrusions measure. It may also be that post-traumatic intrusions occur with similar severity between these two groups, but trauma-specific content manifests in hallucination content for some people, while schema and emotion-related themes facilitate hallucination content in others.
9.2.5 Content Relationships Between Trauma and Delusions

The two major models proposing mechanisms by which trauma leads to psychosis account for the aetiology of both hallucinations and delusions (Garety et al., 2001; Morrison, 2001; Morrison et al., 2003). The first model considers post-traumatic intrusions to be the crucial symptom to which delusional interpretations are applied (Morrison, 2001; Morrison et al., 2003). The second model proposes that trauma-related schemas and emotion are the primary facilitators of the development of delusional interpretations of internal anomalous experiences (Garety et al., 2001; Freeman et al., 2002). Both models have implications for the content of delusions in relation to trauma; delusional interpretations of post-traumatic intrusions would be expected to be thematically similar to trauma content, and schema-related emotional themes would also be expected to manifest in the content of delusions.

Research Question 7 explored the relationship between participants’ traumatic experiences and the content of their delusions. The majority (89%) of people who experienced childhood trauma and delusions had delusions that were thematically related to their trauma, and over half (58%) had a combination of delusional beliefs both thematically related and unrelated to their trauma. The large proportion of thematic similarity found in the content of delusions relative to trauma provides support for the role of maladaptive schemas and emotion, which is a proposed mechanism in both models. This finding is consistent with the few previous studies that specifically assessed the content of delusions in relation to trauma (Beck & van der Kolk, 1987; Read & Argyle, 1999), as well as studies that examined the content of hallucinations and delusions together in relation to trauma (Read, Agar, Argyle & Aderhold, 2003; Reiff, Muenzenmaier, Castille, & Link, 2011; Thompson et al., 2010), all of which
found evidence for content relationships between trauma and delusions. This finding is also consistent with the results of the regression analyses in the current study, which showed that maladaptive schemas were independently associated with delusion severity, implicating the role of schema-related processes in the experience of delusions. The most common theme present in participants’ delusions and traumatic experiences was threat, highlighting the possibility that an anxiety-related sense of threat which is central to theories of PTSD (Ehlers & Clark, 2000) may also be driving delusion development and maintenance (Freeman et al., 2002).

9.3 Trauma, Avoidance, Hallucinations and Delusions

9.3.1 Trauma, Experiential Avoidance and Post-Traumatic Avoidance

Chapter 5 argued for a role for avoidance as a potential mechanism in the pathway from trauma to psychosis. Avoidant cognitive strategies are well-known to be adopted by individuals who have experienced trauma; avoidance is a key part of the diagnostic criteria for PTSD, and is a key component of cognitive models of PTSD (Ehlers & Clark, 2000). Avoidant strategies are proposed to be adopted by individuals as a means of coping with the ongoing sense of threat associated with anxiety and the experience of post-traumatic intrusions. Both experiential avoidance and post-traumatic avoidance were investigated in relation to hallucinations and delusions. The constructs of experiential avoidance and post-traumatic avoidance may overlap, as discussed in Chapter 5. Experiential avoidance captures psychological inflexibility in terms of the extent to which a person negatively evaluates their thoughts and emotions, and avoids unpleasant internal experiences. Post-traumatic avoidance pertains to avoidance of trauma-specific stimuli (i.e., avoiding thoughts, memories, people and places
associated with the person’s traumatic experience), and elements of this would fall under the general umbrella of experiential avoidance.

Hypothesis 8 predicted that more severe childhood trauma would be correlated with higher levels of experiential avoidance, and this was supported with a moderate effect size ($\rho = .29$). This result is in line with the two studies that have investigated the relationship between trauma and experiential avoidance in groups with psychosis, and these both found a relationship (Goldstone et al., 2012; 2011a & b). Hypothesis 9 predicted that higher levels of experiential avoidance would be correlated with higher levels of post-traumatic avoidance. This hypothesis was supported, with a large effect size ($\rho = .49$). This finding may reflect the overlap between these two constructs, as well as the possibility that following trauma, avoidant strategies may initially be trauma-specific but may also then begin to incorporate avoidance of more general aversive stimuli. This finding is also in line with the previous research reviewed in Chapter 5 demonstrating a relationship between experiential avoidance and PTSD symptoms (including post-traumatic avoidance) (Marx & Sloan, 2002, 2005; Orcutt, Pickett, & Pope, 2005; Plumb, Orsillo, & Luterek, 2004; Shenk, Putnam, & Noll, 2012). These studies have conceptualised and analysed experiential avoidance as a precursor or risk factor for PTSD symptoms, but it may also be possible that following trauma, post-traumatic avoidance precedes experiential avoidance and plays an important role contributing to further psychopathology such as hallucinations and delusions.

### 9.3.2 Experiential Avoidance, Post-Traumatic Avoidance and Hallucinations and Delusions

The possibility that trauma-related avoidance may play a role in the aetiology of hallucinations and delusions was explored in Chapter 5. The review of previous
studies investigating avoidance and psychotic symptoms outlined evidence for a link between avoidance and both hallucinations and delusions. Hypothesis 10 predicted that more severe post-traumatic avoidance and experiential avoidance would be correlated with more severe hallucinations and delusions. This hypothesis was supported; both post-traumatic avoidance and experiential avoidance were significantly correlated with hallucinations and delusions. This implies that avoidance may be impacting hallucination and delusion development and severity, however neither post-traumatic avoidance nor experiential avoidance were independently associated with hallucinations or delusions in the subsequent (post-hoc) regression analyses. Only post-traumatic intrusions were independently associated with hallucinations, while post-traumatic intrusions and maladaptive schemas were independently associated with delusions. This may mean that the impact of experiential avoidance and post-traumatic avoidance on hallucinations and delusions occurs through their interaction with other cognitive processes shown to be important in the aetiology and maintenance of psychotic symptoms (such as post-traumatic intrusions and maladaptive schemas).

Intrusive thoughts, memories or images about trauma are often accompanied by a sense of threat, and efforts to avoid or suppress these internal experiences may work to paradoxically increase their frequency and intensity. These post-traumatic intrusions may then act to directly facilitate the development of hallucinations and delusions. This might point towards a particular role for post-traumatic avoidance (i.e., the avoidance of trauma-specific stimuli, such as post-traumatic intrusions) in the aetiology of hallucinations and delusions. Avoidant strategies might also have a role in maintaining and exacerbating maladaptive schemas, which the current study has shown may have a specific impact on delusions. It has previously been suggested that in delusion formation and maintenance, the psychological inflexibility characterised by
experiential avoidance may intensify the negative schematic beliefs associated with delusions (Goldstone et al., 2011). It has been proposed that the reluctance of psychologically inflexible individuals to experience unpleasant or distressing thoughts acts to prevent critical analysis of the maladaptive thoughts and beliefs, and also reduces awareness of disconfirmatory evidence (Goldstone et al., 2011). This may have the effect of strengthening cognitive biases associated with delusional beliefs (e.g. jumping to conclusions), thereby exacerbating the delusion itself. The extent to which the avoidance of unpleasant internal experiences might be specifically post-traumatic (i.e., avoidance of trauma-related thoughts, memories or images) in the pathway to psychosis requires further clarification.

9.4 Summary

High prevalence of both childhood trauma (65%) and PTSD (26%) were found in the entire sample of people with first episode psychosis. Trauma severity was found to be correlated with both hallucination and delusion severity.

The investigation of the relationship between hallucinations and post-traumatic intrusions revealed that hallucinations and intrusions were significantly correlated. In post-hoc regression analyses, post-traumatic intrusions were the only variable independently associated with hallucinations when controlling for comorbid delusions (childhood trauma, experiential avoidance, post-traumatic avoidance and maladaptive schemas were not). Of the people in the sample who had experienced trauma, most (78%) experienced hallucinations the content of which was related to their traumatic experiences in some way. A substantial minority (25%) experienced hallucinations with content directly related to their trauma, which suggests that post-traumatic intrusive re-experiencing symptoms may be facilitating hallucinations in some people, and that
these intrusions can be difficult to distinguish from hallucinations phenomenologically. This, in addition to the results of the regression analyses, provides support for the model implicating a central role for post-traumatic intrusions in the aetiology of hallucinations (Morrison, 2001; Morrison, Frame, & Larkin, 2003).

The majority of people with trauma (67%) experienced hallucinations with content thematically related to their trauma. The finding that similar schema-relevant themes were present in the trauma and hallucinations of these participants lends support for theories implicating the role of maladaptive schemas and emotional processes in the aetiology of hallucinations from trauma (Garety et al., 2001). However, interestingly maladaptive schemas were not uniquely associated with hallucinations in the post-hoc regression analyses. Few participants (8%) experienced hallucinations with content indirectly related to their trauma, which suggests that the theory that post-traumatic cognitions about trauma are potential mechanisms driving some hallucination content may apply in only a small minority of people. Most participants (64%) experienced multiple types of content relationships between their trauma and hallucinations, suggesting that several post-traumatic cognitive processes might be contributing to the experience of hallucinations within individuals.

Content relationships between participants’ hallucinations and post-traumatic intrusions followed a similar pattern; most people with hallucinations and intrusions (73%) had hallucinations related to intrusions in some way, and 55% had multiple types of content relationships between their hallucinations and intrusions. Over half of those with hallucinations and intrusions had hallucinations related to intrusions at the level of schema-relevant themes (55%), with smaller proportions experiencing hallucinations directly (14%) or indirectly (14%) related to their intrusions. This provides further
evidence for trauma impacting hallucinations via several different trauma-related cognitive processes.

The investigation of the relationship between delusions and post-traumatic intrusions revealed that delusions and intrusions were significantly correlated. In post-hoc regression analyses, post-traumatic intrusions and maladaptive schemas were independently associated with delusions when controlling for comorbid hallucinations (childhood trauma, experiential avoidance and post-traumatic avoidance were not). This supports the two major models of trauma and delusions, both of which implicate intrusions and maladaptive schemas in the aetiology of delusions (Freeman et. al, 2002; Garety et al., 2001; Morrison, 2001; Morrison, Frame, & Larkin, 2003). The findings pertaining to the content of delusions in relation to trauma showed that the vast majority (89%) of participants with trauma and delusions experienced delusions with content related to traumatic experiences at the level of schema-relevant themes, lending further support for the role of schemas in delusion development. Over half of those with trauma and delusions (58%) had a combination of delusional beliefs both thematically related and unrelated to their trauma.

The relationships between trauma, avoidance, and hallucinations and delusions were examined, which included investigations of both experiential avoidance and post-traumatic avoidance. Experiential avoidance was found to be correlated with childhood trauma severity, and also to post-traumatic avoidance. This suggests that childhood trauma might be giving rise to both post-traumatic avoidance (avoidance specifically of trauma-related stimuli) and experiential avoidance (a more general avoidance of negative internal experiences). The correlation between experiential avoidance and post-traumatic avoidance may reflect overlap between the two constructs. It may also be the case that following trauma, post-traumatic avoidance occurs first, followed by
experiential avoidance; i.e., avoidant strategies are initially applied to trauma-specific stimuli, and then later to more general internal aversive experiences. Both experiential avoidance and post-traumatic avoidance were found to be correlated with hallucinations and delusions (although neither were independently associated with hallucinations or delusions in the regression models). This may mean that the impact of experiential avoidance and post-traumatic avoidance on hallucinations and delusions occurs via their impact on other cognitive processes such as post-traumatic intrusions and maladaptive schemas. The findings from the current study point towards a role for several post-traumatic symptoms and processes (post-traumatic intrusions, maladaptive schemas/emotion, post-traumatic avoidance and experiential avoidance) potentially interacting and facilitating hallucination and delusion aetiology in people with trauma and psychosis.

9.5 Major Contributions of the Study

The current study tested the two most widely accepted cognitive models of the relationship between childhood trauma and psychosis, neither of which have been extensively tested to date. This was done by investigating potential cognitive mechanisms implicated in these models, using both quantitative as well as semi-qualitative (phenomenological) approaches.

The content of both hallucinations and delusions in relation to trauma was investigated. Few previous studies have specifically examined hallucination content in relation to trauma, and even fewer have done so with delusions. Findings of content relationships between trauma and hallucinations and delusions provide evidence for the theory that in some people, trauma contributes to (and is likely a causal factor in) the aetiology of psychotic symptoms.
This study was the first to investigate content of post-traumatic intrusions in relation to hallucinations. Post-traumatic intrusions are proposed to be the primary mechanism in the aetiology of hallucinations from trauma in Morrison’s (2001) model of the aetiology of psychosis from trauma. In this model it is suggested that post-traumatic intrusions and hallucinations are variants of the same phenomenon, thereby implying that post-traumatic intrusion content and hallucination content would be identical. Findings of content similarities between post-traumatic intrusions and hallucinations support the proposed role of post-traumatic intrusive processes in the development of hallucinations, which has implications for the clinical assessment and conceptualisation of hallucinations in the context of trauma.

The role of post-traumatic intrusions in the experience of both hallucinations and delusions was thoroughly investigated in this study. In addition to exploring content relationships between post-traumatic intrusions and hallucinations, quantitative relationships between intrusions, hallucinations and delusions were examined. Few previous studies have investigated this, and the present study was the only one to assess post-traumatic intrusions using the CAPS, which is widely accepted to be the ‘gold standard’ for the assessment of the symptoms of PTSD.

The content of multiple traumas, hallucinations, delusions and post-traumatic intrusions was investigated in the current study (rather than focusing only on the single most salient trauma or symptoms experienced by participants). This was done for several reasons. Firstly, assessing for multiple traumas allowed for more extensive data to be gathered that reflected the range of traumas experienced by participants. This is particularly useful when assessing childhood abuse and neglect, as it is common for people to experience multiple types of abuse and/or neglect (e.g., experiencing both emotional abuse and physical abuse in the family home). Secondly, the assessment of
multiple hallucinations, delusions and post-traumatic intrusions meant that a more comprehensive range of the content of these symptoms could be obtained; this is important because the content of hallucinations and delusions is often heterogenous rather than confined to single sensory experiences (in the case of hallucinations) or single delusional beliefs. Thirdly, assessing only the most salient trauma, hallucination, delusion, or intrusion would give an indication of which trauma and symptoms the participant feels the most affected by, but other traumas and symptoms (i.e., those appraised as less significant by the participant) may still be playing an important role in the pathway from trauma to psychosis. Fourthly, the examination of several different traumas and the content of several different hallucinations, delusions and intrusions allowed for the exploration of multiple content relationships co-occurring within individuals. The finding that most people had multiple types of content relationships existing between their trauma, hallucinations and delusions (and between hallucinations and intrusions) made it possible to show that multiple post-traumatic processes are likely to be mechanisms in the relationship between trauma and psychosis within individuals.

The present study was the first study to investigate trauma, experiential avoidance, post-traumatic avoidance, hallucinations and delusions together. Previous studies have examined relationships between avoidance and trauma, or avoidance and psychotic symptoms. This study has provided evidence for the role of experiential avoidance and post-traumatic avoidance in hallucinations and delusions in the context of trauma. The finding pertaining to post-traumatic avoidance may be particularly relevant, as it further highlights the importance of assessing for trauma and post-traumatic symptoms in people with psychosis (further discussed in section 9.7 below).
hallucinations and delusions as separate symptoms, using a thorough, well-validated clinician-administered measure (the CAPS).

Finally, the use of a sample with first episode psychosis makes it possible to infer that the post-traumatic processes investigated in this study (post-traumatic intrusions and avoidance) are impacting hallucinations and delusions early in the course of the illness.

9.6 Limitations

9.6.1 Lack of Statistical Power

This study was somewhat underpowered; the power calculations for the correlation analyses stipulated an appropriate sample size of 82 and the study’s final sample size was 66. The sample size of 66 was also somewhat small for the post-hoc regressions. After removing three outlier cases for the regressions, the sample size was 63; power analysis stipulates that the sample size should be 75 given the number of independent variables that were used. Given the number of statistical tests performed in this study, the risk of Type 1 error may be increased. Results of both the correlation analyses and the regressions should therefore be interpreted with caution.

For the investigation of the content of psychotic symptoms and post-traumatic intrusions, looking at proportions of people in the sample experiencing direct, indirect, thematic, and no relationship between trauma/intrusions and psychotic symptoms meant that there were low numbers with some of the less common types of content relationships. For example, the 8% of people with trauma who experienced indirect hallucinations corresponded to three people.
9.6.2 Non-Parametric Analyses

Data for several of the variables were not normally distributed, and did not become normal with any type of transformation. As a result, non-parametric correlations were used in the analyses.

9.6.3 Assessing Childhood Trauma and Post-Traumatic Intrusions

Defining and measuring childhood trauma is fundamentally difficult. The use of retrospective assessments of childhood trauma introduces the possibility of unreliable or inaccurate reporting of traumatic experiences. This has been raised as a particular concern for the assessment of trauma in groups with psychosis, due to the potential interference of psychotic symptoms and cognitive impairments with recall of traumatic events (Howard, 1993; Saykin et al., 1991; Young, Read, Barker-Collo, & Harrison, 2001). Making a thorough assessment of childhood trauma during a research interview can be particularly challenging. Some participants may have been unwilling or unable to fully disclose trauma. The prevalence of PTSD-related avoidance and numbing (as well as experiential avoidance) may also hinder the disclosure of traumatic experiences. This could also affect the willingness or ability to provide details of the content of symptoms (hallucinations, delusions or post-traumatic intrusions) that the person experiences as unpleasant or distressing. However, in Fisher et al.’s (2011) investigation of the accuracy of reports of child abuse with a large group of first-presentation psychosis patients it was found that reports of child abuse were valid and reliable.

There are also fundamental challenges with reliable and valid assessment of post-traumatic intrusions. It has been pointed out that intrusions often occur in response to internal or external cues and therefore questionnaire items asking about the frequency
of intrusions in the last week or month may not be the most appropriate way to measure them (Brewin, 2015). Brewin suggests that other types of questions, for example asking if a person would experience a flashback if they allowed themselves to fully remember the trauma or confront reminders of it, might elicit more accurate responses. Retrospective judgments of the experience of post-traumatic intrusions have been shown to vary in reliability (Priebe et al., 2013), and the experience of intrusions can also be affected or suppressed by avoidant coping tendencies (Brewin, 2015). This may be particularly problematic in the context of assessing intrusions in people with psychosis, where high levels of avoidance have been demonstrated (Hardy et al., 2016; Goldstone et al., 2012; Varese et al., 2011). Furthermore, frightening hallucinations and/or delusions experienced in psychosis may themselves give rise to post-traumatic intrusions (Berry, Ford, Jelicoe-Jones, & Haddock, 2013).

9.6.4 Issues with Coding Symptom Content

While the coding frame and probing questions that were used enabled detailed descriptions of traumatic experiences and symptom content to be obtained, gathering this information in the context of a research interview is difficult compared with the level of detail that could be obtained with clinical assessments, e.g., during the course of therapy.

For the thematic ratings of traumatic experiences, the coding frame stipulated that childhood sexual abuse would rate on all four of the themes (threat, humiliation, intrusiveness and culpability). There was a high rate of childhood sexual abuse in the sample (24%), which meant that a notable proportion of participants had trauma that rated on all four themes. This made it more likely that thematic content relationships would be found between trauma and psychotic symptoms. Similarly, analysing multiple
traumatic experiences, hallucinations, delusions and post-traumatic intrusions per participant also increased the likelihood that content correspondences would be found.

### 9.6.5 Content Relationships Between Post-Traumatic Intrusions and Delusions

Another limitation of this study was that the relationship between the content of delusions and post-traumatic intrusions was not investigated. The primary focus was on identifying direct, indirect and thematic relationships between hallucinations and trauma/intrusions, due to the phenomenological similarities between hallucinations and intrusions (both being sensory-perceptual experiences). Delusions (being beliefs rather than sensory experiences) can be thematically related to sensory-perceptual post-traumatic intrusions, but not directly or indirectly related. However, given that appraisals of trauma can be encoded peri-traumatically and may be reflected in some post-traumatic intrusions, it may be informative for the delusion-intrusion relationship to be further investigated, particularly given the strength of the statistical association found between delusions and intrusions in this study.

### 9.7 Clinical Implications

The finding that 67% of the participants in this study reported at least mild to moderate childhood trauma on the CTQ provides more evidence for the need for routine assessment of childhood trauma in clinical services dealing with young people with first episode psychosis (Morrison, Read, & Turkington, 2005; National Institute for Health and Care Excellence (NICE), 2014). Furthermore, the finding that 26% of the sample (41% of those with childhood trauma) met diagnostic criteria for PTSD suggests
that routine assessments for PTSD in clinical settings should also occur. This means that clinicians should have sufficient training in conducting trauma and PTSD assessments, and be able to offer the appropriate psycho-education and support for clients affected by these issues (National Institute for Health and Care Excellence (NICE), 2014; Galletly et al., 2016).

The content relationships between trauma, hallucinations, delusions and post-traumatic intrusions that were found in this study have implications for clinicians’ assessment and conceptualisation of psychotic symptoms in some clients. For a clinically significant minority of people, hallucinations may be conceptualised as direct representations of traumatic experiences, and may be phenomenologically identical to (or alternative forms of) post-traumatic intrusive re-experiencing symptoms. The substantial proportion of thematic relationships found between trauma and both hallucinations and delusions (and hallucinations and intrusions) suggests a role for trauma-related schematic and emotion-driven processes in many individuals. Avoidance (both post-traumatic and more general) may also play key role and should be assessed for and addressed by clinicians. Importantly, many of these post-traumatic processes (intrusions, negative schemas and emotion, and avoidance) are likely to be co-occurring within individuals and potentially driving psychotic symptoms. Cognitive therapies for people with trauma and psychosis should incorporate targeted strategies for dealing with these trauma-related symptoms.

9.8 Directions for Further Research

There are several possible avenues for future research that come from the current study. This study investigated trauma-related cognitive mechanisms (post-traumatic intrusions, maladaptive schemas and avoidance) potentially underpinning the
relationship between trauma and psychotic symptoms in patients with first episode psychosis. The finding that these post-traumatic processes were related to hallucinations and delusions in this group implies that these mechanisms are impacting psychotic symptoms at an early stage. Similar research with samples of people at high risk of developing psychosis would add further clarification to the question of whether post-traumatic processes contribute the aetiology of psychosis (i.e., that they precede the onset of psychotic symptoms). Longitudinal research in this area would also be beneficial for determining the extent to which post-traumatic symptoms are impacting the aetiology and occurrence of psychotic symptoms. For example, more severe PTSD symptoms in individuals at high risk of psychosis may be found to be indicative of who goes on to develop hallucinations and delusions at clinical levels. Similarly, in clinical groups with psychosis PTSD symptoms may be found to be predictive of relapsing psychotic symptoms.

The use of experience sampling methodology may prove useful in determining temporal relationships between symptoms of PTSD and psychotic symptoms in the context of daily life, which would provide further evidence for a potentially causal relationship. Research using experience sampling has found that paranoid thoughts in students were temporally predicted by experiential avoidance occurring at an earlier time point during the day (Udachina et al., 2009). Similar research with clinical groups that investigates trauma-related symptoms such as post-traumatic intrusions and post-traumatic avoidance as possible predictors of hallucinations and delusions would be useful in identifying potentially causal factors that could then be targeted in treatment. Findings of close temporal relationships between hallucinations and post-traumatic intrusions in the course of daily life might indicate similar cognitive processes
underpinning both, and would advance the understanding of phenomenological relationships between the two.

It is becoming increasingly clear that several trauma-related cognitive processes are likely to be contributors to the experience of hallucinations and delusions in people with trauma. There is a need for more high quality, theoretically informed research on how these hypothesised mechanisms might mediate relationships between traumatic experiences and specific psychotic symptoms (e.g., Hardy et al., 2016). Investigations into how these mechanisms might interact with each other in the pathway to psychosis are also important. Recent avenues of research on other post-traumatic symptoms such as dissociation (e.g., Varese et al., 2011; Varese, Barkus, & Bentall, 2012) may provide insight into possible mediating mechanisms through which other trauma-related symptoms impact hallucinations and delusions.

There is a need for more research investigating the content of hallucinations and delusions in relation to trauma. Few studies have done so to date, and this line of research provides a unique insight into the ways in which adverse life experiences may contribute to the experience of psychotic symptoms. Qualitative investigations of symptom phenomenology in conjunction with quantitative analyses of symptoms and hypothesised mechanisms can provide stronger evidence for potential relationships. The study of the phenomenology of hallucinations and delusions in relation to trauma is an important avenue of research which can lend support for the endeavour to determine whether the relationship between trauma and psychotic symptoms might be causal.

Findings from the current study have added to growing evidence that there are relationships between post-traumatic cognitive processes and psychotic symptoms in people with psychosis. In the current study, of the people with trauma and
hallucinations, 25% had hallucinations with content directly related to their trauma, and 14% of those with post-traumatic intrusions had hallucinations with content directly related to their intrusions. This provides evidence for a key role for post-traumatic intrusions in the experience of hallucinations in this sub-group. Sixty-seven percent of those with trauma and hallucinations had hallucinations thematically related to their trauma, which suggests that in these people, schema-related processes may be impacting hallucinations. These findings have implications for research into clinical interventions targeting post-traumatic intrusions and maladaptive schemas in groups with early psychosis and trauma. There are widely-used, clinically effective treatments targeting post-traumatic intrusions in PTSD, for example, prolonged exposure-based interventions (Foa, Chrestman, & Gilboa-Schechtman, 2008; Powers, Halpern, Ferenschak, Gillihan, & Foa, 2010). There are also well developed, evidence based interventions targeting maladaptive schemas (e.g., schema therapy; Young et al., 2003). There is a need to explore the use of these interventions with people who have early psychosis and have experienced trauma. Prolonged exposure-based interventions could be trialled to see if they might be particularly effective in those who have hallucinations directly related to their trauma and/or intrusions, while trials with schema-based interventions might be especially effective in those with hallucinations thematically related to their trauma. This would contribute important information to the understanding of post-traumatic intrusions and maladaptive schemas as mechanisms involved in the relationship between trauma and psychosis, and to the understanding of whether treatments targeting trauma-related symptoms might be effective in promoting recovery from psychosis in people with trauma.
References


Tosato, S., & Lasalvia, A. (2009). The contribution of epidemiology to defining the most appropriate approach to genetic research on schizophrenia. *Epidemiologia e Psichiatria Sociale, 18*(02), 81-90.


Appendix A. Ethics Committee Approval

Melbourne Health Human Research Ethics Committee Ethics Approval Letter and Site Specific Assessment Authorisation
MELBOURNE HEALTH HUMAN RESEARCH ETHICS COMMITTEE
ETHICAL APPROVAL OF A RESEARCH PROJECT

Dr Sarah Bendall
Centre for Youth Mental Health
35 Poplar Road
PARKVILLE VIC 3052

25th March 2014

Dear Dr Bendall,

MH Project Number: 2014.014

Project Title: Trauma and Psychosis - Exploring the Role of Post-Traumatic Intrusions, Avoidance and Dissociation.

HREC Approval Date: 25th March 2014

I am pleased to advise that the above project has received ethical approval.

Participating Sites:

- Orygen Youth Health Clinical Program

Approved Documents:

- Protocol Version 2 dated 24th February 2014
- Participant Information and Consent Form Version 2 dated 24th February 2014
- Participant Information and Consent Form – parent/Guardian Version 2 dated 24th February 2014
- Checklist for Initial Contact
- Demographics Questionnaire
- Coding Frame for Traumatic Events, Post-Traumatic Intrusions, Hallucinations and Delusions in Psychosis (Hardy et al. dated 2005)
- Clinician – Administered PTSD Scale for DSM-IV dated July 1998
- Positive And Negative Syndrome Scale (PANSS) dated 2004
- PANSS Questionnaire
- Psychotic Symptom Rating Scale
- Impact of Events Scale – Revised (IES-R)
- Childhood Trauma Questionnaire
- Posttraumatic Cognitions Inventory (PTCI)
- AAQ-II Questionnaire
- CISS – Avoidance Subscale
- Dissociative Experiences Scales (DES)
- Center for Epidemiologic Studies Depression Scale – Revised (CESD-R)

The Melbourne Health HREC operates and is constituted in accordance with the National Statement on Ethical Conduct in Human Research 2007.
• Retrospective Bullying Questionnaire
• Global Assessment of Functioning (GAF) Scale
• Exhibit 5-6 Social and Occupational Functioning Assessment Scale (SOFAS) dated 22\textsuperscript{nd} February 2007
• WHO – Assist Version 3.0

Site Specific Assessment:

Please note: You cannot commence this study until you have completed all the requirements of the Site Specific Assessment and have received the “Approval to Conduct a Research Project at Melbourne Health” certificate.

Conditions of Ethics Approval:

In order to comply with the National Statement on Ethical Conduct in Human Research 2007, Guidelines for Good Clinical Research Practice and Melbourne Health Research Policies and Guidelines you are required to:

• Submit a copy of this letter to the Radiation Safety Officer (RSO) at Melbourne Health, for addition of the project to the Licence for Research Involving Human Volunteers held by the Department of Human Services Radiation Safety Section Radiation Safety Licence (if your project involves exposure to ionising radiation). Note: You cannot commence the project until you have received notification from the RSO that the project has been added to the Licence;
• Notify the HREC of the actual start date of the project;
• Submit to the HREC for approval any proposed amendments to the project including any proposed changes to the Protocol, Participant Information and Consent Form/s and the Investigator Brochure;
• Notify the HREC of any adverse events in accordance with the Melbourne Health Guidelines for Monitoring and Reporting of Safety in Clinical Trials Involving Therapeutic Products and Other Clinical Research, July 2009;
• Notify the HREC of any unforeseen events;
• Notify the HREC of your inability to continue as Principal Investigator or any other change in research personnel involved in the project;
• Notify the HREC if a decision is taken to end the study prior to the expected date of completion or failure to commence the study within 12 months of the HREC approval date;
• Notify the HREC of any other matters which may impact the conduct of the project.

Reporting

You are required to submit to the HREC:

• An Annual Progress Report every 12 months (or more frequently as requested by the reviewing HREC) for the duration of the project. This report is due on the anniversary of HREC approval. Continuation of ethics approval is contingent on submission of an annual report in a timely manner; and
• A comprehensive Final Report upon completion of the project.

The HREC may conduct an audit of the project at any time.

Please refer to the Office for Research website to access forms such as the Amendment Form, Annual Report/Final Report Form, Guidelines for Monitoring and Reporting of Safety in Clinical Trials Guidelines and Adverse Event Report Forms, and other information and news concerning research at Melbourne Health:

A list of those HREC members present at the review of this project can be obtained from the above website.

Yours sincerely

Ms. Jessica Turner
Manager - Human Research Ethics Committee
SITE SPECIFIC ASSESSMENT (SSA) AUTHORIZATION

APPROVAL TO CONDUCT A RESEARCH PROJECT AT MELBOURNE HEALTH

Dr. Sarah Bendall
MelbUni: Centre for Youth Mental Health
35 Poplar Road
PARKVILLE
VIC 3052

28 April 2014

Dear Dr. Sarah Bendall

Local Project Number: 2014.014

Study Title: Trauma and Psychosis - Exploring the Role of Post-Traumatic Intrusions, Avoidance and Dissociation.

SSA Authorisation Date: 28 April 2014

HREC Approval Date: 25 March 2014

I am pleased to advise that the above project is approved to be conducted at Melbourne Health. This approval is subject to compliance with any conditions imposed by the reviewing HREC.

SSA Approved Documents:

- Melbourne Health HREC Approval Letter, dated 25 March 2014 and all documents therein.
- Research Agreement between Melbourne Health and Orygen Youth Health Research Centre.

Research governance

You are required to notify the Office for Research of:

1. The actual start date of the project at Melbourne Health.
2. Any amendments to the project after these have been approved by the reviewing HREC
3. Any adverse events involving patients of Melbourne Health, in accordance with the Melbourne Health Guidelines for Monitoring and Reporting of Safety in Clinical Trials Involving Therapeutic Products and Other Clinical Research, July 2009.
4. Any unforeseen events.
5. Any changes to the indemnity, insurance arrangements or Clinical Trial Research Agreement for this project. This includes changes to the project budget or other changes which may have financial or other resource implications for Melbourne Health.

SSA Approval of New Project
6. Your inability to continue as Principal Investigator or any other change in research personnel involved in the project.
7. Any other matters which may impact the conduct of the project at Melbourne Health.

You are also required to submit to the Office for Research:

8. A copy of the TGA acknowledgement letter in respect of the CTN notification (if applicable).
9. An Annual Progress Report every 12 months (or more frequently as requested by the reviewing HREC) for the duration of the project. This report is due on the anniversary of HREC approval. Continued SSA and HREC approval are contingent on receipt of an annual report by the reviewing HREC and the Research Governance Office.
10. A comprehensive Final Report upon completion of the project.

The Office for Research may conduct an audit of the project at any time.

Please refer to the Office for Research website to access forms such as the Amendment Form, Annual Report/Final Report Form, Guidelines for Monitoring and Reporting of Safety in Clinical Trials Guidelines and Adverse Event Report Forms, and other information and news concerning research at Melbourne Health: http://www.mh.org.au/www/342/1001127/displayarticle/1001352.html

Please Note: Template forms for reporting Amendments, Adverse Events, Annual Report/Final Reports, etc. can be accessed from: www.health.vic.gov.au/cchre.

Yours sincerely,

Dr Angela Watt
Director Research Governance and Ethics
Appendix B. Orygen Youth Health Participant Information and Consent Form
Participant Information Sheet/Consent Form

Health/Social Science Research

- Adult providing own consent

Orygen – The National Centre of Excellence in Youth Mental Health

Title
Trauma and Psychosis: Exploring the Role of Post Traumatic Intrusions, Avoidance and Dissociation

HREC Number
HREC# 2014.014

Principal Investigator
Dr. Sarah Bendall

Associate Investigator(s)
Pamela Sun and Natalie Peach

Location
EPPIC Clinic (Orygen Youth Health Clinical Program)

Part 1 What does my participation involve?

1 Introduction

You are invited to take part in this research project. You have been invited because you and your case manager have discussed that you have experienced symptoms of psychosis. The research project is examining how past events in your life may be contributing to the experience of your current symptoms.

Your contact details were obtained from your Case Manager in the EPPIC clinic.

This Participant Information Sheet/Consent Form tells you about the research project. It explains the processes involved with taking part. Knowing what is involved will help you decide if you want to take part in the research.

Please read this information carefully. Ask questions about anything that you don’t understand or want to know more about. Before deciding whether or not to take part, you might want to talk about it with a relative, friend or local health worker.

Participation in this research is voluntary. If you don’t wish to take part, you don’t have to.

If you decide you want to take part in the research project, you will be asked to sign the consent section. By signing it you are telling us that you:
- Understand what you have read
- Consent to take part in the research project
- Consent to be involved in the research described
- Consent to the use of your personal and health information as described.

You will be given a copy of this Participant Information and Consent Form to keep.
2 What is the purpose of this research?

Some people with early psychosis have had traumatic experiences in their lives, such as emotional, sexual or physical abuse. The purpose of this project is to explore some of the symptoms that people with early psychosis may be experiencing, and to investigate how these symptoms might be related to traumatic experiences from the past. It is not yet fully understood how symptoms associated with experiencing a trauma might contribute to the development of psychosis. People who experience past trauma can often develop different ways to avoid thinking about traumatic or unpleasant experiences, and we also wish to investigate how some of these tendencies might be related to symptoms of psychosis. By understanding how past trauma and avoidant tendencies relate to symptoms of psychosis, we can contribute towards improved treatments for other people having similar experiences.

The results of this research will be used by two of the researchers, Pamela Sun and Natalie Peach, to obtain Doctor of Psychology in Clinical Psychology and PhD (Clinical Psychology) degrees respectively.

This research has been initiated by the principal researcher, Dr Sarah Bendall.

This research has been funded by Monash University and the University of Melbourne.

3 What does participation in this research involve?

If you consent to being in the study, after signing this participant consent form, participation will involve an interview with a researcher that will take approximately three hours. If you feel that one three-hour session is too long, the session can be split into two separate sessions. The session(s) will involve being asked questions by the researcher about any past traumatic experiences you might have had including questions about sexual, physical and emotional abuse. The researcher will ask you some questions about these experiences but you can choose not to answer these questions if you wish. You will also be asked about your psychotic symptoms, and what the experience of these symptoms is like for you (for example what your symptoms are about, how often they occur, and how much distress they cause you). During the session you will also be asked to fill in some questionnaires, and complete a short (approximately 10 minute) computer task. The computer task will measure your reaction times to a display of numbers.

As part of the assessments, we would also like your permission to look at your clinical file to get information about any medication you are taking and how long you have been at the service.

There are no costs associated with participating in this research project. However, you will be reimbursed $30 for expenses associated with the research project visit.
4 Other relevant information about the research project

Seventy people with psychosis attending the Orygen Youth Health clinical program will take part in this study. Of these 70 participants, some will have experienced trauma in their past and others will not have. Part of what this study will investigate is how the symptoms of psychosis might differ between people who have experienced a trauma and people who have not.

5 Do I have to take part in this research project?

Participation in any research project is voluntary. If you do not wish to take part, you do not have to. If you decide to take part and later change your mind, you are free to withdraw from the project at any stage.

If you do decide to take part, you will be given this Participant Information and Consent Form to sign and you will be given a copy to keep.

Your decision whether to take part or not to take part, or to take part and then withdraw, will not affect your routine care, your relationship with professional staff or your relationship with those treating you OR with Orygen Youth Health.

6 What are the possible benefits of taking part?

We cannot guarantee or promise that you will receive any benefits from this research; however, a possible benefit may include having the opportunity to reflect on some of the symptoms you are experiencing in the context of a supportive environment. Information obtained through the research interview may assist with your treatment and care and may be fed back to the treating team with your permission. The results of this research may improve our understanding of the symptoms of psychosis, which may contribute towards improved treatments for other people having similar experiences.

7 What are the possible risks and disadvantages of taking part?

You may feel that some of the questions we ask are stressful or upsetting. If you do not wish to answer a question, you may skip it and go to the next question, or you may stop immediately. If you become upset or distressed as a result of your participation in the research project, the research team will be able to arrange for you to talk to your case manager. You may prefer to suspend or end your participation in this research if distress occurs.

8 What if I withdraw from this research project?

If you do consent to participate, you may withdraw at any time. If you decide to withdraw from the project, please notify a member of the research team. If you do withdraw, you will be asked to complete and sign a ‘Withdrawal of Consent’ form; this will be provided to you by the research team.
If you decide to leave the research project, the researchers will not collect additional personal information from you, although personal information already collected will be retained to ensure that the results of the research project can be measured properly and to comply with law. You should be aware that data collected up to the time you withdraw will form part of the research project results. If you do not want your data to be included, you must tell the researchers when you withdraw from the research project.

9  Could this research project be stopped unexpectedly?

This research project may be stopped unexpectedly for a variety of reasons. These may include reasons such as the student researchers discontinuing with their respective courses of study. Another reason may be if an undue amount of distress is experienced by participants of the study. However many studies of a similar nature to this current study have been conducted in the past at Orygen Youth Health without any incident or cause to end the study. Therefore the likelihood that the study will be stopped is low.

10  What happens when the research project ends?

If you would like feedback on your individual results from the assessment, you may ask a member of the research team. Feedback can be provided to you in either a verbal or written format. If you would like we will provide you with a summary of the results of the project when the project is concluded. If you would like this summary we will ask you for some contact details so that we can post or email it to you. This is expected to be available in December 2015. We will also publish results of the study in publicly available scientific journals. Generally these can be accessed through institutional libraries.
Part 2   How is the research project being conducted?

11   What will happen to information about me?

By signing the consent form you consent to the research team collecting and using personal information about you for the research project. The personal information that the research team collects and uses is from the interview, questionnaires and computer task that you complete. Any information obtained in connection with this research project that can identify you will remain confidential. Information from the assessments conducted for this study will be kept in a locked filing cabinet at Orygen Youth Health that can only be accessed by the principal researcher, Dr Sarah Bendall and the student researchers on the project. This information will be entered without any identifying information into a computer database, which will be password-protected and only accessed by Dr Bendall and the student researchers. Your data will have a unique code, which will be linked to your contact details, which is kept in a separate password-protected file, for the purpose of contacting you for further information or, with your consent, contacting your for future research projects at Orygen. Only Dr Bendall and the student researchers will have access to the link between the unique code and your contact details.

We are seeking your consent to keep your data stored for future (unspecified) research into youth mental health conducted by Orygen. After all future research is completed, your information will be kept for 5 years after the results of the final study have been reported. After that it will all be destroyed. We would also like to seek your consent to contact you in the future and invite you to participate in any follow-up studies that may be conducted.

We will endeavour to keep all the information that we collect in the assessments strictly confidential. There are some exceptions to this: 1) information from the assessments may be communicated with your case manager to ensure that you receive the best care possible; 2) if we are concerned about risk to yourself or someone else, we may need to discuss this with your case manager and doctor at Orygen; 3) if as a result of the information you disclose in the interview relating to your past trauma or abuse we believe that someone else may be at risk. In some cases we may contact The Department of Human Services about risk to children under the age of 17 years. Mandatory reporting laws require clinicians to report to Child Protective Services any suspected cases of child abuse and neglect (Children, Youth and Families Act 2005 (Vic.)). In cases where abuse is reported, information gathered by researchers is passed on to the clinical team and the appropriate clinical procedures normally used within the mental health service are implemented. This may involve reporting abuse to DHS or other support services. In all cases we will discuss this with you first.

Any information obtained in connection with this research project that can identify you will remain confidential to the best of our ability and will only be used for the purpose of this research project. It will only be disclosed with your permission, except as required by law. We plan to publish group results in scientific journals, speak about them in scientific conferences and talk about them to other people who work in mental health industries in order to help them improve the service they provide to people with psychosis.

The health records and data obtained from this study may be accessed by the Melbourne Health Office for Research to verify the study procedures and conduct.
Information about you may be obtained from your health records held at this and other health organisations for the purpose of this research. By signing the consent form you agree to the research team accessing health records if they are relevant to your participation in this research project.

It is anticipated that the results of this research project will be published and/or presented in a variety of forums. In any publication and/or presentation, information will be provided in such a way that you cannot be identified, except with your express permission.

In accordance with relevant Australian and/or Victorian privacy and other relevant laws, you have the right to request access to the information about you that is collected and stored by the research team. You also have the right to request that any information with which you disagree be corrected. Please inform the research team member named at the end of this document if you would like to access your information.

Any information obtained for the purpose of this research project that can identify you will be treated as confidential and securely stored. It will be disclosed only with your permission, or as required by law.

We are also seeking your consent to store and use information we gather during this interview with you in any future research projects that might be conducted. By providing your contact details on the consent form below you are consenting to the possibility of being contacted in the future and asked if you would like to participate in any follow-up research.

12 Complaints and compensation

If you suffer any distress or psychological injury as a result of this research project, you should contact the research team as soon as possible. You will be assisted with arranging appropriate treatment and support.

If you have a complaint about the research team, OR any serious event that occurs following your participation in this project, you should talk with your case manager.

13 Who has reviewed the research project?

All research in Australia involving humans is reviewed by an independent group of people called a Human Research Ethics Committee (HREC). The ethical aspects of this research project have been approved by the HREC of Orygen Youth Health and the HREC of Melbourne Health. This project will be carried out according to the National Statement on Ethical Conduct in Human Research (2007). This statement has been developed to protect the interests of people who agree to participate in human research studies.

14 Further information and who to contact
The person you may need to contact will depend on the nature of your query. If you want any further information concerning this project or if you have any problems which may be related to your involvement in the project, you can contact:

**Research Contact Person:**

<table>
<thead>
<tr>
<th>Name</th>
<th>Dr Sarah Bendall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position</td>
<td>Principal Researcher</td>
</tr>
<tr>
<td>Telephone</td>
<td>9342 2986</td>
</tr>
<tr>
<td>Email</td>
<td><a href="mailto:sbendall@unimelb.edu.au">sbendall@unimelb.edu.au</a></td>
</tr>
</tbody>
</table>

If you have any complaints about any aspect of the project, the way it is being conducted or any questions about being a research participant in general, then you may contact:

**Complaints Contact/HREC Executive Officer details:**

<table>
<thead>
<tr>
<th>Name</th>
<th>Ms Jessica Turner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position</td>
<td>Manager, Melbourne Health Human Research Ethics Committee</td>
</tr>
<tr>
<td>Telephone</td>
<td>9342 8530</td>
</tr>
</tbody>
</table>
Consent Form - Adult providing own consent

Title: Trauma and Psychosis: Exploring the Role of Post-Traumatic Intrusions, Avoidance and Dissociation

HREC Number: HREC# 2014.014

Principal Investigator: Dr Sarah Bendall

Associate Investigator(s): Pamela Sun and Natalie Peach

Location: Orygen Youth Health Clinical Program

Declaration by Participant

I have read the Participant Information Sheet or someone has read it to me in a language that I understand.

I understand the purposes, procedures and risks of the research described in the project.

I have had an opportunity to ask questions and I am satisfied with the answers I have received.

I freely agree to participate in this research project as described and understand that I am free to withdraw at any time during the project without affecting my future care.

I understand that I will be given a signed copy of this document to keep.

I consent to the storage and use of data provided by me for this research project, as described in the relevant section of the Participant Information Sheet, for (please circle):

- This specific research project Y / N
- Other research that is closely related to this research project Y / N
- Any future research Y / N

I understand that information I provide for this research may be disclosed to my case manager, and that mandatory reporting laws require that clinicians report any case of suspected child abuse or neglect to Child Protective Services.

Name of Participant (please print) ___________________________________________________________

Signature __________________________ Date __________________________

I consent to the possibility of being contacted in the future and invited to take part in any follow-up research (please circle): Y / N

Participant Contact Details

Phone number _______________ Email address __________________________

Declaration by Researcher†

I have given a verbal explanation of the research project, its procedures and risks and I believe that the participant has understood that explanation.

Name of Researcher†(please print) _________________________________________________

Signature __________________________ Date __________________________

†An appropriately qualified member of the research team must provide the explanation of, and information concerning, the research project.

Note: All parties signing the consent section must date their own signature.
Appendix C. Coding Frame

Modified version of Hardy et al.’s (2005) coding frame for examining phenomenological associations between trauma and hallucinations. (Expanded to include delusions and post-traumatic intrusions.)
**Coding Frame for Traumatic Events, Post-Traumatic Intrusions, Hallucinations and Delusions in Psychosis**

The purpose of the coding frame is to identify the presence of content correspondences between 1) traumatic events and hallucinations and delusions, and 2) hallucinations and post-traumatic intrusions in individuals with a history of trauma.

**Instructions**

**A) Traumatic Event Thematic Ratings**

1. Select the traumatic event description and rating form.

2. Rate the person’s traumatic events on each of the themes. Refer to the glossary for definitions of the themes in order to make the rating. The definitions are comprised of modified definitions of dimensions used in the Life Events and Difficulties Schedule (LEDS, Brown and Harris, 1989). “No” indicates that the theme is definitely not present, “P” indicates that the theme is possibly present, “Yes” indicates that the theme is present and “D/K” indicates that it is not known whether the theme is present. Where there are multiple traumas, the ratings pertain to whether or not the themes are present/absent in any of the traumas.

**B) Hallucination, Delusion and Post-Traumatic Intrusion Thematic Ratings**

1. Select the hallucination, delusion or post-traumatic intrusion description and rating form.

2. For each participant, read the description of the hallucinations/delusions/intrusions.

3. Rate the hallucinations/delusions/intrusions on each of the themes (see above). As above, where there are multiple hallucinations, delusions or intrusions, the ratings pertain to whether the themes are present/absent in any of the hallucinations, delusions or intrusions.

**C) Correspondence Rating**

1. Select the correspondence rating form.

2. Read the descriptions of the hallucinations/delusions and the traumatic events or post-traumatic intrusions.

3. Rate the direct and indirect content correspondence between the two descriptions.

   - A direct content correspondence refers to a literal correspondence between the content of the two. For example, a direct content relationship would be rated if a person who was taken hostage and threatened with a gun experienced visual hallucinations of a gun.

   - An indirect content correspondence refers to a correspondence where there is similar content between the two, but not a literal correspondence. For example, an indirect content relationship would be rated if a person who has been sexually abused experiences a hallucination/delusion with sexual themes.

4. It is not necessary to complete the thematic correspondence table, this will be done at a later stage.
### A) Traumatic Event Description and Thematic Rating Form

<table>
<thead>
<tr>
<th>Traumatic Events (up to 5)</th>
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<th>Rating</th>
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<tr>
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<td></td>
<td>Threat</td>
<td>N Y P DK</td>
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<td>Intrusiveness</td>
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<td>Intrusiveness</td>
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</table>

N = No (Theme absent)  
Y = Yes (Theme present)  
P = Possibly (Theme possibly present)  
DK = Don’t Know (Unclear if theme is present).
### B) Hallucination Description and Thematic Rating Form

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<td></td>
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</tr>
</tbody>
</table>

**Thematic Ratings:** N = No (Theme absent); Y = Yes (Theme present); P = Possibly (Theme possibly present); DK = Don’t Know (Unclear if theme is present).

**Modality:** For each hallucination indicate whether it is: 1=Auditory, 2=Visual, 3=Sexual, 4=Somatic, 5=Olfactory.

**Explanation:** For each hallucination indicate whether the explanation of the experience is: 1=Delusional, 2=Insightful, 3=Person is not sure.
C) Delusion Description and Thematic Rating Form

Rater ID: 
Date: 
Participant Code No: 
Current/Lifetime: 

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<thead>
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<th>Delusions (up to 5)</th>
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Culpability  N  Y  P  DK
Threat  N  Y  P  DK
Intrusiveness  N  Y  P  DK
Humiliation  N  Y  P  DK

N = No (Theme absent)
Y = Yes (Theme present)
P = Possibly (Theme possibly present)
DK = Don't Know (Unclear if theme is present).
**D) Post-Traumatic Intrusion Description and Thematic Rating Form**

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N = No (Theme absent)  
Y = Yes (Theme present)  
P = Possibly (Theme possibly present)  
DK = Don't Know (Unclear if theme is present).
E) Correspondence Rating Form
Comparing Traumatic Events with Hallucination/Delusion

Rater ID:  
Date:  
Participant Code No:  
Current/Lifetime:  

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F) Correspondence Rating Form  
Comparing Hallucinations with Post-Traumatic Intrusions

Rater ID:  
Participant Code No:  
Current/Lifetime:  
Date:  

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<td>Indirect Content Correspondence</td>
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**Post-Traumatic Intrusions (up to 5)**

<table>
<thead>
<tr>
<th>Theme</th>
<th>Correspondence Rating</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
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Glossary

Modified LEDS Theme Definitions

1. Culpability/Guilt

Culpability (guilt) is rated according to whether the event/hallucination would evoke a remorseful awareness of being responsible for having done something wrong.

Rating of events:

Sexual abuse on an adult will always rate at least “possibly” on the culpability scale. Sexual abuse on a child will be rated on culpability. Being bullied as a child does not rate on culpability.

Examples

Traumatic Event:

“I was driving home from the pub and I’d probably had too much to drink. A man crossed the road at a zebra crossing but I didn’t see him and so didn’t stop. I hit him and he rolled across my car bonnet, I just kept driving and didn’t look back.”

Hallucination:

“I hear the voice of the devil telling me he knows what a bad person I am, he says he knows that I’ve not been a good husband or father and it’s my fault that my family don’t speak to me.”

Delusions:

“I caused the earthquake because of what I did.”

Post-Traumatic Intrusions:

“I have flashbacks to the times that my older cousin molested me when I was 7.”

2. Threat

Threat is rated according to whether the event/symptom involved the participant thinking that they or someone else may be killed or injured, receiving actual injury or witnessing someone else receiving actual injury or being killed.

Examples

Traumatic Events:

“I was regularly raped and physically abused by my ex-boyfriend.”

“Two men came into the place where I was working and started a fight, they attacked me with a knife and I got stabbed in my arm.”
Hallucinations:

“I hear one male voice, which sounds evil like the devil, it’s always negative and threatens my family and me.”

“I hear a harassing and threatening voice, it tells me to do things like jump in front of a car.”

Delusions:

“Someone is trying to kill me.”

“Someone is going to attack me while I’m asleep.”

Post-Traumatic Intrusions:

“I keep seeing pictures in my mind of the time that my father attacked my mother and almost killed her.”

3. Humiliation

Humiliating events/symptoms involve the person being socially devalued in relation to self or others. The three types of humiliation are defined as:

1) **Interpersonal**: this refers to an apparently permanent separation in a relationship where the other person took the initiative in breaking off the relationship or the participant was “forced” into ending the relationship (e.g. following the discovery of infidelity). Some element of rejection or failure must be involved.

2) **Social**: this refers to events of a socially unacceptable nature carried out by someone else, which reflect on the participant in a socially devaluing way.

3) **Personal**: this refers to acts against the participant in a way that affects a central aspect of self-identity (e.g. rape, physical violence or public reprimands by authority figures). It also refers to events/symptoms that involve personal failure e.g. infertility.

Rating of events:

Sexual abuse as a child will always be rated on humiliation. Being bullied as a child will rate as humiliating if it is done in a social context.

Rating of hallucinations:

Being controlled or commanded to by voices alone is not rated on humiliation. The content of the voices must reflect being put down in a way that if done in public would be humiliating.

**Examples**

**Traumatic Events:**

“The girls at school bullied me for years, it was like mental torture.”
“My older sister sexually abused me.”

Hallucinations:

“I hear a voice that tells me that I’m an idiot.”

“I hear a voice that makes critical comments about me, for example, it tells me that I’m a paedophile.”

Delusions:

“Everyone is talking about me, all the time, saying embarrassing things about me.”

“The prime minister is spreading nasty rumours about me when he speaks on TV.”

Post-Traumatic Intrusions:

“I sometimes feel like I am reliving the experience of being raped, like I am back at that time and it is happening all over again.”

4. Intrusiveness

Intrusive events/symptoms involve interference and attempted control of the participant by others. It is not physical interference alone and must also contain an emotional or psychological element. Intrusive events/symptoms also often involve intent to harm.

Rating of hallucinations:

Voices are not intrusive just by their presence, even if they are very severe. They must consist of intrusive content in order to be rated.

Examples

Traumatic Events:

“My mother psychologically abused me, it was like mental cruelty, she constantly tried to interfere with and control my life.”

“I was raped by two men whilst I was at work on a building site, another man tried to stop them but they knocked him out.”

Hallucinations:

“I hear my friends trying to communicate with me and advise me. I can’t control it and sometimes what they say is unpleasant.”

“I hear the voice of Jim, he generally isn’t negative but can be quite demanding. He once drove me to attack a stranger who he said was an alien. He also told me to kill my GP because he was an impostor.”

Delusions:

“The space aliens are planting the thoughts in my mind.”
“The CIA is reading my thoughts with equipment they planted at my house.”

Post-Traumatic Intrusions:

“I'm bothered by memories of the times my uncle sexually abused me. I think about the times he would hold me down and I couldn’t move and he would tell me that he would be watching me and if I told anyone I'd be in trouble.”
Appendix D. Statistical Analyses with Bootstrapping
Table D.1 below is a summary of the correlation analyses performed in relation to the hypotheses tested in Aims 1 and 3, in sections 8.3 and 8.5 of the Results chapter. Pearson correlation coefficients are reported, along with 95% confidence intervals based on 1000 bootstrap iterations.

Table D.1
Correlations Between Childhood Trauma, Experiential Avoidance, Post-Traumatic Avoidance, Post-Traumatic Intrusions, Hallucinations and Delusions and Corresponding 95% Confidence Intervals

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<th>3.</th>
<th>4.</th>
<th>5.</th>
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*p < .05, ** p < .01

Note. Correlations pertaining to Hypotheses 8-10 are shown in red.
The following four tables contain analyses corresponding to the regression models in section 8.6 of the Results chapter. The estimates reported are unstandardized beta coefficients based on 1000 bootstrapped iterations.

Table D.2

**Summary of Hierarchical Regression Analysis for Variables Predicting Hallucinations in Model 1 (n = 63)**

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<th>β</th>
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<th>sr² (unique)</th>
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*p < .05, **p < .01

*Note: The squared semipartial correlation coefficient (sr²) represents the unique amount of variance the predictor brings to the model.*

Table D.3

**Summary of Hierarchical Regression Analysis for Variables Predicting Hallucinations in Model 2 (n = 63)**

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<th>∆R² Bias</th>
<th>Bootstrap SE</th>
<th>95% CI</th>
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*Note: The squared semipartial correlation coefficient (sr²) represents the unique amount of variance the predictor brings to the model.*
Table D.4

*Summary of Hierarchical Regression Analysis for Variables Predicting Delusions in Model 1 (n = 63)*

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*p < .05, **p < .01

*Note:* The squared semipartial correlation coefficient (sr²) represents the unique amount of variance the predictor brings to the model.

Table D.5

*Summary of Hierarchical Regression Analysis for Variables Predicting Delusions in Model 2 (n = 63)*

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*p < .05

*Note:* The squared semipartial correlation coefficient (sr²) represents the unique amount of variance the predictor brings to the model.