Predicters of individual psychotic experiences after trauma: a series of longitudinal studies

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Submitted for the degree of DPhil in Psychiatry, Trinity Term 2018

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Abstract

Environmental risk factors including trauma have been linked with individual positive psychotic experiences. The mechanisms underlying these relationships are not well understood. This thesis investigates longitudinally the occurrence of different reactions - paranoia, grandiosity, hallucinations and PTSD - in the direct aftermath of interpersonal trauma. It attempts to ascertain how distinguishable these different experiences are from each other, and the shared and differential factors that lead to their persistence. Chapter 1 sets out the argument of the thesis, and it includes a systematic review of empirical studies investigating mechanisms underlying the relationship between trauma and individual psychotic experiences. The review identifies the absence of longitudinal research on grandiosity, and therefore Chapter 2 reports the first longitudinal, developmental test of grandiosity (N = 4997). Endorsement of grandiose beliefs in adolescence was found to be predicted by overestimation of own success, peer victimisation and perceived harsh parental discipline as assessed in childhood. Chapter 3 reports the first longitudinal study of processing of a recent trauma on the occurrence of hallucinations. A secondary analysis of a previous study that focussed on paranoia and PTSD in the aftermath of an assault (N=106)

finds that problematic peri-traumatic processing, cognitive response styles, and negative post traumatic appraisals were predictive of later occurrence of hallucinations Informed by this and previous chapters the main empirical study was set up to provide a description of the occurrence of paranoia, grandiosity, hallucinations and PTSD in the days and months following an interpersonal assault, to assess how distinguishable these different outcomes are and to test the ability of theory derived variables to predict their persistence. The study recruited 95 assault survivors following their attendance at Accident and Emergency Department for injuries sustained in the assault. Participants were assessed 10 days post assault and followed up over the next 6 months. Whilst differential prediction for grandiosity was identified, paranoia, hallucinations and PTSD were predicted by a very similar pattern of variables. Chapter 7 takes up the contentious issue of sleep in the direct aftermath of trauma and its role in the occurrence of intrusions and PTSD. While sleep has been shown to play a causal role in the development of paranoia and hallucination, there remain two opposing views about the role that sleep plays in the development of PTSD. The sleep of 25 assault survivors was measured on the first night post-assault and over the following week. Lower sleep duration, efficiency and quality were predictive of later paranoia, hallucinations and PTSD. Overall this thesis demonstrates that a range of adverse reactions are not uncommon in the immediate aftermath of trauma and that cognitive processing found to explain PTSD appears also to explain the occurrence of paranoia and hallucinations. Except for grandiosity, differential prediction between PTSD, paranoia, and hallucinations is hard to find empirically. Longitudinal studies cannot prove causation and what is needed going forward are intervention studies that target identified, putative causal processes.

Declaration

The work described in this thesis was carried out between October 2014 and September 2018 under the supervision of Professor Daniel Freeman and Professor Anke Ehlers. The work in this thesis is my own, with only the exceptions listed below:

- The statistical approach in Chapter 2 was advised on by Alecia Nickless
- A proportion of the statistical analysis in Chapter 6 was carried out by Alecia Nickless

I declare that the work presented in this thesis has not been submitted for any other degree, in this or any other university or institute of learning.

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Chapter 1

Individual psychotic experiences following trauma.

Introduction

The relationship between trauma and the entire continuum of psychosis outcomes is well evidenced (Arseneault et al., 2011; Janssen et al., 2004; Shevlin, Houston, Dorahy, & Adamson, 2008; Varese, Smeets, et al., 2012). Furthermore, there is growing evidence of an association between trauma and individual positive psychotic experiences, particularly paranoia and hallucinations (McGarth et al, 2017). However, few studies have investigated individual psychotic experiences in the aftermath of trauma and, despite the potential for differential prediction, even fewer have investigated the possible predictors of these individual experiences in the context of trauma. Whilst some potential predictors have been theorised (e.g. Garety et al., 2011; Longden, Madill & Waterman, 2012; Hardy, 2017) there remain many that are, as yet, untested in empirical studies. Determination of the predictors of the individual psychotic experiences following trauma would not only shed light on the aetiology of the different experiences but potentially enable treatment improvement by identifying targets for intervention in the immediate aftermath of trauma exposure.

In this opening chapter the concepts of trauma and psychotic experiences will be reviewed, and the cognitive models of PTSD, paranoia, grandiosity and hallucinations summarised. The chapter then includes a review of the current empirical research on factors underlying the relationship between trauma and individual positive psychotic experiences. Finally, the structure of the thesis will be set out.

Concepts

Trauma

There is an inherent ambiguity in defining what constitutes a traumatic event, no clear boundaries demarcate 'negative' events from 'traumatic' events. The perception of an event as traumatic relies on subjective appraisal, making it hard to define trauma independently of personal meaning. As a result there is a lack of consensus about the definition of trauma and the categorisation of traumatic life events has differed depending on the area and timing of research (Weathers & Keane, 2007).

In contrast, in the context of post-traumatic stress disorder (PTSD), there are strict criteria about the types of events that qualify as a trauma. (See Appendix 1.1 for the full trauma criterions as laid out in the International Classification of Diseases 10 (ICD 10) and Diagnostic and Statistical Manual of Mental Disorders 5 (DSM 5). The American Psychiatric Association (APA) DSM 5 requires 'actual or threatened death, serious injury, or sexual violence' (APA, 2013, p.271). The debate surrounding the broadness of the definition can be seen reflected in the DSM's changing definition of trauma. DSM 4's (APA, 2000) definition of trauma was criticised for being too inclusive and trauma experts warned of the potential for 'conceptual bracket creep' (McNally, 2004, p.3). Changes to the definition of trauma for DSM 5 (APA, 2013), by discounting exposure through media, television, movies or pictures unless it is work related; medical incidents involving natural causes, such as heart attacks; and non-immediate, non-catastrophic life-threatening illness, such as terminal cancer; led to a restriction of its inclusiveness. As a result, some populations, previously defined as trauma-exposed, do not now qualify for the purpose of

measuring symptoms. Findings regarding the impact of using broad versus narrow definitions of trauma are mixed. One large scale study found it had little impact on the prevalence rates of PTSD (Kilpatrick et al., 1998). However Breslau & Kessler, (2001) suggest that a broader definition results in increased prevalence estimates of both exposure to traumatic events and diagnosis of PTSD.

The DSM/ICD definitions have also been challenged for not acknowledging some of the lesser understood forms of trauma including social trauma, such as poverty, racism, and homophobia, as well as historical trauma and the legacy of violence committed against entire groups, including slavery (Blanch, Filson, Penney, & Cave, 2012). Finally, while it can be argued that hallucinatory and delusional experiences can shatter an individual's experience of themselves, the world and those around them, there remains controversy over whether these symptom-related experiences can be categorised within the trauma criterion (Jackson, Knott, Skeate, & Birchwood, 2004).

Whilst studies investigating PTSD have tended, for diagnostic purposes, to utilise a definition of trauma more in line with the DSM or ICD, studies looking at the link between trauma and psychotic experiences have tended to take a broader approach with less distinction between 'trauma', 'adversity' and 'negative life events' (e.g. Varese et al., 2012). A relationship between more broadly defined trauma that does not fit the DSM 5 or ICD 10 criterion and psychotic experiences has been found. For example, bullying and psychotic experiences are associated even after factors such as family adversity, gender, age and comorbid psychopathology have been accounted for (Schreier et al, 2009).

Whilst the finding that the type of trauma is not as salient as the endorsement of trauma, an important distinction that has been made in research is between trauma with 'intention to harm' (e.g. assault) and without 'intention to harm' (e.g. a car accident). Cross-sectional (Beards et al., 2013) and longitudinal (Kelleher et al., 2008) studies have indicated that an especially high risk of psychotic experience development may be associated with events involving interpersonal trauma (e.g. assault and bullying). Trauma with 'intention to harm' has been associated with increased prevalence of PTSD, first episode psychosis, and psychotic experiences, and a worse psychotic disorder trajectory compared to trauma without 'intention to harm' (Arseneault et al., 2011; Raune, Kuipers, & Bebbington, 2009; Santiago et al., 2013; Van Nierop, Lataster, Smeets, Gunther, Van Zelst, et al., 2014).

The review in this chapter accepts the broader definition of trauma including events such as bullying and negative life events such as loss of a parent. The thesis, as a whole, does not adhere solely to trauma that fits the DSM criterion but there is particular focus on psychotic experiences in the aftermath of interpersonal trauma (trauma with 'intention to harm').

Prevalence

The World Mental Health surveys, using the World health organisation's (WHO) Composite International Diagnostic Inventory CIDI (Kessler & Üstün, 2004), report lifetime traumatic event prevalence of between 54% and 73.8% (Atwoli, Stein, Koenen, & McLaughlin, 2015). There is a clear impact of socio-political environment on the distribution and type of trauma events with traumatic event prevalence rates higher in

countries emerging from conflict. Northern Ireland's history of civil conflict, for example, likely contributed to it having one of the highest rates of trauma exposure in Western Europe (Ferry et al., 2014). Physical violence and witnessing trauma occurring to another person contributed the largest proportion of all lifetime traumatic events in South Africa (Atwoli et al., 2013). In Europe the biggest contributor to trauma exposure were accidents (Atwoli et al., 2015; Darves-Bornoz et al., 2008).

Exposure to potentially traumatic events has been found to be more common in certain groups such as: men (Breslau, 2002; Tolin & Foa, 2006); those in late adolescence/early adulthood (Breslau et al., 1998); those exposed to peer deviance (Rubens, Vernberg, Felix, & Canino, 2013); minority groups (Carter, 2007); psychiatric patients (Bebbington et al., 2011; Fisher et al., 2013); prisoners (Crisanti, 2011); and those exposed to violence early in life (Blom, Högberg, Olofsson, & Danielsson, 2014). Evidence also indicates that survivors of interpersonal trauma events, particularly sexual assault, are at increased risk for further assaults (re-victimisation) when compared to those without a prior history of assault (Nishith, Mechanic, & Resick, 2000). These findings are obviously dependent on the types of trauma assessed. For example, a study by Overstreet et al (2016) reported a higher prevalence of trauma exposure in women than in men, a finding they suggest is due to the non-inclusion of certain traumas usually more prevalent in men (e.g. military trauma). While men appear to be exposed to a greater number of traumas overall, there are particular traumatic experiences, e.g. sexual assault, that are more prevalent in women (Tolin & Foa, 2006).

Trauma reactions

While there is growing evidence that trauma is linked to the development of a range of mental health diagnoses including: psychosis; depression; anxiety; panic disorder; somatization disorder; substance misuse; eating disorder; and personality disorders (Bentall et al., 2014; Fisher et al., 2010; Kessler et al., 2010; Kessler, Sonnega, Brommet, Huges, & Nelson, 1995; Varese, Smeets, et al., 2012), maladaptive reactions to trauma have been studied most extensively in relation to PTSD.

Post-traumatic stress disorder (PTSD), as a diagnosis, is taken to represent a pathological, chronic reaction to a traumatic situation. DSM-5 (APA. 2013) and ICD 10 provide precise criteria for diagnosing PTSD. See Appendix 1.1 for further details of ICD and DSM criteria. DSM-5 (APA. 2013) outlines four distinct symptom clusters: re-experiencing (for example, intrusive thoughts or images related to the trauma); avoidance (for example of cues associated with the traumatic event); arousal or hypervigilance (for example, 'fight or flight' responses, or panic symptoms); and negative thoughts and beliefs. For diagnostic criteria to be met, six symptoms from the four clusters must be present for at least one month and cause significant distress or impairment. When symptoms develop within 4 weeks of the trauma a diagnosis of acute stress disorder can be given. This can represent a normal, albeit distressing, response to stress, usually associated with the experience of one specific trauma.

PTSD prevalence estimates are reported to lie between 0.4% and 3.5% (Bisson, 2013; Kessler et al., 1995). While there is evidence of a gender difference, with females more

likely to develop PTSD than males (Wittchen et al., 2012), these differences may be due in part to ethnocultural issues. Studies from middle Eastern countries, for example, have not found gender differences in rates of PTSD (Elbedour, Onwuegbuzie, Ghannam, Whitcome, & Hein, 2007; Shaar, 2013). Research findings suggest that PTSD symptoms lie on a continuum, with many individuals developing PTSD symptoms classified as partial or sub-threshold PTSD (Breslau, Lucia, & Davis, 2004; Stein, Kennedy, & Twamley, 2002). These subthreshold symptoms have been found to have clinical significance and have been shown to be treatable (Carlier & Gersons, 1995; Naylor et al., 2013).

A model of PTSD

Cognitive models of PTSD focus on a person's responses during and after the trauma. Among the most established psychological approaches is the cognitive model of Ehlers and Clark (2000) (Ehlers & Clark, 2000; Ehlers & Wild, 2015). At the centre of this model is the idea that PTSD occurs when a trauma leads to a sense of current threat. It is hypothesised that these feelings of current threat result from a combination of the type of information processing during the trauma and negative appraisals of the trauma and its effects. Problematic peritraumatic cognitive processing, such as predominance of data-driven processing (focussing on sensory impressions) and lack of self-referential processing (i.e., insufficient linking of the event to knowledge of the self), is thought to result in a poorly elaborated, poorly contextualised and highly emotional memory of the event. As such, these memories are easily and involuntarily triggered into consciousness and lack a sense of happening in the past i.e. the threat feels current. These memories may lead to negative

appraisals of ongoing threat. This threat can be both internal ('I am worthless') or external ('the trauma will happen again'). Mental defeat, a perceived loss of psychological autonomy, at the time of the trauma is a further predictor of negative appraisals. PTSD is thought to persist because negative appraisals of the trauma and its effects motivate a series of maintaining cognitive and behavioural strategies, which include rumination and thought suppression (Ehlers and Clark, 2000), persistent dissociation (Murray, Ehlers, & Mayou, 2002), and safety behaviours and avoidance. Another factor that has been associated with the occurrence of PTSD is the autobiographical memory deficit, over general memory bias (OGM). OGM is the reduction in the proportion of specific memories retrieved intentionally after cue presentation. It is posited the OGM may not be a consequence of trauma (Moore & Zoellner, 2007) but may influence the occurrence of PTSD. Support for this comes from studies that found OGM to be predictive of later PTSD (Kleim & Ehlers, 2008) and studies that found trauma survivors with PTSD show more OGM than those without (Schönfeld & Ehlers, 2006; Schönfeld, Ehlers, Böllinghaus, & Rief, 2007). A further factor that is currently debated in the role it may play in the occurrence of PTSD is sleep. On the one hand sleep problems have been implicated in a delayed recovery from elevated posttraumatic stress levels (Babson & Feldner, 2010) and recent findings (Kleim, Wysokowsky, Schmid, Seifritz, & Rasch, 2016) suggest that sleep in the early aftermath of trauma,, as opposed to no sleep reduces the amount and emotional distress of subsequent intrusive trauma memories. On the other hand there is another line of research that suggests sleep deprivation in the immediate aftermath of trauma may have

a protective effect on the development of PTSD symptoms (Porcheret, Holmes, Goodwin, Foster, & Wulff, 2015; Wagner, Hallschmid, Rasch, & Born, 2006).

Psychotic Experiences

Empirical research indicates that within non-affective psychotic diagnoses, such as schizophrenia, there are multiple independent experiences. Factor analysis of the psychiatric assessments of more than 600 inpatients with a functional psychotic disorder resulted in 11 interpretable factors suggesting the factor structure of psychotic symptoms is more complex than is generally acknowledged (Peralta & Cuesta, 1999). Further support for this level of complexity has been repeatedly found, with results from principal component analysis revealing that positive psychotic experiences are best represented by 5 or 6 underlying dimensions including paranoia, grandiosity and hallucinations (Ronald et al., 2014; Wigman et al., 2011). This suggests that within psychosis, specific positive psychotic experiences, such as paranoia, grandiosity and hallucinations are distinct and independent. Correlations between these different experiences are low to moderate (Garety et al., 2013; Ronald et al., 2014). Furthermore, the heritability of each type of psychotic experience has been found to vary, being highest for paranoia and lowest for hallucinations (Zavos et al., 2014). The implication is that each experience requires explanation, one that takes into account not only shared but differential casual mechanisms. There has been a move to investigate psychotic experiences transdiagnostically, at the level of the individual experience. This approach has proven a useful paradigm for research in this area and is arguably becoming the dominant model for psychological research in psychosis (Geekie & Read, 2009).

In contrast to an historical view that psychotic experiences were inevitably pathological and a sign of severe mental health disorder, there is evidence that psychotic experiences are actually common in non-clinical populations. Psychotic experiences that do not reach full clinical criteria can be found in the general population (Freeman et al., 2005; J van Os et al., 2003) occurring with an approximately normal distribution. The same casual factors, such as: ethnicity (Johns, Nazroo, Bebbington, & Kuipers, 2002; Morgan et al., 2009; Reininghaus et al., 2010); childhood adversity (Linscott & van Os, 2012; Morgan et al., 2009, 2014; Varese, Smeets, et al., 2012); stressful life events (Beards et al., 2013; Johns et al., 2004; Morgan et al., 2014); anomalous experiences; and worry (Freeman, Pugh, Vorontsova, Antley, & Slater, 2010; Johns & van Os, 2001) are implicated in both clinical and non-clinical phenomena. In addition, individuals who endorse psychotic experiences are at higher risk of developing a clinical disorder than those who do not endorse psychotic-like experiences (Os & Reininghaus, 2016). Finally, milder psychotic experiences have been found to be more common in families of individuals with psychotic disorder than in families of those who do not (van Os, Linscott, Myin-Germeys, Delespaul, & Krabbendam, 2009). These three lines of research findings support the idea that non-clinical and clinical psychotic experiences exist on the same continuum. Psychotic experiences are both phenomenologically and temporally continuous with clinical psychotic disorders.

A focus on individual psychotic experiences has led to the development of theoretical models, most notably for paranoia and hallucinations.

Paranoia

A spectrum of paranoia, defined as unfounded or exaggerated thoughts that others intend to cause the person social, psychological, or physical harm (Freeman & Garety, 2000), is found in the general population. Persecutory delusions seen in clinical settings represent the severe end of this spectrum (Bebbington et al., 2013). Epidemiological and experimental studies indicate that paranoid thinking may be a regular experience in over 30% of the general population, with at least 5 % of people experiencing a persecutory delusion during their lifetime (Freeman, Pugh, & Garety, 2008; Johns et al., 2004). There are mixed findings about gender differences in the endorsement of paranoid ideation, some studies suggest an association with male gender (e.g. Johns et al., 2004) some with female gender (e.g. Forsell & Henderson, 1998), some report no differences (e.g. Freeman et al., 2005) whilst some suggest endorsement by gender may depend on the content of the paranoia thoughts (Freeman et al., 2010).

From a causal perspective, the most tested psychological model of paranoia, namely the threat anticipation cognitive model (Freeman, 2007), conceptualises paranoid ideation as threat beliefs arising from a search for meaning of experiences of unusual or emotional significance for the individual. It is hypothesised that there are a number of psychological processes including: worry; negative self-beliefs; disrupted sleep; reasoning biases; and the use of safety behaviours that are implicated in the maintenance of paranoid ideas (Freeman, 2016). This model has led to the development of highly targeted therapeutic interventions (e.g. Freeman et al., 2014, 2015).

Grandiosity

Grandiosity is the unfounded belief that an individual has exceptional abilities, knowledge, power or a special identity. Grandiose delusions are a relatively common psychotic experience (Appelbaum et al, 1999). As with paranoia, grandiose beliefs that fail to meet full delusional criteria are found in the general population (Armando et al., 2010; Verdoux et al., 1998).

Two main groups of theories for the formation and maintenance of grandiosity exist. Firstly, that grandiose thinking develops as protection against depression (Neale, 1988) and underlying feelings of powerlessness (Beck & Rector, 2005) or, taking into account the interpersonal nature of delusional beliefs, in defence of social self-esteem (Heatherton & Polivy, 1991). This is the delusion-as-defence account. However, clinical studies have reported that levels of grandiose beliefs are correlated with higher explicit self-esteem and lower negative affect (Moritz et al, 2010) and levels of grandiose beliefs are predicted by positive (not negative) views of self (Fowler et al., 2006). In addition, one study set up to specifically investigate the delusion-as-defence account with reference to grandiose delusions, did not find any evidence for a discrepancy between overt and covert self-esteem in individuals with grandiose delusions. The authors suggest that grandiose delusions do not currently defend against low self-esteem (Smith, Freeman, & Kuipers, 2005).

The evidence available appears to support a second, more emotion-consistent approach (Knowles, McCarthy-Jones, & Rowse, 2011). The emotion-consistent account posits that grandiose beliefs build on existing or preserved raised areas of self-esteem (Freeman &

Garety, 2003; Smith et al., 2005) which against the backdrop of positive mood (and other factors such as reasoning biases) can become exaggerated. Delusions are partly a reflection of current and past emotion and associated processes.

Cognitive conceptualisations of delusional ideation suggest that the search for meaning following an initial anomalous experience leads to the emergence of delusional explanations (Garety, Kuipers, Fowler, Freeman, & Bebbington, 2001; Maher, 1988). As with paranoia, this type of account is also applicable to grandiose thoughts. The difference between the two delusion subtypes lies in part on the individual's emotional state and extreme evaluations of self and others. Garety et al. (2013) found that whilst higher levels of paranoid thinking are associated with negative emotions, negative self and other evaluations, higher levels of grandiose thinking are associated with higher positive evaluations of self and others and lower depression and anxiety. Furthermore, grandiose delusions were found to be more associated with the jumping to conclusions (JTC) bias than persecutory delusions were (Garety et al., 2013). A number of factors are posited to play a role in the further amplification of positive affect and the internal state change, including the use of ruminative first-person mental imagery relating to future goal attainment and positive internal attributions, more likely if the individual holds an image of an aspirational 'imminent possible self' (Mansell et al. 2007, p.523).

Hallucinations

Hallucinations are defined as sensory perceptions which occur in the absence of corresponding external stimulation, resemble a real perception, and occur in the awake

state (David, 2004). Epidemiological studies suggest a lifetime prevalence rate of 4% - 38% dependent on definition and methodology (Johns et al., 2004; Ohayon, 2000). Cognitive models of hallucinations are arguably less comprehensive than those available for persecutory delusions as evidenced by the reduced consensus in empirical findings and the relatively fewer instances of translation from model to therapeutic intervention as compared to paranoia. In addition, the models tend to focus almost entirely on auditory hallucinations at the expense of other hallucinations occurring in different sensory modalities. Whilst there remains debate about the factors and processes which may ultimately account for the genesis of hallucinatory experiences, many psychologists view these experiences to be the consequence of a dysfunction in source-monitoring, i.e. the misattribution of internally generated cognitive events to external sources (Bentall, 1990; Larøi & Woodward, 2009). Though how this arises and what the exact mechanism is remains unresolved. Evidence in support of this has been found in both clinical and non-clinical subjects (Brunelin et al., 2006; Ditman & Kuperberg, 2005; Larøi, Van der Linden, & Marczewski, 2004). A direct role for emotion has also been hypothesised (Garety et al., 2001) suggesting that the content of hallucinations may reflect emotional concerns. As with delusions, it is hypothesised that cognitive biases play a role in increasing the likelihood of an individual having an hallucinatory experience. In addition to JTC and belief inflexibility, the jumping to perceptions (JTP) bias (i.e. the increased likelihood of identifying an ambiguous perceptual event as external and real, rather than internal and

imaginary; Bentall 1990) has been linked specifically to hallucinations (Böcker, Hijman, Kahn, & De Haan, 2000; Bristow, Tabraham, Smedley, Ward, & Peters, 2014).

Summary

In light of factor analytic studies which show that psychotic experiences are independent experiences, this thesis will investigate the psychotic experiences of paranoia, grandiosity, and hallucinations, as transdiagnostic, dimensional variables. Furthermore, whilst the review in this chapter takes a broad approach to trauma and includes adverse life events such as loss of a parent and neglect, this thesis will primarily be concerned with interpersonal trauma which has been associated with worse outcomes.

Review

Background

The theories described in previous sections have highlighted a number of candidate cognitive and behavioural mechanisms that could account for vulnerability to PTSD symptoms and psychotic experiences after trauma. Mueser (2002) proposed that, although distinct entities, PTSD and psychosis interact and exacerbate each other. He placed PTSD symptomatology at the centre of understanding of how trauma exacerbates psychosis by suggesting PTSD mediates the relationship between trauma exposure and the course of psychopathology. Morrison (2003) went further, proposing that psychotic experiences and PTSD symptoms fall on a continuum of trauma-related reactions (Morrison, Frame, & Larkin, 2003). There may be shared developmental and maintenance factors that operate in both PTSD and psychotic experiences such as dissociation, attribution style, and interpretation of intrusions. Central to this theory is the idea that trauma results in negative beliefs about self, other and the world, beliefs that have been associated with psychotic experiences (Garety et al., 2001; Bentall et al, 2001). As a result, distressing interpretations of ambiguous events are more likely.

Since these initial proposals, theorists have further elucidated a number of potential psychological mechanisms involved in the development of PTSD that may also be involved in the development and maintenance of psychotic experiences (Berry, Barrowclough, & Wearden, 2007; Read & Gumley, 2008). These have included dissociation (Longden, Madill, & Waterman, 2012; Pilton, Varese, Berry, & Bucci, 2015), peri and post-traumatic processes (e.g. Freeman et al., 2013; Hardy et al., 2016; Steel, 2015), emotion regulation and autobiographical memory (Hardy, 2017).

Most empirical studies have looked at potential processes between trauma and psychosis or schizophrenia (e.g. Arseneault et al., 2006; Van Nierop, Lataster, Smeets, Gunther, van Zelst, et al., 2014). While this line of research may potentially highlight possible shared predictors of the individual psychotic experiences in the aftermath of trauma, it may also obscure identification of maintenance factors and lead to the minimisation of potentially important factors. In addition, it is does not allow for the identification of differential predictors. This thesis focuses on individual psychotic experiences, therefore, in contrast to existing reviews (e.g. Gibson, Cooper, Reeves, Anglin, & Ellman, 2017; Matheson, Shepherd, Pinchbeck, Laurens, & Carr, 2012; Varese et al., 2012), this chapter will look at studies that take an individual psychotic experience approach. Those studies that jointly assess delusions and hallucination as positive psychotic experiences or use summed scores for delusions will not be included. The aim of the review is to be aware of all relevant studies that have investigated potential factors involved in the occurrence of individual psychotic experiences (paranoia, grandiosity and hallucinations) in the aftermath of trauma.

Methodology

A search of Pubmed was conducted (July 2015) and repeated (July 2018) using the following search string: (trauma* OR adversit*) AND (Paranoi* OR Persecut* OR Grandio* OR Hallucinat* OR psychot* OR Psychosis) AND (cognit* OR mediat*). Examination of the reference lists of included studies was carried out in addition to the database search.

Studies were eligible if they were empirical and published in peer reviewed journals. They were required to have measured trauma (broadly defined) and individual psychotic experience(s). Furthermore, the studies needed to have assessed the effect of one or more

psychological mechanisms on the relationship between trauma and individual psychotic experiences. Eligible studies needn't have differentiated between proximal or childhood trauma as trauma at all timepoints were included. Studies were excluded if they too broadly defined psychotic experiences (e.g. positive psychotic experiences or delusions).

Results

Overall 25 studies were identified. Table 1 provides an overview of the studies reviewed including the details of the measures used. Nearly all the studies used adult samples (n= 23), only two studies used an adolescent sample (Ashford, Ashcroft, & Maguire, 2012; Campbell & Morrison, 2007) and one study a child sample (Yamasaki et al, 2016). 14 studies employed non-clinical participants, 4 of which used student samples. All studies, apart from one (Freeman et al., 2013) were cross-sectional.

Types of Trauma

12 studies measured lifetime or proximal traumas. These included: peer victimisation; combat; traumatic life events (e.g. bullying); and assault. 13 studies measured only childhood trauma, most often child sexual abuse (CSA), child physical abuse (CPA), child emotional abuse (CEA) and neglect.

Psychotic Experiences

Of the individual positive psychotic experiences, paranoia, grandiosity and hallucinations, included in this review, the studies were limited to only paranoia and hallucinations. No studies investigating potential predictors of grandiosity in the context of trauma were found. It is worth noting that there were studies (e.g. Cole, Newman-Taylor, & Kennedy, 2016; Kilcommons, Morrison, Knight, & Lobban, 2008) that used a summed score for delusions, however, as grandiose and paranoid delusions have been shown to be independent and predicted by different patterns of variables, these were not included. In total, 14 studies investigated mechanisms implicated in the relationship between trauma and paranoia and 16 studies investigated potential mechanisms between trauma and hallucinations.

TABLE 1

Citation	Design	Sample	Trauma measure	Psychotic Experience (Measure)	Potential mechanism (Measure)	Comment on findings
Anketell et al (2010)		40 individuals with PTSD		Hallucinations (PANSS)	Dissociation Thought suppression	Dissociation but not thought suppression is associated with voice hearing in individuals with PTSD.
Appiah-Kusi et al (2017)	Cross-sectional	30 UHR 38 controls	Childhood Trauma Questionnaire	Paranoia (GPTS)	Schemas (BCSS)	Association between emotional neglect and paranoia was partially mediated by negative self-schema.
Ashford, Ashcroft & Maguire (2012)	Cross-sectional	135 Pupils from secondary school	Bullying (Gatehouse bullying Questionnaire)	Paranoia (CAPE)	Threat perception (Neutral social vignettes)	Negative beliefs about self and depression significantly mediated relationship between indirect aggression and paranoia. Negative beliefs about others mediated direct verbal aggression and paranoia
Bortolon (2017)	Cross sectional	425 General population	Childhood Trauma Questionnaire	Hallucinations (LSHS)	Schemas (Young Schema Questionnaire)	Link between CEA, CSA and hallucinations is mediated by

					Dissociation (Dissociation experiences questionnaire)	effect of maladaptive schemas and dissociation. Link between CPA and hallucinations is mediated only by dissociation
Campbell & Morrison (2007a)	Cross-sectional	373 Pupils from secondary school	Bullying (Bully/Victim Questionnaire)	Hallucinations (LSHS-R-Auditory) Paranoia (PS)	Post-trauma cognitions (PTCI)	Negative post-trauma cognitions about the self and the world are associated with paranoia and hallucinations.
Campbell & Morrison (2007b)	Cross-sectional	41 war veterans	Combat experience	Paranoia	Trauma-related thoughts and beliefs (PTCI) Beliefs about paranoia	Negative post-trauma cognitions and beliefs about paranoia were associated with increased predisposition to paranoia.
Choi (2017)	Cross-sectional	169 Out patients	Korean version of the CTQ	Paranoia (RC 6 of MMPI-2)	PTSD symptoms (IES-R-K) Dissociation (K-PDEQ)	Posttraumatic stress symptoms partially mediated the relationship between childhood trauma and paranoia.
Cole, Newman & Kennedy (2016)	Cross-sectional	200 University students	CATS	Hallucinations (LSHS-R)	Dissociation (DES-II; CDS)	Dissociation mediated the relationship between maltreatment and hallucination proneness.

Fisher et al (2012)	Cross-sectional	212 General population	CTQ	Paranoia (2 questions from the PSQ)	Negative schemas (BCSS)	Negative schematic beliefs play a role in pathway between childhood maltreatment and paranoia. However, other pathways are involved.
Freeman & Fowler (2009)	Cross-sectional	200 General population	Life Stressor Checklist	Paranoia (GPTS part B) Hallucinations (CAPS)	Schemas (BCSS) Anxiety	Anxiety mediates relationship between trauma and paranoia. Link between trauma and hallucinations unexplained by negative beliefs about self or anxiety.
Freeman et al (2013)	Longitudinal	106 Survivors of an interpersonal assault	Assault interview	Paranoia (GPTS)	Schemas (BCSS) Trauma processing (Processing during assault) Trauma related thoughts/beliefs (PTCI) Responses to intrusions (RIQ)	PTSD and paranoia in the months after an assault are predicted by a very similar pattern of variables. Information processing style during trauma, mental defeat, negative thoughts about self, worry and safety behaviours all predicted later paranoia and PTSD
Gracie et al (2007)	Cross-sectional	228 University students	Traumatic Life Events Questionnaire	Paranoia (PS) Hallucinations	PTSD symptoms (SR-PTSD) Schemas (BCSS)	Negative beliefs about self and others may mediate relationship between trauma and paranoia. Re-experiencing

				(LSHS-Auditory)		symptoms may mediate the relationship between trauma and hallucinations
Hardy et al (2016)	Cross-sectional	228 Individuals with relapsing psychosis	Trauma History Questionnaire	Auditory Hallucination Paranoia (items from the Assessment of Positive Symptoms)	PTSD symptoms (SR-PTSD) Schemas (BCSS)	Relationship between CSA and AH mediated by posttraumatic avoidance and numbing but not intrusive trauma memory, negative beliefs or depression. Relationship between CEA and paranoia was mediated by negative other beliefs but not posttraumatic stress symptoms, negative self-beliefs, or depression.
Kilcommons & Morrison (2005)	Cross-sectional	32 Individuals with psychotic diagnoses	Trauma History Questionnaire	Hallucinations (PANSS)	PTSD symptoms (PTSDSS-SSR) Trauma related thoughts (PTCI) Dissociation (DES)	Dissociative processes and negative beliefs formed as a result of trauma were associated with hallucinations.
Kilcommons et al (2008)	Cross-sectional	40 Survivors of sexual assault		Hallucinations (RHS)	PTSD symptoms (DTS) Dissociation (DES)	Negative post trauma beliefs about the self and the world were associated with hallucinations. Dissociative

		40 controls			Trauma related thoughts/beliefs (PTCI)	experiences also associated with hallucinations.
Laloyaux (2016)	Cross-sectional	112 General population	Questionnaire developed for study	Hallucinations (LSHS)	Expressive suppression (ERQ) Emotion regulation strategies (CERQ)	Relationship between adverse life events and hallucinations was mediated by maladaptive emotion regulation strategies, but not by stress sensitivity.
McCarthy-Jones (2018)	Cross-sectional	7403 General population	CSA/CPA (APMS)	AVH (1 question from psychosis screening questionnaire)	Anxiety Depression (CIS-R) PTSD symptomatology (trauma screening questionnaire)	Posttraumatic symptomatology was found to mediate the relationship between CSA and AVH. No evidence was found for depression or anxiety as a mediating variable.
Morrison & Petersen (2003)	Cross-sectional	64 General population	Trauma measure designed for study	Hallucinations (RHS)	Dissociation (DES) Trauma-related thoughts/beliefs (PTCI) PTSD symptomatology (PSS-SR)	Dissociative processes explained significant proportions of the variance in predisposition to both auditory and visual hallucinations

Pearce et al (2017)	Cross-sectional	77 Individuals with clinical levels of psychosis	Brief betrayal trauma survey	Paranoia Hallucinations (items from CAPE)	Dissociation (DES-R)	Dissociation mediated the relationship between trauma and hallucinations but also the relationship between trauma and paranoia
Perona-Garcelan et al (2012)	Cross-sectional	71 Patients with a psychosis diagnosis	TQ	Hallucinations (PANSS)	Dissociation (DES-II)	Some evidence that dissociation, specifically depersonalisation, mediates the relationship between childhood trauma and hallucinations.
Seo & Choi (2018)	Cross-sectional	199 Psychiatric patients	Korean CTQ	Paranoia (MMPI-2, restructured Clinical Scale 6)	Social Defeat (Defeat Scale)	Social defeat partially mediates the relationship between childhood trauma and paranoia
Sun et al (2018)	Cross-sectional	66 First episode psychosis patients	CTQ	Hallucinations (PANSS)	Dissociation (SCID-D-R, DES-II)	Dissociation did not mediate the relationship between childhood trauma and hallucinations
Valiente et al (2017)	Cross-sectional	138 52 Participants with persecutory ideation	Trauma History Screen	Paranoia PaDS	Explicit/Implicit self esteem (SPWB/GNAT) Emotional avoidance (AAQ-II)	Adversity is associated with higher levels of paranoia and mediated by experiential avoidance.

		35 participants with depression 51 controls				
Varese, Barkus & Bentall (2012)	Cross-sectional Case-control	65 45 patients with schizophrenia 20 controls	The child abuse and trauma scale	Hallucinations (LSHS-R)	Dissociation (DES)	Dissociation was found to mediate the relationship between childhood trauma and hallucination proneness.
Yamasaki et al (2016)	Cross-sectional	4478 Early adolescents	Parent rated-questions from the Olweus Bully/Victims Questionnaire	Hallucinations (parent rated 2 items from Child Behaviour Check List)	Dissociation (parent rated 6items from the Child Behaviour Check List)	The relationship between peer victimisation and hallucination was mediated by dissociation, not by depressive symptoms or external locus of control

Design

24 of the studies had a cross sectional design. Most of the studies in the review (n = 15) included empirical tests of mediation utilising cross-sectional data. There is increasing recognition that mediation hypotheses should not be tested unless the data are longitudinal and spaced appropriately. It has been demonstrated that cross-sectional approaches to mediation generate substantially biased estimates of longitudinal parameters (Maxwell & Cole, 2007) and therefore, the results of analyses based on cross-sectional data are unlikely to accurately reflect longitudinal mediation effects (Cole & Maxwell, 2003). All the results from the cross-sectional studies should be interpreted in this context.

Few of the studies clearly identified between proximal and distal trauma. This is important not only because the time between the trauma and assessment is an additional confounding variable but also because the temporal state of a mediating relationship can have a significant effect on the causal relationship (Schrout & Bolger, 2002). Furthermore, converging evidence from studies investigating how individuals remember their trauma over time suggests that there is a risk of memory amplification (Southwick, Morgan, Nicolaou, & Charney, 1997).

Potential mechanisms in cross-sectional studies

A small range of factors that might influence the relationship between trauma and individual psychotic experiences were investigated in the cross-sectional studies. These

included: dissociation; negative affect; negative schemas; post-trauma beliefs, and PTSD symptomatology.

Dissociation

The most investigated factor was dissociation, included in eleven of the studies. Dissociative experiences were found to be associated with hallucinations in those with a diagnosis of PTSD (Anketell et al., 2010) as well as in sexual assault survivors (Kilcommons et al., 2008). Dissociation was also found to mediate the relationship between trauma and hallucinations in non-clinical populations (Bortolon, Capdevielle, Boulenger, Gely-Nargeot, & Raffard, 2013; Cole et al., 2016; Morrison & Petersen, 2003; Morrison & Wells, 2007) and in individuals with psychosis (Perona-Garcelán et al., 2012; Varese, Barkus, & Bentall, 2012). Only one recent study (Sun et al, 2018) failed to identify dissociation as a mediator in the relationship between trauma and hallucinations in individuals with first episode psychosis There is less evidence for the role of dissociative experiences in the development of paranoia after trauma, although findings in clinical populations suggest that its impact may extend to paranoia (Choi, 2017; Pearce et al., 2017).

Negative affect

Negative affect has been emphasised in cognitive models as having a key role in the development of both paranoia (Freeman, Garety, Kuipers, Fowler, & Bebbington, 2002) and hallucinations (Waters et al., 2012). It has therefore been theorised to be one way that exposure to trauma may result in the development of these psychotic experiences.

However, the empirical evidence does not support this unequivocally. Neither the link between trauma and paranoia nor the association between trauma and hallucinations was explained by depression in a study carried out by Hardy and colleagues (2016). Furthermore, whilst Freeman and Fowler (2009) found that anxiety did mediate the relationship between trauma and paranoia it was not found to mediate the relationship between trauma and hallucinations. In line with these findings, McCarthy-Jones (2017) also failed to find evidence of an indirect effect of CSA on hallucinations via depression.

Negative schemas

One potential mechanism investigated in six of the studies is negative schemas. There is some support for a role for negative-self schemas in the relationship between trauma and paranoia (Appiah-Kusi et al., 2017; Fisher, Appiah-Kusi, & Grant, 2012; Gracie et al., 2007) and for a role for negative-other schemas (Hardy et al, 2016). However, two studies (Freeman & Fowler, 2009; Hardy et al., 2016) failed to find a role for negative-self schemas in the mediation of the relationship between trauma and paranoia whilst another study (Fisher et al., 2012) found no evidence of negative-other schemas impacting on the relationship.

The role of negative beliefs in the relationship between trauma and hallucinations has been less well investigated as compared to paranoia. Findings here are also mixed with one study (Bortolon et al., 2013) suggesting that maladaptive schemas only mediate the relationship

between CEA and hallucinations, not the relationship between CPA and hallucinations. Whilst Hardy et al (2016) and Gracie et al (2007) both failed to identify a role for negative schemas in the relationship between trauma and hallucinations.

Post-trauma cognitions

The role of trauma related thoughts and beliefs was investigated in two studies. Negative appraisals about the self and the world, formed as a direct result of trauma, were found to mediate the relationship between trauma and hallucinations (Campbell & Morrison, 2007; Kilcommons & Morrison, 2005) as well as between trauma and paranoia (Campbell & Morrison, 2007). Wickham & Bentall (2012) found the relationship between neglect and paranoia was mediated by the perception of personal justice.

Post traumatic symptomatology

Six studies investigated posttraumatic symptomatology as a potential factor influencing paranoia or hallucinations in the aftermath of trauma. Hardy et al (2016) found that within a clinical sample, the relationship between CSA and auditory hallucination was mediated by post-traumatic avoidance, numbing and hyperarousal. This finding is supported by a more recent study (McCarthy-Jones, 2017) that also found evidence that posttraumatic symptomatology mediated the association between CSA and auditory hallucinations. Gracie et al (2007) found that re-experiencing symptoms may mediate the relationship between trauma and hallucinations.

Other studies found evidence of the relationship between trauma and paranoia being partially mediated by social defeat (Seo & Choi, 2018) and by experiential avoidance (Valiente, Espinosa, Villavicencio, Cantero, & Fuentenebro, 2017), whilst the relationship between trauma and hallucinations was found to be mediated by maladaptive emotion regulation strategies (Laloyaux, Dessart, Van Der Linden, Lemaire, & Larøi, 2016).

Longitudinal studies

Only one of the studies reviewed was a longitudinal design. This study by Freeman and colleagues (2013), assessed 106 people one month after they received hospital treatment for injuries sustained in an interpersonal assault. Participants were then followed up 3 months and 6 months later. The design of the study overcomes the problem of differing time between index trauma and assessment. They found that despite paranoia and PTSD being independent outcomes after trauma, they were predicted by a very similar pattern of variables. This leaves a 'significant question unanswered: what are the factors determining specifically paranoid rather than PTSD responses to a trauma?' (Freeman et al, 2013, p. 2682).

Discussion

In this first chapter the context for the work to be undertaken in this thesis has been set out. The concept of trauma taken up in this chapter is a broader one than the criterion laid out in the current DSM or ICD. The review includes events such as bullying and adverse life events. Beyond the review, the thesis is primarily focussed on interpersonal trauma (e.g. assault and bullying) and, for diagnostic purposes, where measures of PTSD are taken, the trauma does fall within the DSM/ICD criteria. The approach taken in this thesis, to investigate at the level of the individual psychotic experience, is explained and the research supporting this idea, outlined. The cognitive models of the main positive psychotic experiences included in the thesis are also covered.

The review of empirical studies investigating predictors of individual psychotic experiences in the aftermath of trauma highlights a number of gaps in the literature. There are surprisingly few studies that have assessed potential factors that may be involved in the association between trauma and individual psychotic experiences. No studies investigating factors in the occurrence of grandiosity after trauma were identified. With regards paranoia and hallucinations, it appears that there are a number of putative mechanisms that may partially explain their development in the context of trauma. Most notably these are dissociative experiences, negative post-traumatic appraisals, and post-traumatic symptomatology. However, a number of methodological limitations need to be considered when interpreting these results. First, the studies were almost exclusively cross-sectional.

Many of them utilised mediation analyses on cross-sectional data, a practice that has been questioned in the literature. Few of the studies adjusted for the time between the trauma and the assessment. Furthermore, the studies for the most part were relatively small, while the large studies tended to be secondary analyses of studies where the design was set a priori. Finally, only a limited number of potential predictors have been tested.

As suggested by the cognitive models of PTSD and the main positive psychotic experiences, outlined earlier in the chapter, there are a large number of plausible trauma-related factors that may play a role in the relationship between trauma and psychotic experiences. These include trauma related coping strategies such as suppression numbing and hypervigilance, peri-traumatic processing such as dissociation and data driven processing, and safety behaviours such as avoidance. Another, untested, potential predictor of individual psychotic experiences in the aftermath of trauma includes disrupted sleep, which has recently been implicated in the development of individual psychotic experiences (Freeman et al, 2017; Reeve, Sheaves and Freeman, 2014).However, there remain contrasting views on the role of sleep in the context of trauma on the development of PTSD symptoms (Kleim, Ehlers, & Glucksman, 2012; Porcheret et al., 2015).

It remains unclear why some individuals after trauma develop persistent experiences whereas others do not, or why one outcome is more likely than another. Each of the individual experiences need explaining. While paranoia and its relationship with trauma

appears to be explained by a similar pattern of variables as the relationship between trauma and PTSD (Freeman et al, 2013), it is likely that there are, as yet untested mechanisms that will specifically predict the presence of paranoia as opposed to PTSD. These may, for example, include thinking biases such as jumping to conclusions.

In conclusion, there is increasing acknowledgement of the potential role of trauma in the occurrence and persistence of individual positive psychotic experiences, most notably paranoia and hallucinations. Research clearly demonstrates that these phenomena are associated. However, the shared and differential predictors of the individual psychotic experiences remain to be identified.

Aims for the thesis

This thesis assesses individual psychotic experiences, including grandiosity, and their association with trauma. It uses longitudinal design and draws on the theoretical models to investigate a number of potential shared and differential predictors.

Chapters 2 and 3 are secondary analyses designed to help inform the main empirical study. The study reported in chapter 2 is the first longitudinal study (n = 4997) to look developmentally at grandiosity. It explores the ability of trauma in childhood to predict adolescent grandiosity and hypothesises on potential mechanisms underlying this relationship. Chapter 3 is a secondary analysis of the study identified in the review as the only longitudinal study. This is the first study (n=106) to explore the role that cognitive processing of a recent trauma may have on the occurrence of hallucinations. Findings suggest that the way in which trauma is processed may partly determine the presence and persistence of hallucinations.

The methodology of the main empirical study is described in chapter 4. This study (n= 95) is the first to investigate prospectively PTSD symptoms and multiple psychotic experiences (paranoia, grandiosity and hallucinations) in the months after a physical assault. It looks at the occurrence of these different psychopathological reactions to trauma, how distinguishable they are from each other, and the shared and differential psychological factors that lead to the problems persisting. In chapter 5 a description of the levels of paranoia, grandiosity, hallucinations and PTSD at 10 days post-assault are reported along

with detailed demographics and assault characteristics. In chapter 6 the results from the investigation to explore the shared and differential predictors of the different outcomes are displayed. The final empirical chapter picks up the contentious issue of sleep in the aftermath of trauma. Using a subgroup of the main study participants (n = 25) the chapter looks at the ability of sleep in the nights following an assault to predict the occurrence of paranoia, grandiosity, hallucinations and PTSD. The last chapter gives a summary of the thesis and its limitations and discusses potential future directions.

This programme of research will illuminate the shared and differential predictors of individual positive psychotic experiences and PTSD in the aftermath of trauma. It is hoped that this will provide etiologically useful information as well as help inform the development of preventative interventions that could be used to aid victims of interpersonal trauma.

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Chapter 2

Grandiosity in adolescence: testing childhood adversity and bullying as predictors.

This chapter has been adapted from the following paper, attached in Appendix 2.1

Geddes, G, Ehlers, A., Nickless, A., Ronald, A., and Freeman, D. (submitted) Grandiosity in adolescence: Childhood predictors.

Findings presented at:

6th European Conference of Schizophrenia Research, Sept 2017, Berlin

Abstract

Background

Grandiosity is an under-researched delusion type, particularly in comparison to paranoia. The heritability of grandiosity across the spectrum of severity is around 44%, indicating a significant role for environmental factors. In this chapter the first study that looks developmentally at grandiosity, examining potential associations with earlier adverse life events, self-perceived ability, height and age of puberty onset, is described.

Aims

This chapter takes the opportunity provided by the Twins Early Development Study (TEDS) to investigate childhood predictors of adolescent grandiosity. It was hypothesised that adverse life events and bullying reported in childhood, higher self-perceived ability at age 9, early puberty onset and increased height would all predict increased reporting of grandiosity at age 16.

Method

Participants were one twin from each of 4997 adolescent twin pairs, a sample from the Twins Early Development Study (TEDS). As part of TEDS they completed measures at age 9 of self-perceived ability, academic achievement, cognitive ability, parental discipline and life events and at age 12 completed measures of bullying victimisation, depression, and height. At age 16 they completed assessments of ability and achievement. The participants-reported on their grandiose thoughts at age 16.

Results

There was appreciable endorsement of grandiosity items at age 16. Grandiose ideas were not significantly associated with objective measures of ability or achievement taken at age 9 or age 16. Higher self-perceived ability and reporting being smacked or slapped by parent at age 9 and reporting peer victimisation at age 12 were associated with adolescent grandiose ideas.

Conclusions

Adolescents endorsing grandiose ideas were overestimating individual success, while perceiving a harsh external environment. It may be that grandiose ideas are a strategy to deal with difficult circumstances.

Introduction

Grandiosity is characterised by unfounded or exaggerated ideas of exceptional abilities, knowledge, power or special identity. Factor analytic studies have demonstrated the independence of grandiosity from other psychotic experiences (Ronald et al., 2014; Wigman et al., 2011) and it has been shown that there are significant differences between the processes associated with paranoid and grandiose delusions (Garety et al., 2013). However, as highlighted in Chapter 1, grandiosity has rarely been a specific focus of research, particularly in comparison to paranoia. As with other psychotic experiences (van Os et al., 2003), there may be a spectrum of severity of grandiose ideas within the general population, where grandiose delusions, typically seen in psychotic disorders, represent the severe end of this dimension.

The Longitudinal Experiences And Perceptions (LEAP) study assessed psychotic experiences as quantitative traits in five thousand adolescent twin pairs (Ronald et al., 2014) drawn from the Twins Early Development Study (TEDS). Using this cohort, a behavioural genetic study investigated the degree of genetic and environmental influences on specific psychotic experiences (Zavos et al., 2014) and found heritability of grandiosity to be 44%, with the extent of genetic contribution to causation similar across the full spectrum of severity (Zavos et al., 2014). This study indicates a significant role for environmental factors in the occurrence of grandiosity. In this chapter, the childhood data collected on this cohort from TEDS was analysed to identify early environmental and

individual predictors of later grandiosity. This study is the first longitudinal developmental test of grandiosity.

One of the most robust environmental risk factors for the development of psychotic experiences is childhood adversity and trauma (Bendall, Alvarez-Jimenez, Nelson, & Mcgorry, 2013; Read, Van Os, Morrison, Ross, & Read, 2005). There is preliminary evidence that this association extends to grandiose delusions. One study (Thompson et al., 2009) found that in a group of 30 individuals at high risk for psychosis, grandiosity was the positive symptom that bore the greatest relationship to trauma exposure. In a replication and extension of this study, Velthorst and colleagues (2013), found that having experienced physical abuse was significantly associated with grandiose delusions (OR=10.1 (2.2-47.1), p=0.003) in an ultra-high risk for psychosis cohort (n=127). This was consistent even after adjustment for other types of trauma. However, the authors note that this finding should be interpreted cautiously due to the low number of participants who endorsed the grandiosity item(n=10).

Grandiosity may be one strategy that young people use to cope with difficult circumstances. Grandiose ideas may provide pleasurable distraction from feelings of inferiority or victimisation. It was therefore hypothesised that negative life events and bullying victimisation in childhood would predict later reports of grandiosity. Grandiose ideas are unlikely to come from nowhere. They may build upon, or may be an exaggeration

of, existing raised areas of self-esteem, and perceived strengths (Freeman & Garety, 2003; Smith, Freeman, & Kuipers, 2005). Therefore, it was hypothesised that higher perceptions of one's own ability in childhood would predict later grandiosity in adolescence.

Furthermore, an established correlate of social rank is height. Taller adults are more likely to have higher social esteem and report higher levels of well-being (Carrieri & De Paola, 2012; Judge & Cable, 2004). As a result, we included measures of height and pubertal onset in order to test the hypothesis that height and early puberty onset would predict elevated levels of grandiosity in adolescence.

To assess genuine grandiosity with greater precision the analyses were repeated throughout, controlling for markers of objective ability. In addition, it has been found in general adolescent population cohorts that males have higher levels of grandiosity than females (Wigman et al., 2011) and therefore, it was also tested whether the childhood predictors differed by gender.

Methods

Participants

The Longitudinal Experiences and Perceptions (LEAP) study (Ronald et al., 2014) focuses on specific psychotic experiences in adolescence. It is an extension of the Twins Early Development Study (TEDS) which comprises a community sample of monozygotic and dizygotic twins born in England and Wales between 1994 and 1996 (Haworth, Davis, & Plomin, 2013). The initial aims of TEDS were to consider genetic and environmental influences on cognitive and behavioural development. A sample of 16,302 families who had recently had twins were contacted. 13, 488 families responded. Since initial enrolment the families have been invited to take part in studies when the twins were aged 2, 3, 4, 7, 8, 9, 10, 12, 14 and 16 years of age (Haworth, Davis & Plomin, 2013). TEDS has full ethical approval.

10,874 families from TEDS were invited to take part in the LEAP study. Families were not contacted for LEAP if they had withdrawn from TEDS, were inactive, had known address problems, or were special cases, most notably medical exclusions. Of those contacted 5076 (47%) parents and 5059 (47%) twin pairs provided data. Individuals were excluded (n=327) if they did not provide consent at first contact (when TEDS was started), if they had a severe medical disorder, had experienced severe perinatal complications or if zygosity was unknown. Exclusions for medical disorders included individuals with cystic fibrosis, cerebral palsy, fragile X syndrome, autism spectrum disorder, and those with

chromosomal abnormalities such as Down Syndrome. Participating and non-participating families were largely similar with regard to sex, ethnicity, and mother education level. The non-participating families had higher scores on childhood psychopathology than the participating families, although the difference was very small (Ronald et al., 2014).

One twin per pair (selected randomly for birth order to avoid birth order effects) was included for psychometric analyses and only those with complete grandiosity scores were included, giving a final sample of 4,997.

Measures

Grandiosity was assessed at 16 with the grandiosity subscale of the Specific Psychotic Experiences Questionnaire (SPEQ) (Ronald et al., 2014). The full list of items can be seen in Table 1. Participants were asked how much they agreed with eight statements, based on their thoughts and feelings over the last month. Responses were given on a 4-point scale: *"Not at all"* (0), *"Somewhat"* (1), *"A great deal"* (2), *"Completely"* (3). The grandiosity subscale includes three items from the 'Myself' sub-scale of Cognition Checklist for Mania-Revised (CCL-M-R) (Beck, Colis, Steer, Madrak, & Goldberg, 2006), two items from Peters et al. Delusions Inventory (PDI) (Peters, Joseph, Day, & Garety, 2004), and three items developed by the authors from clinical case studies. The age appropriateness of items was ensured by obtaining expert clinical opinion and by piloting with this age group (Ronald et al., 2014). The grandiosity subscale shows good internal consistency (Cronbach's alpha = 0.85) and stability across a nine-month interval (r = 0.66). Validity was assessed in terms of

agreement with a second known measure of adolescent psychotic experiences, the Psychosis-LIKe Symptoms (the PLIKS Zammit *et al.*, 2011). The grandiosity subscale showed a significant positive correlation with the PLIKS score (r =0.27, p<0.001) (Ronald et al., 2014; Zammit et al., 2011). In addition it was found that adolescents with a family history of schizophrenia scored significantly higher on the grandiosity scale than those without a family history of schizophrenia (Zavos et al., 2014).

Perceived ability*:* Children's perceptions of their own abilities were assessed using the Perceived Ability in School Scale (Spinath, Spinath, Harlaar, & Plomin, 2006) at the age of 9 years old. The scale contains 12 items, three items for English, three for mathematics, three for science, and three for physical education (PE). The child was asked *"How good do you think you are"* about the different activities listed in the UK's National Curriculum. Responses were on a 5-point scale from *"Very good"* to *"Not at all good"*. The summed total was used, with lower scores indicating higher perception of ability.

Perceived ability for individual subjects*:* Children's reports of their perceived abilities in English, mathematics, science, and physical education at age 9 years were created by summing standardised scores for the three skill areas within their respective subjects.

Parental discipline: Two items from the Parental Discipline scale (Deater-Deckard, Dodge, Bates, & Pettit, 1998) were used. When the children were 9 years old parents were asked to rate how often (*'often', 'sometimes', 'rarely or never'*) they used the following methods

when their child misbehaved: *'Give a smack'* and *'Tell him/her off or shout at him/her'*. Children (at age 9) were asked to rate how true it was (*'very true', 'quite true', not true'*) that, when they misbehaved, they were '*smacked or slapped'* and *'told off or shouted at'*.

Bullying victimisation: Bullying victimisation was assessed at the age of 12 years using the Multidimensional Peer Victimisation Scale (Mynard & Joseph, 2000). Consisting of 16 items, this self-report measure has been shown to be a reliable and valid measure of bullying victimisation (Mynard & Joseph, 2000) , encompassing physical abuse, verbal abuse, social manipulation, and property damage.

Life events: Parents, when the participant was 9 years old, were asked about *'any changes or events that have had an impact on the family'* in the past two years such as, divorce/separation of natural parents, death of a sibling.

Affect: Depressive symptoms were measured at 12 years using the Short Moods and Feelings Questionnaire (SMFQ*)* (Angold et al., 1995). This is an 11 item self-report measure assessing how often depressive symptoms occurred in the past fortnight and is suitable for use in adolescents (Brooks & Kutcher, 2001). A total symptom score was used (Angold et al., 1995).

Puberty and height: Pubertal status was assessed using the Petersen Pubertal Development Scale (Petersen, Crockett, Richards, & Boxer, 1988), a 9 item self-report measure. Height was self-reported.

Objective measures

Academic achievement: Teachers rated children's ability at age 9 on National Curriculum criteria using their knowledge of the child's achievement over the academic year. Responses were on a 5-point scale from *"Very good"* to *"Not at all good"*. The summed total was used, with lower scores indicating higher perception of ability.

Parents' perception of their child's abilities*:* Parent's perceptions of their children's abilities at age 9 was assessed using the Perceived Ability in School Scale (Spinath et al., 2006).

Cognitive ability at age 9: Children completed the Vocabulary and General Knowledge Multiple-choice tests from the Wechsler Intelligence Scale for Children, third edition (WISC-III-PI; Kaplan *et al.*, 1999) under the supervision of a parent (guided by an instruction booklet). The Vocabulary Multiple Choice subtest of the WISC requires the child to retrieve and recognise word meaning (e.g., "What does transparent mean?"). This subtest encompasses 20 out of the 30 original WISC items with a maximum raw score of 40. The Information Multiple Choice subtest assesses the child's ability to retrieve and recognise learned information (e.g., "What must you do to make water boil?"). It includes 18 of the 30 original WISC items yielding a maximum raw score of 18.

IQ at 16

Non-verbal cognitive ability was tested with a version of the Ravens Matrices test (J. Raven, Raven, & Court, 1998). The test consisted of incomplete patterns and participants were asked to identify the missing part of the pattern from a choice of 8 possible missing parts.

There were 30 items giving a total possible score of 30 correct answers. Verbal cognitive ability was assessed using a web test based on the Mill Hill vocabulary scale (Raven, Raven, & Court, 1988). The test consists of 33 multiple choice questions. In each question, a single word is presented. The participant is asked to choose the response, out of a possible 6 options, that they think is closest in meaning to the word. Total scores were out of 33. The web-based tests in TEDS have been successfully validated by comparing a subsample with more traditional paper and pencil in-person tests (Haworth et al., 2007). In addition, for the web assessments at age 16, an average correlation of 0.72 between online and offline versions of the ability tests administered 2 months apart, provides further support for the validity and reliability of the web-based tests in adolescence (Haworth, Davis & Plomin, 2013).

Analysis

All analyses were conducted using R (version 3.2.4) (R Development Core Team, 2016) and two-tailed p-values are reported. The first stage was to provide a description of levels of grandiose ideas in the participant group at age 16. In order to test the hypotheses that adverse life events, higher self-perceived ability, increased height and earlier onset of puberty in childhood would predict later grandiosity, key tests of longitudinal relationships, with grandiosity as the main outcome, were carried out in the second stage. A log transformation of the grandiosity outcome was used to improve the normality of the residuals. First, univariate relationships were tested between grandiosity and the variables

of interest (Miller and Chapman, 2001). In order to control for genuine ability, separate multivariate analyses were then carried out in order to adjust for cognitive ability and academic achievement at age 9 and IQ at age 16. To determine if predictors of grandiosity were moderated by gender, the same univariate and multivariate relationship as above, with interaction term between gender and the variable of interest and the main effect for gender in each relationship, was also considered. This allows for separate estimates by gender of the relationship between the variable of interest and grandiosity.

Results

Demographic details

The adolescents had a mean age of 16.32 years (SD = 0.68 years). 2219 (44.4%) of the participants were male and 2777 (55.6%) were female. Nearly all participants (94%) identified their ethnicity as white.

Presence of grandiosity in adolescence

The number and percentage of participants endorsing each individual item of the SPEQ grandiosity subscale are displayed in Table 1. A substantial subgroup of the adolescents, ranging from 8.6% ("I have a special mission") to 31.3% (I have many great ideas") endorsed the grandiosity items with "a great deal" or "totally". Boys endorsed significantly more grandiose items than girls with mean total scores of 6.0 and 4.8 respectively.

Predicting grandiosity at 16

The ability of the individual variables to predict self-reported grandiosity at age 16 years is reported in Table 2. None of the objective measures of ability (academic achievement, cognitive ability, and parent perceptions of ability at 9 and non-verbal IQ at age 16) were significantly associated with grandiosity reported in adolescence. Verbal IQ at 16 was negatively associated with grandiosity, so those with lower verbal IQ were more likely to have higher levels of grandiose thoughts. Male gender, higher perceptions of own ability, and reports of smacking/slapping by parents at age 9, and reports of peer victimisation, and increased height at age 12 were all associated with the later presence of grandiose ideas in adolescence.

Table 1: The number of participants (%) endorsing each of the items in the SPEQ grandiosity subscale.

Statement	Never n (%)	Somewhat n (%)	A great deal n (%)	Totally n (%)	Mean (S.D)
I have a special mission	3378 (68.6)	1188 (23.7)	275 (5.5)	155 (3.1)	0.44 (0.73)
I have many great ideas	852 (17.1)	2579 (51.6)	1234 (24.7)	331 (6.6)	1.21 (0.80)
Everything I do is great	2209 (44.2)	2171 (43.5)	490 (9.8)	126 (2.5)	0.71 (0.74)
I am, or am destined to be someone very important	2279 (45.6)	1859 (37.2)	605 (12.6)	253 (5.2)	0.77 (0.85)
I am a very special or unusual person	2251 (45.1)	1806 (36.1)	656 (13.1)	283 (5.6)	0.79 (0.88)
I have special abilities that others do not	3153 (63.1)	1235 (24.7)	439 (8.8)	169 (3.4)	0.52 (0.79)
I am much more unique than anyone else	3105 (62.1)	1269 (25.4)	434 (8.7)	188 (3.8)	0.54 (0.80)
Everyone is going to know about me because of my greatness	3706 (74.1)	930 (18.6)	210 (4.2)	150(3.2)	0.36 (0.70)

Table 2: Childhood predictors of grandiosity

	Univariate			
	Coefficient	Standard Error	p-value	R^2
Objective measures				
Academic achievement at 9 (Teacher)	0.003	0.101	0.302	0.000
Good at total at 9 (Parent)	0.013	0.027	0.627	0.000
Measure cognitive ability at 9	0.001	0.002	0.538	0.000
Verbal IQ at age 16	-0.008	0.003	0.012*	0.011
Non-verbal IQ at 16	-0.003	0.004	0.439	0.000
Variables				
Perceived ability at 9 (Child report)				
Perceived academic ability total	0.123	0.028	<0.001***	0.008
Perceived ability at English	0.020	0.024	0.404	0.000
Perceived ability at Maths	0.090	0.017	<0.001***	0.014
Perceived ability at Science	0.054	0.023	0.016*	0.004
Perceived ability at PE	0.102	0.024	<0.001***	0.009
Parental discipline at 9				
Smacking (Child report)	0.083	0.021	0.002**	0.004
Smacking (Parent report)	0.084	0.043	0.493	0.001
Shouting (Child report)	0.032	0.028	0.257	0.000
Shouting (Parent report)	-0.007	0.031	0.828	0.000
Life event at 9 (Parent report)	0.037	0.078	0.259	0.000
Victimisation at 12 (Child report)				
Physical	0.034	0.006	<0.001***	0.008
Verbal	0.015	0.005	0.001**	0.002
Social manipulation	0.011	0.005	0.047*	0.0008
Property	0.024	0.007	<0.001***	0.0033
Depression at 12 (Child report)	0.004	0.004	0.296	0.000
Height at 12 (Child report)	0.004	0.002	0.012*	0.002
Puberty at 12 (Child report)	0.037	0.022	0.087	0.000
Gender	0.211	0.022	<0.001***	0.018

*Significant at $p < 0.05$, **Significant at $p<0.01$, ***Significant at $p < 0.001$

Controlling for cognitive ability

To assess genuine grandiosity with greater precision and to make sure that it was not just a reflection of actual level of ability, the predictor variables were assessed again taking account of cognitive ability measured at age 9 (see Table 3). Many of the same variables remained significantly associated. Height and reports of being socially manipulated, when accounting for cognitive ability, were no longer significant predictors. The same pattern of associations was found when accounting separately for objective measures of academic achievement at age 9 and verbal and non-verbal IQ measured at age 16.

Cognitive ability at 9 significantly correlated with non-verbal IQ at 16 (r=0.24, $p<0.001$) and verbal IQ at 16 (r=0.34, $p<0.001$). Cognitive ability also correlated with teachers' reports of academic achievement (r=0.34, $p<0.001$), parents' reports of ability (r=0.36, $p<0.001$) and with children's reports of ability (r=0.27, $p<0.001$).

Controlling for Gender

The moderation by gender of the relationship between the variables of interest and grandiosity were tested. However, all interaction terms were non-significant (see Table 4). Therefore, only linear regression models which adjusted for gender as a main effect were considered (see Table 5). As before, higher perceived ability at age 9, reports of peer victimisation, and reports of smacking/slapping by parents were all associated with the presence of grandiose ideas in adolescence. Earlier onset of puberty was also significantly predictive once gender was taken into account.

Table 3: Childhood predictors of grandiosity adjusted for cognitive ability at age 9.

Covariate	Coefficient	Standard Error	p-value	R^2
Objective measures of ability				
Good at total at 9 (Parent)	0.003	0.029	0.910	0.001
Academic achievement at 9 (Teacher)	0.021	0.031	0.501	0.001
Verbal IQ at 16	-0.009	0.004	0.020*	0.003
Non-verbal IQ at 16	-0.004	0.005	0.387	0.001
Variables				
Perceived ability at 9 (Child report)				
Perceived academic ability total	0.124	0.029	<0.001***	0.008
Perceived ability at English	0.016	0.024	0.516	0.001
Perceived ability at Maths	0.092	0.017	<0.001***	0.013
Perceived ability at 9 Science	0.052	0.022	0.022*	0.001
Perceived ability at 9 PE	0.102	0.024	<0.001***	0.008
Parental discipline at 9				
Smacking (Child report)	0.086	0.029	0.002**	0.004
Smacking (Parent report)	0.085	0.042	0.047*	0.001
Shouting (Child report)	0.031	0.028	0.274	<0.001
Shouting (Parent report)	0.002	0.031	0.940	0.001
Victimisation at 12 (Child report)				
Physical	0.037	0.009	<0.001***	0.007
Verbal	0.015	0.007	0.025*	0.002
Social manipulation	0.010	0.009	0.239	0.000
Property	0.033	0.010	0.001***	0.005
Life event at 9 (Parent report)	0.033	0.033	0.311	<0.001
Depression at 12 (Child report)	0.005	0.006	0.425	0.001
Height at 12	0.002	0.002	0.425	0.001
Puberty at 12 (Child report)	0.005	0.030	0.878	0.001

*Significant at $p < 0.05$, **Significant at $p<0.01$, ***Significant at $p < 0.001$

Table 4: Interactions with gender.

Covariate	Coefficient	Standard Error	p-value
Objective measures of ability			
Academic achievement at 9 (Teacher)	0.011	0.057	0.841
Good at total at 9 (Parent)	0.024	0.054	0.655
Measure cognitive ability at 9	-0.001	0.005	0.827
Verbal IQ at age 16	0.005	0.007	0.466
Non-verbal IQ at age 16	0.007	0.009	0.387
Variables			
Self-perceived academic ability	-0.003	0.005	0.581
Perceived ability at 9 (c) – English	0.035	0.048	0.468
Perceived ability at 9 (c) – Maths	-0.001	0.035	0.978
Perceived ability at 9 (c) – Science	0.062	0.045	0.168
Perceived ability at 9 (c) – PE	-0.008	0.049	0.875
Parental discipline at 9			
Smacking (c)	-0.024	0.054	0.658
Smacking (parent)	-0.022	0.085	0.793
Shouting (c)	-0.062	0.057	0.274
Shouting (parent)	0.041	0.062	0.516
Victimisation at 12 (c)- Physical	0.008	0.012	0.525
Victimisation at 12 (c)- Verbal	0.015	0.009	0.120
Victimisation at 12 (c)– social manipulation	0.007	0.011	0.482
Victimisation at 12 (c)– property	0.013	0.013	0.335
Life event at 9 (P)	0.057	0.065	0.386
Depression at 12	0.009	0.008	0.240
Height at 12	-0.002	0.003	0.555
Puberty at 12	0.002	0.048	0.964

*Significant at $p < 0.05$, **Significant at $p<0.01$, ***Significant at $p < 0.001$

Table 5: Childhood predictors of grandiosity adjusted for gender.

Covariate	Coefficient	Standard Error	p-value	R^2
Objective measures of ability				
Academic achievement at 9(Teacher)	0.023	0.028	0.412	0.017
Good at total at 9 (Parent)	0.007	0.027	0.778	0.020
Measure cognitive ability at 9	0.000	0.002	0.858	0.018
Verbal IQ at 16	-0.009	0.003	0.007**	0.03
Non-verbal IQ at 16	-0.006	0.004	0.171	0.027
Variables				
Perceived ability at 9 (Child report)				
Perceived academic ability total	0.110	0.028	<0.001***	0.025
Perceived ability at English	0.031	0.024	0.183	0.019
Perceived ability at Maths	0.07	0.017	<0.001***	0.027
Perceived ability at Science	0.052	0.022	0.021*	0.021
Perceived ability at PE	0.097	0.024	<0.001***	0.026
Parental discipline at 9				
Smacking (Child report)	0.069	0.025	0.010*	0.022
Smacking (Parent report)	0.070	0.042	0.099	0.021
Shouting (Child report)	0.022	0.028	0.438	0.019
Shouting (Parent report)	0.016	0.031	0.603	0.019
Victimisation at 12 (Child report)				
Physical	0.021	0.006	<0.001***	0.025
Verbal	0.009	0.005	0.047*	0.023
Social manipulation	0.014	0.005	0.008**	0.023
Property	0.017	0.006	0.008**	0.023
Life event at 9 (P)	0.036	0.032	0.271	0.020
Depression at 12	0.004	0.004	0.347	0.021
Height at 12	0.004	0.002	0.009**	0.024
Puberty at 12	0.105	0.022	<0.001***	0.028

*Significant at $p < 0.05$, **Significant at $p<0.01$, ***Significant at $p < 0.001$

Discussion

The aim of this chapter was to utilise a large developmental study dataset to perform an opportunistic investigation of childhood predictors of grandiosity in adolescence. Grandiosity is an under researched delusion type and this study, by highlighting childhood predictors of later grandiosity, not only adds strength to the idea that adversity and grandiosity are linked but may also help shed light on some of the psychological mechanisms potentially involved in the development of grandiose thoughts. This is the first study to test a range of childhood predictors of later adolescent grandiose ideas. It tested longitudinally the predictive relationship of a number of factors assessed in childhood, including perceived academic ability, parental discipline, bullying victimisation, life events, depression, height, and puberty onset.

Within the large adolescent sample there was a relatively high frequency of reported grandiose experiences. This is similar to those found in other cohort-based studies, for example Wigman and colleagues (2011) found grandiosity prevalence rates of 12.0% and 7.7% in two large independent adolescent cohorts. Endorsement of the grandiosity items was not significantly correlated with more objective measures of ability taken at age 9, such as cognitive ability scores and teacher perceptions of academic and sporting achievement. In addition, grandiosity was negatively correlated with verbal IQ measured at 16. This supports the idea that the SPEQ grandiosity sub-scale is not simply measuring actual ability.

The presence of grandiose ideas allowed for the examination of the predictive ability of childhood factors. Findings suggest that being male, having a higher perceived ability in mathematics, science and physical education (not matched by objective ability), and perceptions of being disciplined with smacks/slaps by a parent at age 9, and of peer victimisation at age 12, may be contributing factors in the occurrence of grandiose ideas in adolescence. Speculatively it could be that grandiose thoughts are a strategy for coping with a perceived, or actual, harsh external environment. There may be secondary gains of grandiose thinking with such ideas being a pleasurable distraction from what is perceived to be a hostile environment.

One of the most prominent predictors of endorsement of grandiose ideas in adolescence was being male. This supports previous findings of a gender imbalance in the reporting of grandiose ideas in adolescents and college student cohorts (Grijalva et al., 2014; Wigman et al., 2011). However, this is not reflected in the grandiose delusions literature where there is no evidence that rates of grandiose delusions differ between men and women (de Portugal et al., 2010). It is feasible that at the less severe end of this spectrum societal ideas of masculinity and femininity play a more prominent role, impacting on whether individuals report grandiose ideas. Thus, the difference is a social phenomenon, a result of females adopting a more modest self-presentation style than males (Zook & Russotti, 2013). Alternatively, the lower rates of grandiosity may be a reflection of the fact that females experience more depression and anxiety (Freeman & Freeman, 2014), though notably

depression measured at age 12 in this study was not (negatively) associated with grandiosity at age 16.

After controlling for gender both earlier puberty and increased height, as measured at 12 years, was linked with increased reporting of grandiosity at age 16. Earlier puberty and increased height may lead to a sense of feeling different from peers, increasing self-focused attention and could, in some situations, increase the likelihood of perceived victimisation. In line with the idea that grandiose ideas build upon, or may be an exaggeration of, existing raised areas of self-esteem, and perceived strengths (Freeman & Garety, 2003; Smith, Freeman, & Kuipers, 2005) it may be that for some, increased height and strength form the foundation of these thoughts.

It was predicted that higher self-reports of perceived ability at 9 years of age would be associated with adolescent grandiose ideas. This was the case, with only the child's perceived ability, and not objective measures of achievement or ability, being a predictor of grandiose thoughts. This association remained even after separately adjusting for cognitive ability, academic achievement, IQ and gender. This suggests a discrepancy between the child's view of their own abilities and more objective measures of achievement. Adolescents who endorse grandiose ideas at age 16 overestimated their abilities at age 9, indicating that grandiose thinking might already be present at this earlier time point.

This overestimation of own abilities appears to be coupled with a view of the external environment as more hostile. Adolescents with higher grandiosity reported increased rates

of smacking/slapping by parents at age 9 and increased bullying victimisation at age 12. These results suggest a potential role for perceived physical victimisation as a factor in the development of grandiose ideas. This is consistent with a cross-sectional study (Velthorst et al., 2013) that found a relationship between physical abuse and higher levels of grandiosity in ultra-high-risk individuals of similar age as well as with previous studies that have highlighted the importance of physical abuse in the development of positive psychotic symptoms (Rubino, Nanni, Pozzi, & Siracusano, 2009).

This pattern of children overestimating their own abilities together with reports of a more hostile environment raises the issue of whether grandiose thoughts play a role in helping some children cope with perceived, or actual, harsh external environments. There is evidence to suggest that young children tend to overestimate their own abilities but that their judgements become more accurate over time (Spinath & Spinath, 2005; Yussen & Levy, 1975). It may be that for some children, overestimating their own abilities plays an important role in helping them to deal with perceived hostile social environments, providing a pleasurable escape from their difficulties. As a result, the tendency to overestimate ability in these individuals does not diminish in later childhood and forms the foundations for grandiose thoughts in adolescence. This study, however, is not able to test this hypothesis.

Limitations

There are a number of limitations. Firstly, grandiosity was not assessed at the earlier time points. This means that original levels of grandiose thinking could not be controlled for.

While the design of the study is longitudinal it is unable to determine causality. In the same way that inherited characteristics may make individuals jointly vulnerable to both bullying and feelings of paranoia (Shakoor et al., 2015) the factors associated with grandiosity may not be causal but instead be linked via a shared genetic propensity. Secondly, there were a number of variables of interest that were not controlled for. For example, there was no measure of carers' levels of grandiosity nor of adolescent drug use. Both these factors may have impacted on the levels of grandiosity measured at 16. Finally, it should be noted that all participants were a twin. Whilst previous studies have found no differences between twins and non-twins in the prevalence rates of bullying (Arseneault et al., 2006) or behaviour problems (Gjone & Novik, 1995) it is possible that being a twin may impact on feelings of grandiosity. For example, by the increased social closeness that being a twin can bring (Johnson, Krueger, Bouchard, & McGue, 2002). Importantly however, this study demonstrates that grandiosity can be measured in adolescents in the community, capturing self-perceived grandeur that does not align with objective ability as measured here.

Whilst these findings evidence a link between interpersonal trauma and grandiosity, they also suggest some putative mechanisms involved in the association between trauma and grandiosity. The findings that high perceptions of ability in childhood are a predictor of grandiose thoughts in adolescence suggest that positive self-schema may play a role. This is consistent with findings that whilst paranoia is predicted by negative self and other schemas, grandiosity is predicted by positive self-schemas (Garety et al., 2013). The finding

that levels of grandiose thinking are increased in those who perceived their environment as more hostile suggest that there may be a secondary gain from grandiose ideas. It may be that those with higher levels of fantasy proneness are, in the context of trauma, more likely to engage in grandiose thinking. These, and other potential mechanisms identified from cognitive models, have yet to be tested longitudinally.

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Chapter 3

Psychological factors predicting the occurrence of hallucinations in the months after a trauma.

This chapter has been adapted from the following paper, attached in Appendix 3.1

Geddes, G., Ehlers, A., & Freeman, D. (2016). Hallucinations in the months after a trauma: An investigation of the role of cognitive processing of a physical assault in the occurrence of hallucinatory experiences. Psychiatry Research, 246, 601–605.

Abstract

Background

Whilst cognitive processes during and after trauma have been examined as factors in the occurrence of post-traumatic stress disorder (PTSD), they have not been studied in relation to hallucinations.

Aim

The aim in this chapter is to test longitudinally the role that cognitive processing of a recent trauma may have on the occurrence of hallucinations. In addition, this secondary analysis of a dataset will be used to inform the setting up of this thesis' main empirical study.

Method

Four weeks after hospital treatment for injuries sustained in an assault, 106 participants were assessed for peri-traumatic cognitive processing, cognitive responses to trauma memories, negative beliefs about the self, post-traumatic stress disorder (PTSD), and hallucinatory experiences. Hallucinatory experiences were reassessed six months later.

Results

It was found that cognitive processing during trauma (lack of self-referential processing, and dissociation), beliefs about permanent negative change, self-vulnerability, self-blame, and cognitive response styles (thought suppression, rumination, and numbing) were significant predictors of later hallucinations.

Conclusion

The way in which trauma is processed may partly determine the occurrence of hallucinations. However, this is in the context that clear hallucinatory experience, such as hearing a voice, occurred infrequently in this non-clinical population and that the study design cannot rule out the influence of unmeasured confounders.

Introduction

Trauma and hallucinations may be associated (e.g. John Read et al., 2005). However, as outlined in Chapter 1, the mechanisms underlying this relationship are not well understood. Empirical studies investigating putative predictors of hallucinations in the context of trauma have been cross-sectional and for the most part have focussed on dissociation (Cole, Newman-Taylor, & Kennedy, 2016; Varese, Barkus, & Bentall, 2012). Potential predictors of hallucinations in the aftermath of trauma have not been looked at in a longitudinal study. Furthermore, there remain many untested factors which may influence the development of hallucinations in the context of trauma. A recent study looking at paranoia and PTSD in the months following an interpersonal assault found evidence for an increase in rates of paranoia and highlighted the fact that a similar pattern of cognitive factors predicted the development and persistence of both outcomes (Freeman et al., 2013). In this chapter the results of a secondary analysis of this study will be reported. The occurrence of hallucinations in the months following an assault will be described and the role that cognitive processing of a recent trauma has in the occurrence of hallucination will be tested longitudinally. Findings from this chapter will not only provide useful etiological information but was designed to help inform the development of the later thesis study looking at shared and differential predictors of PTSD, paranoia, grandiosity and hallucinations.

The experience of hallucinations is the psychotic experience most strongly and consistently related to child abuse (e.g. Hammersley et al. 2003). Based upon substantial evidence of an

association found in retrospective studies (e.g. Read et al., 2005) many clinical researchers consider childhood trauma as a possible contributory factor in the occurrence of hallucinations. Another complementary perspective suggests that exposure to more proximal 'life events', recent negative occurrences that bring about a substantial change in personal circumstances for the worse, increases the risk in the subsequent weeks of psychotic experiences such as hallucinations (for review see Beards et al., 2013). The implication of trauma in the occurrence of hallucinations has led to cross-sectional studies of trauma-related processes and hallucinations (e.g. Gracie et al., 2007; Morrison and Petersen, 2003). Cognitive processing related to recent trauma in the prediction of subsequent hallucinations has not yet been tested. This chapter reports such a study: examining cognitive processing in the aftermath of a recent physical assault in relation to the occurrence of hallucinations.

Cognitive processing during and in the aftermath of trauma

Cognitive processes during and after trauma have been extensively examined as factors in the development and persistence of post-traumatic stress disorder (PTSD) (e.g. Dunmore et al., 1999; Ehring et al., 2008; Kleim et al., 2007). As described in Chapter 1, at the centre of Ehlers and Clark's (2000) model is the idea that PTSD occurs when individuals process the trauma in a way that leads to a sense of current threat. This is thought to result from a combination of problematic information processing during trauma and negative appraisals of the trauma and its consequences. Problematic peri-traumatic cognitive processing, such as predominance of data-driven processing (focussing on sensory impressions), lack of

self-referential processing (i.e. insufficient linking of the event to other autobiographical knowledge) and peri-traumatic dissociation results in a poorly elaborated and poorly contextualised memory of the event. As such, these memories are easily and involuntarily triggered into consciousness and have a strong sense of occurring in the present ('nowness', Michael et al., 2005). PTSD is thought to persist because negative appraisals of the trauma and its effects motivate a series of maintaining cognitive and behavioural strategies. These include: cognitive responses to the intrusive memories such as rumination and thought suppression (Ehlers & Clark, 2000); persistent dissociation (Murray, Ehlers, & Mayou, 2002); and excessive precautions (safety behaviours).

Understanding trauma and hallucinations

From a cognitive perspective, as described in chapter 1, hallucinations are often conceptualised as common internally generated cognitive events that are wrongly attributed to an external or alien source (Ditman & Kuperberg, 2005; Frith, 1992; Larøi & Woodward, 2009).

A number of ways that trauma may lead to hallucinations have been proposed. First, the phenomenological overlap between hallucinations and the intrusive images and 'flashback' experiences often considered the hallmark symptoms of PTSD (Ehlers & Steil, 1995) has been noted. These phenomenological similarities have led to suggestions that some hallucinations may simply be better understood as re-experiencing phenomena (e.g. McCarthy-Jones and Longden, 2015). A 'weaker' version of this account is that trauma related intrusive cognitions, including poorly contextualised trauma memories, are the

type of low cognitive effort mental events that are most prone to source monitoring errors, i.e. the misattribution of internally generated cognitive events to an external source (e.g. Larøi et al., 2004). Bentall (2003) suggests that source monitoring failures tend to occur when thoughts are intrusive or automatic as they lack the characteristic of self-generated events. This idea is supported by findings in both clinical and non-clinical samples where those experiencing intrusive thoughts are at increased risk of developing hallucinatory experiences (Jones & Fernyhough, 2009; Lobban, Haddock, Kinderman, & Wells, 2002). Within this context it is feasible that trauma, by increasing the likelihood and frequency of intrusive cognitions, may lead to an increase in the occurrence of hallucinatory experience.

Having been found to mediate the effect of childhood trauma on hallucination proneness (Varese et al., 2012), dissociation has been considered another explanatory factor. Dissociation may be particularly relevant to hallucinations as it is characterised by a sense of disconnect from reality. Trauma induced dissociation and dissociative detachment renders individuals vulnerable to psychotic experiences including hallucinations (Allen, Coyne, & Console, 1997). However, the mechanism through which dissociation might promote hallucinations remains to be described.

Exposure to trauma can also cause negative changes in thoughts about the self (e.g. Foa et al., 1999), such as the sense of being permanently changed for the worse (e.g. Dunmore et al., 2001), resulting in previous conscious content being experienced as alien (e.g. Morrison, 2001). Finally, maladaptive cognitive responses to intrusive memories and thoughts (e.g. rumination and thought suppression), may amplify the likelihood of

hallucinatory experiences as they not only increase the occurrence of intrusive cognitive events but also increase their intensity (Guastella & Moulds, 2007; Yoshizumi & Murase, 2007).

Current study

In this study, hallucinations are examined in relation to the processing of a recent interpersonal assault. This is a secondary analysis of a study that focussed on paranoia and PTSD in the aftermath of an assault (Freeman et al., 2013). Four weeks after attending A&E for injuries related to an assault, 106 people were assessed on multiple symptom measures and cognitive factors from models of paranoia and PTSD. The symptom measures were repeated 3 and 6 months later. The current study aimed to use these data to investigate associations between trauma-related processing and cognitions, derived from Ehlers and Clark's (2000) model of PTSD, and hallucinations. In the current study it was hypothesised that problematic peri-traumatic processing (data-driven processing, lack of self-referential processing and dissociation), negative appraisals of the consequences of trauma (permanent change, vulnerable self, self-blame) and maladaptive cognitive control strategies (thought suppression, rumination and numbing) would all predict the presence and maintenance of hallucinations.

Method

The method used paralleled that of previous prospective studies of PTSD after assault (e.g. Dunmore et al. 2001; Kleim et al., 2007). All individuals attending an A&E department for injuries relating to an interpersonal assault were written to and invited to take part in the study. Participants had an initial assessment between 4 and 6 weeks after the assault and were followed up over the following six months.

Participants

106 individuals were recruited. In order to meet the inclusion criteria individuals must have experienced a distressing assault within the previous month, attended the Accident and Emergency (A&E) Department at King's College Hospital, London for related injuries, been aged 18-65 years, and been able to attend a baseline assessment between 4 and 6 weeks after the assault. The main exclusion criteria were that: the assault was part of on-going abuse; there was a history of diagnosed severe mental illness; they had been diagnosed alcohol or drug dependent; or they had insufficient command of English so that the assessments could not be completed.

Recruitment took place prospectively over 12 months. All those who attended the A&E and were recorded as having been assaulted were written to and then contacted by telephone. 1482 people attended the A&E department following an assault. 851 of these had working contact details. 426 people were successfully reached by telephone (at least four attempts were made to reach individuals). 175 people were uninterested, 75 were ineligible, 176 people agreed to take part. 106 individuals attended a baseline assessment.

The group that took part did not significantly differ from those who did not take part either in sex ($x^2_{(1)}$=2.52, p=0.112), or in age (t_{1480}=-1.65, p=0.100)

Broadly the types of assault experienced were: confrontations (n=33); random attacks (n=24); muggings (n=22); one-off attacks from family member or friends (n=19); and attacks in the context of work (n=8). All participants reported sustaining injuries during the assault.

Measures:

The study variables used in this analysis are summarized below.

Hallucinatory experience at baseline was assessed with the self-report Cardiff Anomalous Perceptions Scale (CAPS; Bell et al., 2006) and the interviewer-rated hallucinatory behaviour item of the Positive and Negative Symptoms Scale (PANSS; Kay et al., 1987). At the 6 months follow up only the hallucinatory behaviour item of the PANSS was used. The CAPS is a 32 item questionnaire assessing a range of perceptual anomalies. The measure shows good construct and criterion validity and has good internal reliability (α=.87), as well as good test-retest reliability (correlation coefficient 0.77; Bell et al., 2006). Higher scores indicate a greater reporting of perceptual anomalies. The PANSS is a semi-structured interview for measuring the presence and severity of positive and negative psychotic symptoms. In this study, only the items in the interview that measure hallucinations are reported. Responses are scored on a 7-point scale where 1 indicates an absence of the experience and 7 indicates the maximum severity of the symptom. The interrater reliability of the two assessors (postgraduate psychologists) for the PANSS

positive items was assessed using 12 audiotapes of the assessments. The intra-class correlation coefficient (0.92) indicated very high levels of reliability.

PTSD severity at baseline and at 6 months was measured with self-report Post-traumatic Diagnostic Scale (PDS; Foa et al., 1999). The PDS asks participants to rate how much they were bothered by each of the PTSD symptoms specified in DSM-IV (APA, 1994). Items are rated on a 5-point scale with 0 = not a lot and 4 = extremely. The scale shows good agreement with the structured clinical interview for DSM-IV (Foa et al., 1997). Re-experiencing was assessed with the first 5 items of this scale (e.g. In the past week, how much were you bothered by repeated, disturbing, and unwanted memories of the stress experience).

For assessment of peri-traumatic cognitive processing the Thoughts and Feelings During the Assault scale (Halligan, Clark, & Ehlers, 2002; Halligan, Michael, Clark, & Ehlers, 2003), the Mental Defeat Scale (Dunmore et al., 1999) and the Cognitive Processing Questionnaire (Halligan et al., 2002, 2003) were used. The Thoughts and Feelings During the Assault Scale assesses perceived threat to life and negative emotions during the assault. The 3 'perceived threat to life' items (e.g. 'I thought I was going to die') and the 6 'negative emotion' items (e.g. 'I felt terrified') were rated on a 5-point Likert-type scale with 0 = not at all and 4 = very strongly. The Mental Defeat Scale assesses the extent to which victims perceived they had relinquished their autonomy during the worst moments of the assault. This self-report questionnaire is shown to have good internal consistency ($\alpha = 0.93$; Dunmore et al., 1999). Items (e.g. I no longer felt like a human being) are rated on a 5-

point scale with 0 = not at all and 4 = very strongly. The Cognitive Processing Questionnaire has three subscales measuring data-driven processing (e.g. 'It was just like a stream of unconnected impressions following each other'), peri-traumatic dissociation and self-referential processing (e.g. 'I felt cut off from my past). The questionnaire is shown to have satisfactory to good internal consistency (α= 0.89; Kleim, Ehlers, & Glucksman, 2012).

Trauma appraisals were assessed with an updated version of the Post-traumatic Cognitions Inventory (Foa et al., 1999). This is a 36-item measure designed to assess trauma-related thoughts and beliefs. Scores for three subscales are generated: negative cognitions about self; negative cognitions about the world; and self-blame. The three factors show good internal consistency (from α = 0.86 to 0.97) and good test-retest reliability (from 0.74 to 0.89). Items are rated on a 7-point scale with 1= totally disagree and 7=totally agree. Higher scores indicate more negative appraisals.

Cognitive responses to trauma memories were assessed with the Response to Intrusions Questionnaire (RIQ; Clohessy and Ehlers, 1999; Murray et al., 2002). This 19-item questionnaire generates scores for three subscales: numbing; thought suppression; and rumination. Items are rated on a four-point scale with 0 = never, 1 = sometimes, 2 = often, 3 = always.

Affective symptoms were assessed using the Depression Anxiety Stress Scales (DASS; Lovibond, 1995). The DASS is a 42-item self-report measure designed to measure three related negative emotional states of depression, anxiety and tension/stress.

Statistical analysis

All analyses were carried out using SPSS version 22 (Corp., 2013) . A similar analytic strategy to Freeman et al (2013) was used for comparability. The first stage was to provide a description of levels of hallucinatory experience within the participant group in the months following an assault. The patterns of correlation between PTSD re-experiencing and hallucinatory experience were then examined. The third stage used a series of simple univariate linear regressions to examine the prediction of the occurrence of hallucinatory experience at baseline and at 6 months. Finally, predictor variables were assessed again after controlling for the baseline score of the dependent variable.

Results

Demographic details

There were more male than female participants (79 men and 27 women). Mean age was 34.4 years (S.D. =11.6 years). The ethnicities were white (*n*=55), black Caribbean (*n*=14), black African (*n*=15), black other (*n*=5), and other (*n*=17). Most participants were single (*n*=80), but a minority were married (*n*=19) or divorced/separated (*n=6).* The educational qualifications obtained were: none (*n*=11), GCSE (*n*=23), AS/A-level (*n*=9), diploma/foundation degree (*n*=23), degree (*n*=26), postgraduate diploma (*n*=11), and doctorate (*n*=3). Employment statuses were: full time (*n*=47), part time (*n*=11), unemployed for less than 1 year (*n*=18), unemployed for more than 1 year (*n*=15), retired (*n*=1), homemaker (*n*=1), and student (*n*=13). There was a large distribution across socio-economic categories: large employers and higher managerial occupations (*n*=3), higher professional occupations (*n*=9), lower managerial and professional occupations (*n*=15), intermediate occupations (*n*=10), small employers and own account workers (*n*=11), lower supervisory and technical occupations (*n*=6), semi-routine occupations (*n*=10), routine occupations (*n*=12), never worked and long-term unemployed (*n*=15), and students (*n*=13).

Presence of hallucinations/anomalous experience

The mean scores of the hallucination and re-experiencing measures are displayed in Table 2.

There was a high correlation between the total scores for the self-report (CAPS) and the interviewer-rated (PANSS) hallucination assessments at baseline, r=0.54, p<0.001. Seven

people (6.6%) were rated as having mild to moderate hallucinatory behaviour as measured by the PANSS.

By the six-month follow up there was a statistically significant reduction in hallucinatory behaviour as assessed by the PANSS hallucinatory behaviour item, t (92) =3.01, p=0.003. Of the 20 participants rated as having at least minimal hallucinatory behaviour at baseline, 16 had follow up data. Of these, 11 showed a decrease in their hallucinatory behaviour and 5 showed no change.

Table 1. Hallucination scores

	Baseline		**6-month-follow-up**	
Measure	***N***	**Mean (S.D.)**	***N***	**Mean (S.D)**
PANSS (Hallucinatory behaviour)	106	1.26 (0.61)	93	1.11 (0.37)
CAPS	106	7.81 (6.56)		
PDS (re-experiencing items)	106	4.92 (3.81)	94	3.77 (3.9)

PANSS, Positive and Negative Symptom Scale; CAPS, Cardiff Anomalous Perceptions Scale; PDS, Post-traumatic Diagnostic Scale

Hallucinatory behaviour and PTSD re-experiencing

Re-experiencing scores, as assessed by the re-experiencing subscale of the PDS, at baseline positively correlated with baseline hallucinatory measures, CAPS: r=0.308, p=0.001; PANSS-hallucinations r=0.202, p=0.038. There was a significant correlation between re-experiencing as assessed by items in the Post-traumatic Diagnostic Scale at six months and hallucinatory behaviour as assessed by PANSS item, r=0.313, p=0.002 at six months. There was a statistically significant reduction in re-experiencing over the six months, t (93) =2.79, p=0.006.

Factors associated with the presence and persistence of hallucinatory behaviour.

Table 2 provides the tests of the baseline variables predicting baseline hallucination scores. There was a consistent pattern of variables being associated with the presence of hallucinatory behaviour as assessed by the PANSS item at baseline, and all variables correlated with self-reports of baseline hallucinatory behaviour (CAPS). Higher scores of each variable at baseline increased the likelihood of baseline hallucinatory behaviour.

Table 2. Baseline predictors of baseline hallucination scores

	Baseline			
	CAPS		**PANSS**	
	Standard coefficient	*P*	Standard coefficient	*p*
PTSD				
PTSD severity	0.468	<0.001	0.277	0.004
PTSD- re-experiencing	0.308	0.001	0.202	0.038
Peri-traumatic cognitions				
Perceived threat to life	0.309	0.001	0.174	0.075
Negative emotions during trauma	0.212	0.029	0.168	0.084
Data-driven processing	0.191	0.050	0.071	0.473
Lack of self-referent processing	0.308	0.001	0.216	0.026
Dissociation	0.289	0.003	0.242	0.012
Mental Defeat	0.198	0.042	0.143	0.145
Cognitive responses to trauma memories				
Suppression	0.240	0.013	0.151	0.122
Rumination	0.256	0.008	0.186	0.056
Numbing	0.397	<0.001	0.256	0.008
Post trauma cognitions				
Vulnerable self	0.502	<0.001	0.391	<0.001
Permanent change	0.483	<0.001	0.375	<0.001

Self blame	0.349	<0.001	0.378	<0.001

PTSD, Post Traumatic Stress Disorder; CAPS, Cardiff Anomalous Perceptions Scale; PANSS, Positive and Negative Symptom Scale

Table 3 shows which of the baseline variables predicted hallucinatory experience as assessed by PANSS hallucination item at 6 months. Of the 12 trauma related baseline variables, 10 predicted the likelihood of hallucinatory experience at follow up, only negative emotions during trauma and data-driven processing failed to reach significance. The predictor variables were assessed again after controlling for the baseline score of the dependent variable (i.e. to assess variable prediction above initial symptoms score). Even after controlling for baseline score of hallucinatory behaviour, 8 out of the 12 trauma related baseline variables significantly predicted hallucinations at 6 months. Of the peri-traumatic cognitions tested, lack of self-referent processing and higher levels of peri-traumatic dissociation and mental defeat, predicted hallucinations at follow up. Higher levels of suppression and rumination in response to trauma memories and all tested post-trauma cognitions, vulnerable self, permanent change and self-blame, all predicted hallucinations at 6 months.

Table 3. Baseline predictors of hallucinatory behaviour (PANSS) 6 month follow-up scores and adjusted for original PANSS hallucination symptom score.

	6 months		Adjusted for original PANSS score	
	Standard coefficient	*P*	Standard coefficient	*p*
Peri-traumatic cognitions				
Perceived threat to life	0.314	0.002	0.104	0.166
Negative emotions during trauma	0.168	0.107	0.021	0.772
Data-driven processing	0.160	0.125	0.072	0.318
Lack of self-referent processing	0.303	0.003	0.154	0.034
Dissociation	0.308	0.003	0.153	0.035
Mental Defeat	0.282	0.006	0.204	0.004
Cognitive responses to trauma memories				
Suppression	0.275	0.008	0.175	0.014
Rumination	0.298	0.004	0.181	0.011
Numbing	0.307	0.003	0.106	0.155
Post trauma cognitions				
Vulnerable self	0.464	<0.001	0.261	<0.001
Permanent change	0.398	<0.001	0.233	0.001
Self blame	0.344	0.001	0.177	0.015

PANSS, Positive And Negative Symptom Scale

Discussion

The study tested longitudinally the predictive relationship of cognitive processing of recent trauma to hallucinations. Whilst PTSD and, more recently, paranoia (Freeman et al., 2013), have been the focus of previous research, hallucinations in the months after an assault have not. The results of the exploratory study supported the hypothesis that particular styles of processing of trauma (e.g. lack of self-referential processing, and peri-traumatic dissociation), negative appraisals of the consequences of trauma (e.g. permanent change, vulnerability, and self-blame), and maladaptive cognitive control strategies (e.g. thought suppression, rumination, and numbing) would all predict the presence and maintenance of hallucinations. How a trauma is processed may impact on the likelihood of subsequent hallucination occurrence. This is, however, in the context that clear hallucinatory experience, such as hearing a voice, occurred infrequently in this non-clinical population and that the study design cannot rule out the influence of unmeasured confounders (e.g. frequency of any previous hallucinatory experiences, medication, etc).

Rates of PTSD at one month after assault were consistent with other studies, as were the reductions over time (e.g. Halligan et al., 2003; Kleim et al., 2007). A new finding was that hallucinatory experience appeared to mirror this pattern. Using the PANSS, 18.9% of participants were rated as having at least minimal hallucinatory experiences and 6.6% of participants having hallucinatory experiences rated as mild or moderate. There was a statistically significant reduction in hallucinatory behaviour between the baseline assessment and the six-month follow up. One interpretation of these findings is that in the

direct aftermath of trauma there is a raised likelihood of experiencing hallucinations. This increase in hallucinatory behaviour is, for the majority of participants, only temporary, and reduces over the following six months. This pattern also indicates that the higher rates of hallucinatory experience at one month were probably not simply a reflection of associations between high levels of hallucinatory behaviour and the likelihood of being a victim of assault. The presence of hallucinatory experience allowed for the examination of the predictive ability of trauma-related processes derived from a cognitive model of PTSD (Ehlers & Clark, 2000). Findings suggest that trauma-related processing predicted the occurrence and maintenance of hallucinations. Re-experiencing, as measured by items 1-5 of the PDS, was found to correlate with all measures of hallucinatory experience. However, the correlation was only moderate, indicating that the hallucinatory experience scales were most likely not simply a measure of severe re-experiencing. This suggests that hallucinatory experience is unlikely to be just re-experiencing phenomena.

Certain peri-traumatic cognitive processing styles such as dissociation and data-driven processing have been linked in the literature with an increase in intrusive cognitions. Individuals experiencing intrusive thoughts are at increased risk of developing hallucinations (Jones & Fernyhough, 2009). In this study both peri-traumatic dissociation and lack of self-referent processing were predictive of the occurrence and persistence of hallucinations. Whilst data-driven processing was significantly associated with anomalous experiences as assessed by CAPS, it did not significantly predict the presence or persistence of hallucinatory behaviour as assessed by the hallucinatory behaviour item on the PANSS.

Whilst this is most likely due to methodological issues, it is interesting that it did not emerge as one of the stronger predictors as, like lack of self-referent processing and peri-traumatic dissociation, it has been consistently linked with intrusive memories after trauma (Ehring et al., 2008; Halligan et al., 2003). Increased emotion has been shown to specifically promote data-driven processing (Arntz, Groot & Kindt, 2004). In the current study, neither increased peri-traumatic negative emotion or perceived threat to life predicted the occurrence or persistence of hallucinations. It may be that the severity of the assaults was not sufficient to push individuals into data-driven processing.

Post-trauma cognitions about a vulnerable self, permanent change and self-blame, along with mental defeat, predicted the presence of hallucinatory experience even after controlling for baseline hallucination symptom scores. These results highlight a potential role for negative appraisals of trauma and a sense of changed or defeated self in determining the occurrence of hallucinations. Mental defeat has also previously been shown to be one of the strongest predictors of PTSD after interpersonal trauma (Kleim et al., 2007). All three cognitive responses to trauma-related intrusions (rumination, thought suppression and numbing) included in this study also significantly predicted the persistence of hallucinatory experience. Thought suppression and rumination predicted later hallucinations, even after controlling for baseline hallucination score. It is possible that this is due to their impact on the frequency and intensity of intrusive cognitive events.

Limitations

The main strength of this study was its longitudinal design. The prevalence of hallucinations provided the opportunity to examine the predictive ability of certain cognitive variables linked to recent trauma. However, as this study is a secondary analysis of a study focussed upon paranoia, several limitations are apparent. It cannot be determined that the assault led to an increase in hallucinatory behaviour, it is likely that this could only be researched in a natural experiment where levels of pre-assault hallucinations could be obtained. It may have been useful to have had a measure of symptom severity at a time closer to the assault as it is possible that levels of hallucinatory behaviour may have already been reducing by 1 month. In addition, a retrospective evaluation of pre-trauma hallucinatory behaviour might have helped support the supposition that the hallucinatory behaviour is a result of the assault.

The primary outcome measure, the PANSS hallucination item, is part of a clinical tool for use in psychiatric settings and, as a result, it is insensitive to hallucinatory behaviour at the less severe end of the spectrum. Individual psychotic experiences show quantitative variation, existing on a continuum with normal experiences. By extending the search for psychological mechanisms predictive of specific psychotic symptoms to samples at lower levels of the continuum (Garety & Freeman, 1999) our understanding of psychosis could potentially be enhanced (Johns & van Os, 2001). It would have been beneficial to include the CAPS in the 6-month assessment in order to give a more detailed account of hallucinatory behaviour at the lower levels of the continuum. It is important when

investigating how trauma reactions can induce hallucinations to consider both a) psychological processes which are common to PTSD and hallucinations and b) distinct psychological processes which are specifically associated with hallucinations. This may include source monitoring and reasoning biases. It would be useful to include measures of these in any future investigations of hallucinations in the direct aftermath of trauma.

Implications for thesis

The study reported in this chapter provided useful information that contributed to the design of the main thesis study reported in chapters 4, 5 and 6.

As noted in the limitations section above, there were a number of potential improvements suggested. These were incorporated into the main study. Measures of the individual psychotic experiences were chosen to give a detailed account of the experience even at the lower levels of the continuum, and these were carried out at each time point. It was also decided, in light of the observation that levels of hallucinatory behaviour may have already been reducing by one-month post-assault, that an earlier measure of symptom severity at 10 days post-assault would be carried out. Furthermore, a retrospective evaluation of levels of the individual psychotic experiences pre-trauma was included in order to assess if the participants felt that their experiences were new or more frequent since the assault. In addition, more detailed information on two of the endorsed hallucinatory experiences 'Do you ever see things that other people cannot?' and 'Do you ever hear sounds or music that people near you don't hear?', as well as on nightmares were sought. Finally, additional potential mechanisms, derived from theory and the studies in chapters 2 and 3, would be included for the first time. These would include, for example, source monitoring and jumping to perceptions bias which have both been linked with hallucinations in the literature.

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Chapter 4

Methodology for a prospective longitudinal study looking at the predictors of paranoia, grandiosity, hallucinations and PTSD in the aftermath of an assault.

Introduction

There have been few empirical studies looking directly at the predictors of psychotic experiences in the immediate aftermath of trauma. An even fewer number of studies have differentiated between individual psychotic experiences.

With an estimated 2 million incidences a year (CSEW, 2013) physical assault is a common traumatic event that can precipitate a number of psychological problems (Freeman et al., 2013; Resnick, Acierno, & Kilpatrick, 1997; Shepherd & Bisson, 2003). Whilst PTSD is the most extensively studied outcome, studies drawing upon cognitive models of paranoia, grandiosity and hallucinations, including those presented in chapter two and three, suggest that there are a number of potential predictors of individual psychotic experiences in the aftermath of trauma (see Chapter 1 for review, Chapter 2 and Chapter 3). Further investigation of the shared and differential predictors of the different outcomes in the context of trauma will not only help shed light on their aetiology, but potentially enable treatment improvement by highlighting areas for intervention.

Current study

This study is the first to investigate prospectively PTSD symptoms and multiple psychotic experiences (paranoia, grandiosity and hallucinations) in the months after a physical assault. It investigates the occurrence of these different psychopathological reactions to trauma, how distinguishable they are from each other, and the shared and differential psychological factors that lead to the problems persisting.

One aim of this study is to replicate previous findings of the link between assault and individual psychotic experiences (Freeman et al, 2013; see also Chapter 3). This study adds to the literature by capturing the presence of psychotic experiences at an earlier time point, within 10 days of the trauma. It has been noted previously in chapter 3 that by one-month post assault, levels of psychotic experiences may already be decreasing suggesting a need to look at psychotic experiences in the days immediately following the assault. Furthermore, this early assessment time overcomes some of the difficulties identified in Chapter 1 relating to retrospective reports of trauma. This study is also the first to look at grandiosity in the direct aftermath of assault. While evidence suggests a link between interpersonal trauma and grandiosity (see Chapter 2), grandiosity has not been looked at in the months following a trauma. It is hypothesised that there will be significant levels of paranoid and grandiose ideation and hallucinations.

The study also took the opportunity provided by the baseline assessment to investigate emotional and thematic links between the assault and subsequent auditory and visual hallucinations reported at 10 days.

The study looked at whether the different reactions to trauma are independent. In line with previous research (Freeman et al., 2013; Ronald et al., 2014; Wigman et al., 2012) it is hypothesised that paranoia, hallucinations, grandiosity and PTSD will be correlated but distinct phenomena. Using a longitudinal design, the study then tested theory-based hypotheses about the shared and differential predictors of the persistence of the problems.

Trauma related cognitive processes have been most extensively researched in the context of PTSD. This study investigated whether factors drawn from Ehlers and Clarks (2000) model of PTSD not only predicted PTSD but also paranoia, grandiosity and hallucinations. Certain cognitive processes during and after trauma have been implicated in the development and persistence of PTSD (e.g. Dunmore et al., 1999; Ehring et al., 2008; Kleim et al., 2007). There is also preliminary evidence that the way in which trauma is processed may determine the presence of paranoia and hallucinations (Freeman et al, 2013 and see Chapter 3). Problematic peri-traumatic processing, including lack of self-referential processing (i.e. insufficient linking of what is happening to autobiographical knowledge), increased data-driven processing (i.e. increased focus on sensory impressions) and peri-traumatic dissociation are thought to lead to increased intrusions of emotion-laden trauma memories (Ehlers & Clark, 2000). These trauma-related intrusions are likely to contribute to an ongoing sense of current threat, something central to both PTSD and paranoia experiences. These trauma-related intrusions may also be the type of low-cognitive effort mental events that are most prone to source monitoring errors (e.g. Larøi et al., 2004) leading to an increase in hallucinatory experience. There is also evidence that negative post-trauma beliefs including beliefs about permanent change, vulnerable self and self-blame, not only predict PTSD but also predict the later presence of hallucinations and paranoia (see Chapter 3; Freeman et al, 2013). Models of paranoia and hallucinations both emphasise the key role of negative affect in the occurrence of experiences (e.g. Daniel Freeman, Garety, Kuipers, Fowler, & Bebbington, 2002; Waters et al., 2012). Further

support comes from studies that have found negative appraisals formed as a direct result of trauma mediate the relationship between trauma and hallucinations and between trauma and paranoia (Campbell & Morrison, 2007; Kilcommons & Morrison, 2005). Maladaptive cognitive response styles, including thought suppression, rumination, numbing, and the use of safety behaviours are other factors shared across the cognitive models of paranoia, hallucinations and PTSD. These factors have also been shown to predict later occurrence of paranoia and hallucinations (Freeman et al, 2013, see Chapter 3).

In light of the findings outlined above, it is hypothesised that problematic peri-traumatic processing, negative post-trauma beliefs, negative self and other-schemas, maladaptive cognitive responses to trauma and safety behaviours will be shared predicters of PTSD, paranoia and hallucinations.

In line with an emotion-congruent model of grandiosity (Smith, Freeman, & Kuipers, 2005), it is hypothesised that negative post-trauma beliefs will not be associated with the subsequent presence of grandiosity. Furthermore, as findings presented in Chapter 2 suggest, grandiose ideas likely build on pre-existing positive views of self (Freeman & Garety, 2003). Therefore, it's hypothesised that positive self- schemas will be a differential predictor of grandiosity as compared to paranoia, hallucinations and PTSD. According to theories of the persistence of grandiosity, increased ruminative first-person mental imagery may play a role in further amplification of positive affect (Mansell, Morrison, Reid, Lowens, & Tai, 2007). It is hypothesised that increased fantasy proneness will

differentially predict the later presence of grandiosity as opposed to paranoia, PTSD and hallucinations.

Given the hypothesised ability of factors derived from cognitive models of PTSD to predict not only PTSD but also paranoia and hallucinations, identifying differential predictors of paranoia, PTSD and hallucinations is likely to come from the theories relating to individual psychotic experiences. Drawing on cognitive models of paranoia, grandiosity, and hallucinations (see Chapter1) a number of variables are hypothesised to show specificity for certain individual outcomes.

First, the autobiographical memory deficit, over general memory bias (OGM), has been found to predict subsequent PTSD (Bryant, Sutherland & Guthrie, 2007; Kleim & Ehlers, 2008) and a meta-analysis (Ono et al 2006) found amplified OGM in the presence of PTSD. It is therefore hypothesised that OGM will differentially predict PTSD. Source-monitoring difficulties have been highlighted by many researchers as a crucial mechanism in the development of hallucinations (Bentall, 1990; Brookwell, Bentall, & Varese, 2013; Larøi & Woodward, 2009). It is hypothesised that the presence of source-monitoring difficulties will differentially predict the presence of hallucinations in the months after an assault. Jumping to conclusions bias has been linked with the maintenance of delusions in both clinical and non-clinical samples (Freeman, Pugh, & Garety, 2008; McLean, Mattiske, & Balzan, 2017; Ross, McKay, Coltheart, & Langdon, 2015) and is therefore predicted to show specificity for paranoia and especially grandiosity as opposed to hallucinations and PTSD.

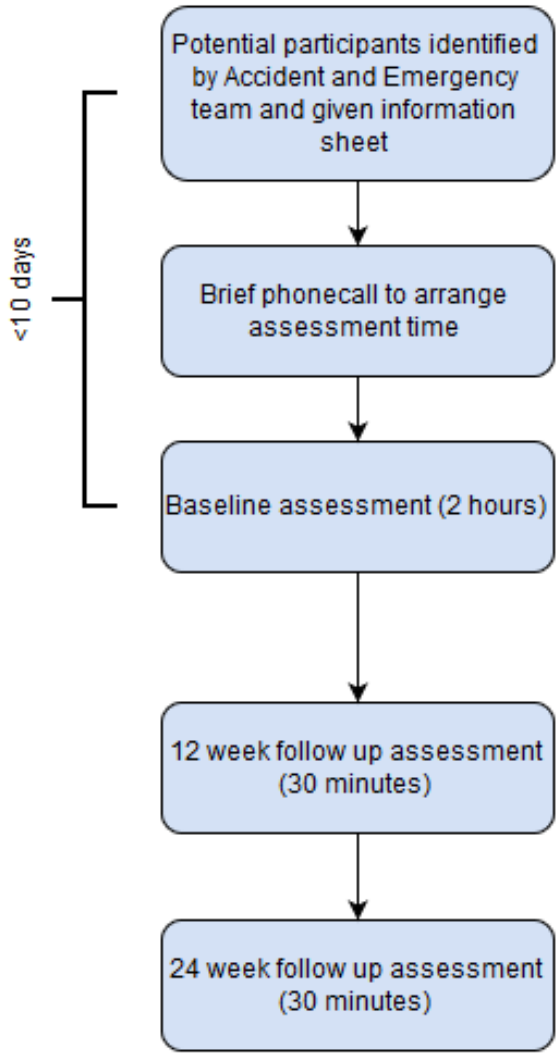
In summary, the first aim of this study is to provide a description of the occurrence of the different psychotic experiences in the 6 months directly following an interpersonal assault. It is hypothesized that there will be significant levels of paranoid and grandiose ideation and hallucinations at all time points and that this will be in relation to established cut off points on assessment. The second aim is to examine the shared and differential predictors of the persistence of the different psychopathological reactions, paranoia, grandiosity, hallucinations and PTSD. It is hypothesised that (1) the individual reactions will be moderately correlated but distinct phenomena; (2) there will be shared predictors of the different outcomes; (3) there will be differential predictors of the of the individual experiences.

From the literature it is hypothesised that shared predictors of PTSD, paranoia and hallucinations will include maladaptive processing of the assault, safety behaviours, belief inflexibility, dissociation, negative schemas of self and others and negative appraisals of the trauma and its effects. With regards to differential prediction, it is hypothesised that: (i) source monitoring bias will show specificity for hallucinations; (ii) that over general memory will predict PTSD over psychotic experiences; (iii) jumping to conclusions bias will show specificity for delusional thinking; (iv) schemas of self and others will be differential predictors of grandiose ideation compared to paranoia with high scores in negative-self and negative-other predicting paranoia, and high scores in positive-self predicting grandiose ideation; (v) fantasy proneness will be a differential predictor of grandiose ideation compared to other psychotic experiences.

Study design

Individuals attending Milton Keynes University Hospital and the John Radcliffe A&E Departments for injuries relating to an interpersonal assault were invited to take part. The study consisted of a baseline assessment within 10 days of the assault, and two follow up assessments at weeks 12 and 24.

Study timeline



Participants

A total of 95 participants were recruited to the study. The inclusion criteria were: victim of an interpersonal assault; attended the Accident and Emergency (A&E) Department for injuries sustained in the assault; willing and able to give informed consent for participation in the study; aged over 18 years old. The only exclusion criteria were: insufficient command of English so that the assessments could not be completed; current diagnosis of severe psychiatric illness; and, known cerebral pathology.

189 people were identified as having sustained injuries in an interpersonal assault and gave verbal consent to be contacted by the researcher. (174 by staff at Milton Keynes University Hospital A&E and 15 by staff at the John Radcliffe A&E). Of these, 154 people had correct, working contact details, and 138 were successfully contacted (there were at least four attempts made to contact people on the contact numbers). Of those contacted, 23 people were uninterested in taking part, 2 people were ineligible, and 9 people were unable to take part (e.g. they would be uncontactable at the time of the assessment). In total, 102 people agreed to take part, 95 people attended the baseline assessment, and 7 people did not attend the arranged assessment. There were no significant differences in the gender or age of those individuals who did take part and those that didn't.

Please see initial power calculation in Appendix 4.0. Due to changes in the statistical analysis used (refer to individual chapters) this calculation was no longer valid.

Procedure

Research nurses within the A&E departments volunteered for a brief training session on identifying potential participants. Once an individual was identified as seeking treatment for injuries related to an interpersonal assault, they were given a participant information sheet and informed about the research (see Appendix 4.1 for a copy of the participant information sheet). If the patient was happy to be contacted by the researcher their contact details were noted down. Alternatively, they could contact the researcher using the contact information on the participant information sheet.

In order not to bias the sample during recruitment and testing, it was not explicitly stated that the main focus of the study was on psychotic experiences and PTSD symptoms. The study was called 'Reactions to Assault' and participants were informed that:

Every year thousands of people attend A&E Departments as a result of an assault. This study concerns reactions to the assault in the weeks following. We want to find out how many people have difficulties coping with the incident (e.g. remain distressed by it) and how many people are relatively unaffected by the incident (e.g. rarely think about it). Importantly, we want to identify the factors that may predict the different reactions. This information will be written up and can be used to help others who experience an assault in the future.

The participant information sheet gave details about the nature of the study and what taking part would involve for the participant. It clearly stated that participants were free to withdraw at any time without giving any reason. Participants were given a week to 10 days

to consider the information and had the opportunity to ask questions or consult their GP or other independent parties to decide whether they would participate in the study.

Participants were asked to attend a two-hour baseline assessment within 10 days of their assault. Baseline assessments were carried out at Milton Keynes University Hospital, Milton Keynes or the Warneford Hospital, Oxford. Written consent was obtained (see Appendix 4.2 for a copy of consent form). If the participant was unable to attend an appointment at either location, then a telephone assessment was arranged. Follow up assessments (at 12 and 24 weeks) were primarily carried out over the telephone. All data were collected by the thesis author (GG).

The study was approved by the NRES Committee South Central (15/SC/0288) (see Appendix 4.3), and locally by each site.

At the baseline assessment the researcher went through the information sheet with all participants making sure they understood what would be involved and answering any questions they had. The participant was then asked to initial the boxes and sign and date the approved consent form. All participants provided written informed consent to take part in the study. Signed copies were retained at the study site.

Measures

The measures chosen to assess the concepts are summarised in Table 1.

The assessment comprised of self-report questionnaires, interview questions, and experimental tasks assessing psychological processing.

Demographics, including gender, age, employment status, and education level, were collected using a demographics questionnaire. Assault Characteristics were obtained through use of the Assault Interview (Dunmore et al., 1999). This is comprised of questions relating to the nature and severity of the assault and resultant injuries. See Appendix 4.4 for copy of the questionnaire.

Outcome variables

PTSD was assessed using the PTSD Checklist for DSM-5 (PCL-5; Weathers et al., 2013). The PCL-5 is a 20 item self-report measure that assesses the 20 DSM-5 symptoms of PTSD. Participants are asked to rate how much they have been bothered by certain problems in the past week. Answers are rated on a 5-point scale; 0 (not a lot), 1 (a little bit), 2 (moderately), 3 (quite a bit), 4 (extremely). The PCL-5 has four subscales measuring: intrusions (e.g. Repeated, disturbing, and unwanted memories of the stressful experience); avoidance (e.g. Avoiding memories, thoughts, feelings related to the stressful experience); hyper-arousal (e.g. Being 'super alert' or watchful or on guard); and negative alterations in cognition and mood (e.g. Trouble experiencing positive feelings). The measure has been shown to have good internal consistency (Cronbach's alpha = 0.96), good test-retest

reliability (r = 0.84) and convergent and discriminant validity (Bovin et al, 2015). See Appendix 4.5 for a copy of the questionnaire

Paranoia was measured using the Green et al paranoid thoughts scale, part B (GPTS; Green et al., 2008). Each of the 16 items (e.g. 'Certain individuals have had it in for me' and 'I was distressed by someone wanting to harm me in some way') conforms to a definition of persecutory ideation (Freeman & Garety, 2000). The items are rated on a 5-point scale from 1 (Not at all) to 5 (Totally). For the purposes of this study answers were based on the past week. Higher scores indicate greater levels of persecutory thinking. The scale has good internal consistency (α=0.90), good test-retest reliability (correlation coefficient 0.81) and good convergent and criterion validity (Green et al., 2008). Mindful of 'the paranoia problem' (Freeman, 2008), the difficulty of determining whether persecutory ideation is unfounded, participants were explicitly asked "not to include thoughts and feelings about the person or people who recently assaulted you". In addition, participants were asked not to rate items according to 'any experiences you may have had under the influence of drugs'. See Appendix 4.6 for a copy of the questionnaire.

Grandiosity was measured by the Specific Psychotic Experiences Questionnaire (SPEQ) – grandiosity subscale (Ronald et al., 2014). The SPEQ was developed by selecting and combining items from existing scales for adults and adapting wording to be age appropriate and by clinical experience. Grandiosity was assessed with 8 items rated on a 4-point scale: *"Not at all"* (0), *"Somewhat"* (1), *"A great deal"* (2), *"Completely"* (3). The grandiosity subscale shows good internal consistency (Cronbach's alpha = 0.85) and

stability across a nine-month interval (r = 0.66). See Appendix 4.7 for a copy of the questionnaire.

Hallucinations were assessed using the Cardiff Anomalous Perceptions Scale (CAPS; Bell, Halligan, & Ellis, 2006). CAPS is selective for perceptual anomalies. The scale has good internal reliability (α=0.87) and good test-retest reliability (correlation coefficient 0.77; Bell et al, 2006). Yes or No answers based on sensations and perceptions experienced in the previous week were recorded for 32 items (e.g. Do you ever hear voices saying words or sentences when there is no one around that might account for it?). In an attempt to control for effects of injuries, participants were asked not to include experiences they felt were down to physical injuries (e.g. sensitivity of skin due to abrasion, visual disturbances due to eye injury etc). Higher scores represent the reporting of a greater number of perceptual anomalies. See Appendix 4.8 for a copy of the questionnaire. Extra questions were asked following endorsement of CAPS item 31 'Do you ever see things that other people cannot?' and 32 'Do you ever hear sounds or music that people near you don't hear?'. These were (1) What did you/do you see/hear that others cannot? (2) Had you ever experienced this before the assault? (3) Thinking about the new experience you have had most in the last few days, do you see any connection between it and recent events?

Processing during the trauma

Processing during the trauma was captured by one questionnaire comprised of the three scales below. See Appendix 4.9 for a copy of the questionnaire.

Perceived threat to life and negative emotions during the assault were assessed using the Thoughts and Feelings During the Assault Scale (Halligan, Michael, Clark, & Ehlers, 2003). This scale is shown to have good internal reliability (α = 0.83; Halligan, Michael, Clark, & Ehlers, 2003). The 3 'perceived threat to life' items (e.g. 'I thought I was going to die') and the 6 'negative emotion' items (e.g. 'I felt terrified') were rated on a 5-point Likert-type scale with 0 = not at all and 4 = very strongly.

Mental defeat was assessed using the Mental Defeat Scale (Dunmore et al., 1999) which assesses the extent to which victims perceived they had relinquished their autonomy. This self-report questionnaire has been shown to have good internal consistency (α = 0.93; Dunmore et al, 1999). Participants rate the extent to which each item applied to them at the time of the assault (e.g. 'I no longer feel like a human being'). The items are rated on a scale from 0 (not at all) to 4 (very strongly).

Cognitive processing during the assault was assessed with the Cognitive Processing Questionnaire (Halligan, Clark, & Ehlers, 2002). This has three subscales measuring data-driven processing (e.g. 'It was just like a stream of unconnected impressions following each other'), peri-traumatic dissociation and self-referential processing (e.g. 'I felt cut off from my past). The questionnaire is shown to have satisfactory to good internal consistency (α= 0.89; Kleim, Ehlers, & Glucksman, 2012).

Trauma memory

The Trauma Memory Questionnaire (Halligan et al., 2003) was used to assess trauma memories. Disorganisation items assess deficits in intentional recall (e.g. I have trouble

remembering the order in which things happened during the assault; 5-items, α=0.88). Intrusion items assess characteristics of unwanted memories, the extent to which trauma memories have strong perceptual elements, are easily triggered or uncontrollable, and are accompanied by a sense of reliving the event (7-items, α=0.90). See Appendix 4.10 for a copy of the questionnaire.

Post-trauma responses

Cognitive responses to trauma memories were captured by the Response to Intrusions Questionnaire (RIQ; Clohessy & Ehlers, 1999). The RIQ assesses responses to intrusive memories over the last week. This 19 item inventory contains 3 subscales: numbing (5 items); rumination (8 items) and thought suppression (6 items). It is rated on a four-point scale; never, sometimes, often, always. These subscales have good internal consistency (α = 0.86 to α = 0.93; Ehring, Ehlers, & Glucksman, 2008) See Appendix 4.11 for a copy of the questionnaire.

Negative thoughts about self, negative thoughts about others, and self-blame were assessed by the updated Posttraumatic Cognitions Inventory (PTCI; Foa, Ehlers, Clark, Tolin, & Orsillo, 1999). The original Posttraumatic cognitions inventory (PTCI) has good internal consistency (α=0.97) and good test-retest reliability (correlation coefficient 0.85). The updated PTCI includes 34 items rated on a 7-point scale; 1 (Totally disagree) to 7 (Totally agree). See Appendix 4.13 for a copy of the questionnaire.

The Safety Behaviours Questionnaire (Dunmore et al., 1999) is a 13 item, self-report questionnaire assessing safety behaviours. The participant rates each item (e.g. 'I take

precautions whatever I do') on a 4-point scale (from never (0) to always (3)). They then indicate whether this is more often than before the assault. See Appendix 4.13 for a copy of the questionnaire.

Affect without recollection was measured by the Affect without Recollection Questionnaire (Ehlers et al, unpublished). Affect without recollection measure includes a list of experiences (e.g. 'I experienced a sudden change in how I felt for no apparent reason') to which the participant indicates how often it has happened to them in the last week; 0 (not at all), 1 (once), 2 (2 to 4 times a week/half the time), 3 (5 or more times a week/nearly every day). See Appendix 4.14 for further details and a copy of the questionnaire.

General psychological processing

Worry over the past week was assessed with the Dunn Worry Questionnaire (Freeman et al, submitted). This 10-item scale assesses frequency of worry and cognitions about worry. Items include 'There was little I could do to stop worrying' and 'Worry has caused me to feel upset'. The items are rated on a 5-point Likert-type scale with 0 indicating 'none of the time' and 4 indicating 'all of the time. Developed for use in clinical and non-clinical groups, the questionnaire shows high consistency (Cronbach's alpha 0.94 and 0.92) and high correlation with the Penn State Worry Questionnaire ($r = 0.73$ and 0.87) in a sample of 250 non-clinical individuals and 50 patients with persecutory delusions (Freeman et al, submitted). See Appendix 4.15 for a copy of the questionnaire.

Cognitive flexibility was assessed with the 12 items of the Cognitive Flexibility Scale (Martin & Rubin, 1995). This scale deals with participants' beliefs about their own

behaviour. Rated on a 6-point scale; from 1 (strongly disagree) to 6 (strongly agree). The scale has good test-retest reliability (correlation coefficient 0.83), and shows construct and concurrent validity (Martin & Rubin, 1995). See Appendix 4.16 for a copy of the questionnaire.

Fantasy proneness was measured with the Creative Experiences Questionnaire;(CEQ; Merckelbach, Horselenberg, & Muris, 2001). The CEQ is 25 item self-report measure of fantasy proneness. 'Yes' answers are summed to give a final score with higher scores indicating higher levels of fantasy proneness. It has been shown to have adequate internal consistency ($\alpha = 0.72$; Merckelbach et al., 2001) and good test-retest reliability (correlational coefficient 0.95). See Appendix 4.17 for a copy of the questionnaire.

Negative and positive beliefs about self and others were assessed with the Brief Core Schema Scale (BCSS; Fowler et al., 2006). The BCSS has 24 items concerning beliefs about self and others rated on a 5-point scale from 0 (don't believe it) to 4 (totally believe it). Four scores are obtained: negative-self, positive self, negative-others and positive-others. In a non-clinical sample test-retest reliability (Pearson's r) for the negative-self, positive-self, negative-other and positive-other scales respectively were r=0.84, 0.82, 0.7 and 0 .72 (all significant $p<0.001$). The scales show good internal consistency ($\alpha = 0.79$ to $\alpha = 0.87$; Fowler et al., 2006). (See Appendix 4.18 for a copy of the questionnaire.)

The Jumping To Conclusion (JTC) bias was assessed using the beads task (Dudley, John, Young, & Over, 1997; Garety & Freeman, 1999). The 60:40 ratio version of the task was

used. This is an established task of probabilistic reasoning. Participants are shown two jars of beads; one with 60 purple and 40 white beads and one with 40 purple and 60 white beads. Participants requested beads one at a time with replacement from an unknown jar before deciding which jar the beads are being taken from. The number of beads requested is the outcome, with a JTC bias determined by two or fewer beads (Colbert, Peters, & Garety, 2010).

Dissociation was assessed using the Trait Dissociation Questionnaire (TDQ; Murray, Ehlers, & Mayou, 2002). The TDQ assesses disposition for dissociative experiences. It has good internal consistency (α=0.93) and good retest reliability (correlation coefficient=0.86). There are 38 items rated on a 6-point scale; 0 (never), 1 (rarely), 2 (sometimes), 3 (often), 4 (mostly), 5 (always). See Appendix 4.19 for a copy of the questionnaire.

Autobiographical memory test (AMT; Williams & Broadbent, 1986) is a cueing methodology used to measure over general autobiographical memory. Participants were presented with a series of cue words, for which they are asked to produce a specific memory. Positive and negative cue words were used. See Appendix 4.20 for full list of words used in the test.

Source monitoring difficulties were assessed using the 'hear-Imagine test (external versus internal). This test requires participants to encode stimuli from different sources and on later representation of the stimuli, judge the original source (see Keffe et al, 1999).

Current Psychological Problems

Insomnia Severity Index (Bastien, Vallières, & Morin, 2001) is a 7 item self-report questionnaire assessing quality of sleep in the past week. Rated on a 5-point scale, higher numbers indicate more problematic sleep. It is shown to have good internal consistency (Cronbach alpha = 0.83; Chung et al. 2011). Participants were also asked if they had had nightmares since the assault. If they answered yes to this question then they were asked follow up questions regarding the content and any perceived link with the assault. See Appendix 4.21 for a copy of the questionnaire.

The Maudsley Addiction Profile (Marsden et al., 1998) was used to assess drug use in the last year.

Past trauma was measured with the Trauma History (Kubany et al., 2000). This post traumatic diagnostic scale trauma screen has 12 items including: serious accidents; natural disasters; non-sexual assault by a family member or someone you know; non-sexual assault by a stranger; sexual assault by a family member or someone you know; sexual assault by a stranger and torture. Brief details were obtained for any endorsed items.

Table 1: Predictor and outcome variables

Potential predictor variables	Outcome variables
(Measure)	(Measure)
Demographics	PTSD symptoms
(Demographics questionnaire)	(PCL-V)
Trauma characteristics	Paranoia
(Assault interview)	(GPTS)
Trauma processing	Hallucinations
	(CAPS)
Response to intrusions	Grandiosity
(RIQ)	(SPEQ- grandiosity subscale)
Safety Behaviours	
(Safety behaviours questionnaire)	
Jumping to Conclusion Bias	
(Beads task)	
Cognitive flexibility	
(Cognitive flexibility questionnaire)	
Self and other schemas	
(BCSS)	
Worry	
(Worry questionnaire)	
Fantasy proneness	
(Creative experiences questionnaire)	
Trait dissociation	
(Trait dissociation questionnaire)	
Trauma history	
(Trauma history questionnaire)	
Autobiographical memory	

(Autobiographical memory task)

Source monitoring

(Imagine-Hear test)

Insomnia

(ISI)

RIQ, Response to Intrusions Questionnaire; BCSS, Brief Core Schema Scale; PCL-V, PTSD Checklist for DSM 5; GPTS, Green et al Paranoid Thoughts Scale; SPEQ, Specific Psychotic Experiences Questionnaire; CAPS, Cardiff Anomalous Perceptions Scale.; ISI, Insomnia Severity Index.

Timing of measures

For the assessment of PTSD symptoms at baseline the PTSD Checklist for DSM-5 (PCL-V; Weathers et al. 2013) was used. Paranoia, hallucinations, and grandiosity were assessed using the Green et al paranoid thoughts scale; part B (GPTS; Green et al. 2008); Cardiff Anomalous Perceptions Scale (CAPS; Bell et al. 2006); (SPEQ)- grandiosity subscales (Ronald et al. 2014) respectively.

At baseline, there were assessments of descriptive information on the recent assault (Dunmore et al, 1999) and demographic information. Factors derived from the cognitive models of PTSD, paranoia, hallucinations and grandiosity were also assessed at this time point. For peri-traumatic factors the Thoughts and Feelings during the Assault scale (Halligan et al. 2002, 2003); Mental Defeat Scale (Dunmore et al., 1999) and Cognitive Processing Questionnaire (Halligan et al 2002; 2003) were used. Trauma memory was assessed with the Trauma Memory Questionnaire (Halligan et al. 2003). Trauma appraisals were assessed with an updated version of the Posttraumatic Cognitions Inventory (PTCI; Foa et al, 1997). Potential maintaining behaviours and cognitive strategies were assessed

with both the Safety Behaviour Questionnaire (Dunmore et al. 1999) and Response to Intrusions Questionnaire (Clohessy & Ehlers, 1999; Murray et al. 2002). A further trauma related phenomenon 'Affect without recollection' was assessed with a scale of the same name (Ehlers, unpublished)

Additional measures, not tied to the trauma event, but assessing affective processes and reasoning were used. The affective measures were: Dunn Worry Questionnaire (Freeman et al, submitted); Brief Core Schema Scale (BCSS; Fowler et al. 2006). Reasoning style was assessed using: Cognitive Flexibility Scale (Martin & Rubin, 1995); Jumping to Conclusions (JTC); the beads task (Dudley et al, 1997); and the Creative Experiences Questionnaire (CEQ; Merckelbach et al. 2001).

Other measures included: the Insomnia Severity Index (Bastien et al. 2001); Maudsley Addiction Profile (Marsden et al. 1998); Trauma History (Kubany et al., 2000); Trait dissociation questionnaire (TDQ; Murray et al., 2002); and Autobiographical memory test (AMT; Williams & Broadbent 1986).

At the week 12 and week 24 follow up assessments, participants completed measures for the main outcome variables: PTSD Checklist for DSM-5 (PCL-V; Weathers et al. 2013); Green et al paranoid thoughts scale; part B (GPTS; Green et al. 2008); Cardiff Anomalous Perceptions Scale (CAPS; Bell et al. 2006); grandiosity subscale of the Specific Psychotic Experiences Questionnaire (SPEQ; Ronald et al. 2014). Participants were also asked about any changes in their circumstances, any further assaults or traumas that might have taken

place since the last assessment, any new psychological treatments they were receiving and details on any ongoing nightmares.

Withdrawals from the study

Participants could withdraw from the study by emailing the researcher or by no longer completing the assessments. If any participant, who had given informed consent, lost capacity to consent during the study they would be withdrawn from the study. Identifiable data already collected with consent would be used but no further data would be collected.

Ethical Considerations

Due to the nature of the study it was expected that individuals with PTSD or psychotic experiences would likely be identified during the course of the assessments.

As the study included individuals whose assault was part of ongoing abuse a number of extra precautions were taken. When contacting the participant, the researcher used only the contact details given to the research nurse in relation to the study. On telephoning the participant, the researcher asked to speak to the individual, if another person answered the phone the researcher did not disclose why they were calling, apart to say that they were calling from the hospital and offered to call back at a later stage. Details about any special requirements regarding contacting the participant were noted down (e.g. not to send any information to the house address). Any written information given to participants was put in unmarked white envelopes. If there were any concerns about taking the information with them alternative methods were found (e.g. writing the researcher's email on a medical

leaflet). Information sheets with details of local sources of help were provided to those who disclosed ongoing or past domestic violence.

During the course of the study it was expected that there may be disclosures of past child abuse. In all instances care was taken to assess current risk. Information was provided for all participants disclosing historic child abuse. If any safe guarding issues arose during the course of the study, referrals to local Multi Agency Safeguarding Hub (MASH) were made. This information was fed back to the relevant A&E department to aid improvement of their safeguarding procedures.

In cases where the police were involved, the baseline assessment was not carried out until after the police had taken a statement and detailed notes were taken.

In line with previous studies (e.g. Freeman et al 2013) participants were compensated for their time and effort. The participant, if completing all three hours of assessment, received £30. The first £15 was generally paid in cash in person at the baseline assessment while the remaining £15 was either paid directly into their bank account or given in cash in person on completion of the final assessment.

Finally, brief information on the main findings was sent to those participants who expressed an interest in receiving further updates.

Summary

This study is the first to investigate prospectively paranoia, grandiosity, hallucinations, and PTSD in the months after a physical assault. It investigates the occurrence of these different psychopathological reactions to trauma, how distinguishable they are from each other, and the shared and differential psychological factors that led to the problems persisting.

Leading on from the study carried out in chapter 3, this empirical study included a number of improvements. First, an earlier measure of symptom severity was included at 10 days post assault. Second, the measures chosen for the outcome variables assessed the full spectra of severity and retrospective evaluations of levels of the individual psychotic experience before the assault were included. Finally, additional potential differential predictors, including over general memory, thinking biases, source monitoring biases and fantasy proneness, were incorporated.

The results of this study are presented in the subsequent two chapters. Chapter 5 reports on the demographic details and assault characteristics of the sample. It describes the levels of paranoia, grandiosity, hallucinations and PTSD present at 10 days post-assault. Finally, it investigated emotional and thematic links between the recent trauma and any auditory or verbal hallucinations and nightmares reported by the sample. Chapter 6 focusses on the longitudinal data, examining how independent the different outcomes are and assessing the ability of theory derived variables to predict their occurrence. The primary aim of this

study was to identify the shared and differential predictors of paranoia, grandiosity, hallucinations and PTSD.

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Chapter 5

Presence of psychotic experiences and post-traumatic stress disorder symptoms in the immediate aftermath of an assault.

Abstract

Background

Levels of paranoia and hallucinations 1 month after an interpersonal assault have previously been reported. It is possible that by 1-month, post-assault levels of these experiences have declined. Furthermore, levels of grandiosity in the direct aftermath of an assault have not yet been assessed.

Aim

The primary aim of this chapter is to report on the levels of paranoia, hallucinations, grandiosity and PTSD 10 days after an interpersonal assault. The demographic details and assault characteristics will also be detailed. A secondary aim is to look at the content of any reported auditory or visual hallucinations and nightmares. The extent to which any new experiences are perceived to be linked to the recent assault will also be recorded.

Method

95 individuals attended a baseline assessment 10 days after treatment in a hospital's Accident and Emergency Department for physical injuries sustained in an interpersonal assault. The assessment included measures of the individual psychotic experiences and PTSD. Extra questions on the content of any auditory or visual hallucinatory experience and on the content of any nightmares were asked of those who endorsed certain items.

Results

There were significant levels of paranoia, grandiosity, hallucinations and PTSD in the sample. Most participants reported that their paranoia and hallucinations were worse since

the assault. 81.5% of new auditory hallucinations and 50% of new visual hallucinations shared content or thematic similarities with the recent assault.

Conclusions

The results add to previous findings by reporting on the levels of individual psychotic experiences 10 days after an assault. The high levels of psychotic experiences in this sample suggest that psychotic experiences, as well as PTSD, may not be uncommon in the days after an assault. The findings suggest that the idea of 'normal' trauma reactions needs to be broadened to include these experiences.

Introduction

Previous studies investigating psychotic experiences in the aftermath of an assault have focussed on paranoia (Freeman et al., 2013) or hallucinations (see Chapter 3). These studies initially assessed the psychotic experiences one month after an assault. The occurrence of psychotic experiences has not been assessed earlier after an assault – it is plausible that levels may be higher the closer in time to the assault. No study has assessed grandiosity in the direct aftermath of an assault.

This chapter reports on the cross-sectional data gathered from 95 assault survivors ten days after their treatment in hospital for injuries relating to an interpersonal assault. The demographics of the group and characteristics of the assault are reported; the presence, frequency, and severity of paranoia, hallucinations, and grandiosity are described and correlations between the psychotic experiences and PTSD symptoms tested.

There is evidence to suggest that trauma, such as an assault, not only impacts on the occurrence of psychotic experiences but also on their content (Bentall et al., 2012; Corstens and Longden, 2013). One study (Hardy et al., 2005) found that in a subgroup of trauma-exposed individuals with nonaffective psychosis, 12.5% had hallucinations with similar themes and content and 45 % had hallucinations with similar themes. Whilst mostly due to perceived phenomenological similarities, nightmares have long been associated with psychotic experiences (Limosani et al, 2011; Mason & Wakerley, 2012) and it has been proposed that nightmares and psychotic experiences may represent a common domain with shared aetiology (Koffel and Watson, 2009). Whilst nightmares are one of the most

commonly reported symptoms of PTSD (Nappi et al., 2012), they have also been found to be a common problem for people with psychosis, with preliminary evidence suggesting that this is irrespective of the presence of PTSD (Sheaves et al., 2015). Cognitive models of nightmares (e.g. Nielsen & Levin, 2007) link with cognitive models of paranoia and hallucinations via a shared emphasis on affective disturbance, such as anxiety, and biases towards negative appraisals. A secondary aim of this chapter therefore is to get reports on the content of auditory and visual hallucinations and nightmares in order to consider potential emotional or thematic links with the recent trauma.

Method

Chapter 4 gives the full details of the methodology. This chapter reports on the findings from the baseline assessments. Baseline assessments were carried out 10 days (mean 10.9 days, SD, 5.7) after admission to A&E for injuries related to an interpersonal assault.

Measures

The subset of measures relevant to this study are summarised in Table 1.

Table 1. Summary of measures used in baseline assessment.

Variable	**Measure**
PTSD	PTSD Checklist for DSM-5 (PCL-5;Weathers et al., 2013)
Paranoia severity – persecution	Green et al. Paranoid Thoughts scale (GPTS) – part B (Green et al., 2008)
Grandiosity	Specific Psychotic Experiences Questionnaire (SPEQ; Ronald et al., 2014) – grandiosity scale
Hallucinations	Cardiff Anomalous Perceptions Scale (CAPS; Bell et al., 2006)
Retrospective assessment of paranoia, grandiosity and hallucinations	'If you think back to before the assault do you think your levels of X are: worse/the same/better More frequent/the same/ less frequent
Processing during trauma	
Perceived threat to life	Thoughts and Feelings During the Assault Scale (Halligan et al., 2003)
Negative emotions	Thoughts and Feelings During the Assault Scale (Halligan et al., 2003)
Mental defeat	Mental defeat Scale (Dunmore et al., 1999)
Cognitive processing (data-driven processing, lack of self-referent processing and dissociation)	Cognitive Processing Questionnaire (Data-Driven Processing Scale; Lack of Self-Referent Processing Scale; State Dissociation Scale) (Halligan et al., 2002)
Assault Characteristics	Assault Interview (Dunmore et al., 1999)
Demographics	Demographic Questionnaire
Past Trauma	Trauma History (Kubany et al., 2000)
Trauma memory	
Memory disorganisation	Trauma Memory Questionnaire (Halligan et al., 2003)
Characteristics of unwanted memories	Intrusions Qualities Questionnaire (Michael et al., 2005)
Post-trauma responses	
Cognitive responses to trauma memories (suppression of trauma memories, rumination on trauma, numbing)	Response to Intrusion Questionnaire (RIQ; Clohessy and Ehlers, 1999)

Safety behaviours	Safety Behaviour Questionnaire (Dunmore et al., 1999)
Negative thoughts about self	Posttraumatic Cognitions Inventory (PTCI) (Foa et al., 1999)
Negative thoughts about others	Posttraumatic Cognitions Inventory (PTCI) (Foa et al., 1999
Self-blame	Posttraumatic Cognitions Inventory (PTCI) (Foa et al., 1999
Affect without recollection	Affect without Recollection Questionnaire (Ehlers et al, unpublished)
General psychological processing	
Worry	Worry Scale (Freeman et al, unpublished)
Negative and positive beliefs about self	Brief Core Schema Scales (BCSS) (Fowler et al., 2006)
Negative and positive beliefs about others	Brief Core Schema Scales (BCSS) (Fowler et al., 2006)
Cognitive flexibility	Cognitive Flexibility Scale (CFS) (Martin and Rubin, 1995)
Fantasy proneness	Creative Experiences Questionnaire (Merckelbach et al., 2001)
Jumping to conclusions	Jumping to Conclusions (Dudley et al., 1997)
Dissociation	Trait dissociation (Fisher et al., 2009)
Autobiographical memory	Autobiographical memory test (Williams and Broadbent, 1986)
Source monitoring	Source monitoring task (the Hear-Imagine test (external versus internal). (see Keefe et al, 1999)
Current psychological problems	
Insomnia	Insomnia Severity Index (ISI) (Bastien et al., 2001)
Drug use	Maudsley Addiction Profile (Marsden et al., 1998)

PTSD, Post Traumatic Stress Disorder.

Please refer back to Chapter 4 for more detailed information on each of the measures.

Extra questions asked following endorsement of CAPS item 31 'Do you ever see things that other people cannot?' and 32 'Do you ever hear sounds or music that people near you don't hear?' were: (1) What did you/do you see/hear that others cannot? (2) Had you ever experienced this before the assault? (3) Thinking about the new experience you have had most in the last few days, do you see any connection between it and recent events?

Extra questions following endorsement of the nightmares question, 'have you experienced any nightmares in the last 10 days?' were: (1) How many times have you had this

nightmare in the last 10 days? (2) Had you had this nightmare before the assault? (3) Thinking about the new nightmare that you have had most in the last few days, do you see any connection between the new nightmare and recent events?

Content correspondence was based on whether there were literal links between the content of the trauma and the content of hallucinations. Content ratings were based solely on the content of the hallucination/trauma not on the explanation of the experience. Thematic correspondence was based on whether both the trauma and the hallucination shared the same theme. Thematic ratings were based on both the content and the explanation of the experience. Due to the nature of the trauma, an assault in which the participant sustained an injury, the trauma was rated as having a threat theme.

Analysis

All data were analysed with Statistical Package for Social Sciences (SPSS) program version 22.0 for Microsoft Windows (IBM Corp. Released, 2011). Descriptive statistics (frequencies, means and standard deviations) were used for summarising demographic variables, assault characteristics and the outcome measures. The differences between groups were analysed with two-tailed t-tests.

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Results

Demographics

In the sample there were more male participants than female (62 men and 34 women) and the mean age was relatively young (mean age=33.4, S.D. 12.3 years). The ethnicities that participants most identified with were white British (n=74, 77.9%), white other (n= 8, 8.4%), black-African (n=5, 5.3%), black other or mixed (n=2, 2.2%), white Irish (n=2, 2.2%), and Asian (n=4, 4.3%). The number of participants who were in a relationship (n = 41, 43.2%) was similar to the number of participants who were single (n=44, 46.3%). Most participants (n=54, 56.8%) were in full time employment. 12 (12.7%) were unemployed, with 7 (7.4%) being unemployed for over one year. The remaining 5 (5.3%) were homemakers or retired.

Overall, 46 participants (48.4%) reported seeking some type of support for mental health problems in the past. 43 participants (45.3%) for low mood or depression, 30 (31.6%) for anxiety. Seven participants (7.4%) reported receiving treatment for other mental health issues including alcohol misuse (n=4). This is slightly higher than the nearly half (43.4%) of adults that think that they have had a diagnosable mental health condition at some point in their life (Mental Health Foundation, 2017).

Assault characteristics.

Types of assault

Most assaults (n= 83, 87.4%) occurred in a familiar place. Broadly the types of assault experienced were confrontations (n=38, 40%) (e.g. the person tried to intervene in an argument and got punched), random attacks (n=11, 11.6%) (e.g. the person was waiting for a bus and was punched by another man waiting), muggings (n=10, 10.5%) (e.g. the person was kicked unconscious by men who stole his things), one off attacks from family member or friend (n=8, 8.4%) (e.g. an argument with a relative led to being attacked), assault in the context of work (n=17, 17.9%) (e.g. prison officer assaulted by prisoner), sexual assault (n=3. 3.2%) (e.g. person raped by ex-partner) and assault as part of ongoing abuse (n=8, 8.4%) (e.g. an incident of domestic violence).

Duration of Assault

The average duration of assault was 13.3 minutes (S.D. = 32.7). The average time until the person felt safe was 42.5 minutes (S.D. = 113.5).

Under influence of alcohol or drugs at the time

The majority of participants (n=57, 60%) reported not being under the influence of alcohol or drugs at the time of the assault. 37 (39%) participants reported having had alcohol in the run up to the assault. One participant reported having had alcohol and opioid based painkillers.

Perpetrator characteristics

In nearly all cases (n=93/95), the perpetrator was described by the victim as male. 47 participants (49.5%) reported being assaulted by a stranger, 28 participants (29.5%) by an acquaintance and 19 participants (20%) by a close friend or family member. The

perpetrator was reported to be verbally abusive by 65 participants (66.3%). All 95 participants felt that the incident had been started by the perpetrator of the assault.

Weapon

27 (28.4%) respondents reported that a weapon was definitely used. Of these individuals 6 reported that some kind of metal pole had been used, 4 reported blades or knives, 3 reported some kind of glass was used,1 reported use of a metal wrench, 2 reported use of an axe, 9 reported that everyday items were used as weapons against them (including items such as TV, mobile phone, crutches, stones), and one person reported use of a car. Only two respondents reported using a weapon themselves. These were a work-issued taser and a work-issued baton.

Injuries

All participants reported sustaining injuries. Injuries reported included minor cuts/bruises (n=94, 98.9%), major cuts/bruises (n=84, 88.4%), loss of consciousness (n=22, 23.2%), broken bones (n=36, 37.9%), head injuries (n=52, 54.7%), injuries to internal organs (n=12, 12.6%), facial injuries/scars (n=63, 66.3%), stab wounds (n=8, 8.4%) and other injuries (n=51, 53.7%) (e.g. loss of teeth, bite mark, contact with another's blood or spit etc). Only 2 participants (2.1%) reported injuries in just one category. 72 participants (75.9%) reported injuries in 4 or more categories. The mean severity of injuries reported was 6.2 out of a total 10 (SD 1.99). These injury

Ongoing problems

The majority of participants (n= 86, 90.5%) reported ongoing problems with their physical health. This included scarring (n=38, 40%), problems with walking (n=15, 15.8%) and

headaches (n=33, 34.7%). The mean severity of ongoing problems was 4.4 (SD 2.46). 72 participants (75.8%) reported ongoing physical pain resulting from the assault.

In ongoing police investigations/compensation

41 participants (43.2%) reported being involved in ongoing police investigations. It may be that systematic recording of the event by police and the outcome of any investigation will impact on the outcome measures. Only 9 participants (9.4%) were seeking compensation.

Outcome measures

Presence of PTSD symptoms and psychotic experiences at 10 days.

The mean scores of the PTSD and psychotic experience measures are displayed in Table 2.

Table 2. Mean scores of PTSD and Psychotic Experience measures

Outcome Variable	**N**	**Measure**	**Mean (Standard Deviation)**
PTSD	95	PCL-5	36.21 (21.99)
Paranoia	95	GPTS- part B	31.15 (17.92)
Grandiosity	95	SPEQ – grandiosity subscale	16.54 (6.73)
Hallucinations	95	CAPS	7.04 (6.86)

PTSD, Post-traumatic stress disorder; PCL-5, PTSD Checklist for DSM-5; GPTS, Green et al. Paranoid Thoughts Scale; SPEQ, Specific Psychotic Experiences Questionnaire; CAPS, Cardiff Anomalous Perceptions Scale.

Gender differences in outcome measures

Females reported more paranoia, hallucinations and PTSD symptoms than men, but men reported more grandiose beliefs. Findings reported in Table 3.

	Females		Males	
	N	Mean (SD)	N	Mean (SD)
PTSD	32	48.03 (19.47)	63	30.21 (20.71)
Paranoia	32	34.44 (20.39)	63	29.48 (16.45)
Grandiosity	32	13.34 (5.28)	63	18.16 (6.83)
Hallucinations	32	9.28 (7.39)	63	5.90 (6.34)

PTSD, Post traumatic stress disorder; SD, standard deviation;

PTSD

100% of the sample endorsed at least one item 'moderately' or above. The mean of 36.21 is above the cut off of 34 used to assess for differential diagnosis of presumptive PTSD (Murphy et al, 2017). Mean scores for the symptom clusters are displayed in Table 3.

Table 3. Mean scores of PTSD symptom clusters

Symptom Cluster	Mean (Standard Deviation)	Scale
Re-experiencing	8.72 (6.10)	0-20
Avoidance	4.43 (2.89)	0-8
Negative cognitions	13 (8.20)	0-28
Arousal	10.06 (7.34)	0-24

Paranoia

69 participants (72.6%) endorsed at least one persecutory item. For example, the item, "People have stared at me to try to make me feel threatened", was endorsed: 1, (Not at all) by 47 participants (49.5%); 2 by 9 participants (9.5%); 3(somewhat) by 13 participants (13.7%); 4 by 10 participants (10.5%); and 5 (totally) by 16 participants (16.8%). 71 participants (74.7%) reported a change for the worse in their levels of paranoia suggesting that even those who did not endorse any items on the scale still felt more paranoid than before the assault.

Grandiosity

The number and percentage of participants endorsing each individual item of the SPEQ grandiosity subscale are displayed in Table 5. A substantial percentage of the participants, ranging from 25.2% (n =14) ('everyone is going to know about me for my greatness') to 54.8% (n = 52) ('I have many great ideas'), endorsed items with 'a great deal' or 'totally'. The mean score of 16.54 is higher than in previous studies using the same measure (see Chapter 2).

Table 4: The number of participants (%) endorsing each of the items in the SPEQ grandiosity subscale.

Statement	Never n (%)	Somewhat n (%)	A great deal n (%)	Totally n (%)	Mean (S.D)
I have a special mission	56 (58.9)	15 (15.8)	9 (9.5)	15 (15.8)	1.82 (1.14)
I have many great ideas	18 (18.9)	25 (26.3)	28 (29.5)	24 (25.3)	2.61 (1.07)
Everything I do is great	37 (38.9)	28 (29.5)	19 (20)	11 (11.6)	2.04 (1.03)
I am, or am destined to be someone very important	45 (47.4)	18 (18.9)	13 (13.7)	19 (20)	2.06 (1.19)
I am a very special or unusual person	29 (30.5)	30 (31.6)	20 (21.1)	16 (16.8)	2.24 (1.07)
I have special abilities that others do not	44 (46.3)	17 (17.9)	19 (20)	15 (15.8)	2.05 (1.14)
I am much more unique than anyone else	46 (48.4)	22 (23.2)	12 (12.6)	15 (15.8)	1.96 (1.12)
Everyone is going to know about me because of my greatness	62 (65.3)	9 (9.5)	10 (10.5)	14 (14.7)	1.75 (1.14)

Hallucinations

75.8% (N=72) of participants endorsed at least one item on the CAPS scale. The most endorsed items were 'Do you hear your own thoughts repeated or echoed?', 'Do you find

your skin is more sensitive to touch, heat or cold than usual?' and 'Do you find that your experience of time changes dramatically', endorsed by 38 participants (40%), 39 participants (41.1%) and 43 participants (45.3 %) respectively.

Of those who did endorse an item, 54 (75%) reported at least one new experience since the assault. 48 participants reported that some of the experiences they had endorsed had been present before the assault. Of these, 39 people felt that the experiences had become more frequent since the assault and 9 people felt that things had not changed. Not one person reported a reduction in anomalous experiences.

Table 5 Endorsement of visual hallucination items.

Item	N (%)
Do you ever see shapes, lights or colours though there is nothing really there?	36 (37.9)
Do you ever find the appearance of things or people seems to change in a puzzling way; e.g. distorted shapes or sizes or colour?	15 (15.8)
Do you ever have days where lights or colours seem brighter or more intense than usual?	32 (33.7)
Do you ever think that everyday things look abnormal to you?	11 (11.6)
*Do you ever see things that other people cannot?	15 (15.8)

*Individuals endorsing this item were asked follow-up questions.

There were 15 individuals (15.8% of the sample) who endorsed the item 'Do you ever see things that other people cannot see?'. Of this group, 8 reported new visual hallucinatory experiences. These were primarily flashing lights (n = 3) and fast-moving things seen out of the corner of their eye (n = 2). 3 people reported seeing shadows or the silhouette of someone, these were reported to be new experiences since the assault and were linked to

the trauma by a sense of threat (they were interpreted by the participants to mean that someone was there who wished them harm).

Auditory hallucinations

Table 6 Endorsement of auditory hallucination items

Item	N (%)
Do you ever notice that sounds are much louder than they normally would be?	36 (37.9)
Do you ever hear you own thoughts repeated or echoed?	38 (40)
Do you ever hear noises or sounds when there is nothing about to explain them?	33 (34.7)
Do you ever hear your own thoughts spoken aloud in your head, so that someone near might be able to hear them?	10 (10.5)
Do you ever hear voices commenting on what you are thinking or doing?	21 (22.1)
Do you ever hear voices saying words or sentences when there is no one around that might account for it?	12 (12.6)
Do you ever find that sounds are distorted in strange and unusual ways?	25 (26.3)
Have you ever heard two or more unexplained voices talking with each other?	11 (11.6)
*Do you ever hear sounds or music that people near you don't hear?	33 (34.7)

*Individuals endorsing this item were asked follow up questions

Of the 33 individuals who reported 'hearing sounds or music that other people near you don't hear' 24 individuals reported a new experience. Of these new experiences 21 (87.5%) were perceived to be in some way related to the assault. This varied from direct links such as hearing the perpetrators voice or hearing sounds that they had heard during the assault, to more indirect links such as hearing sounds that signified they were under threat (e.g. people in the house or people outside the window). Table 7 reports on auditory

experiences that were reported to be new since the assault and the presence of perceived links.

Table 7 Content of new auditory hallucinations.

	N	Examples	Content correspondence	Thematic correspondence
Own voice	2	*'my mind talking to myself'*	N	N
		'my own voice inside my head telling like a story of what happened [in the assault] over and over'	Y	Y
Others talking	9	*'people outside the window talking about the assault*	Y	Y
		'I hear talking about me'	N	Y
		'people whispering outside the apartment'	N	Y
		'people calling my name'	Y	Y
		'I hear people talking, mostly about the assault'	N	Y
		'I think I hear a crowd of people outside…but there is no one there'	Y	Y
		'laughing'	Y	Y
		'him [the perpetrator] saying that he is going to get me again'	Y	Y
		'I hear my wife's voice'	N	N
Music	3	*'I think I have left the radio on but when I check it is off'*	N	Y
		'Songs'	N	N
		'Music'	N	N
Doors opening/closing	3	*'a door being slammed'*	Y	Y
		'the front door being opened'	Y	Y
		'just like a door opening… but there isn't anyone there'	N	Y
Knocking	3	*'knocking like how he [the perpetrator] knocks on the door'*	Y	Y
		'tapping'	N	Y
		'knocking on the window'	N	Y
People moving about/footsteps	3	*'sounds in the house'*	N	Y
		'someone walking up the stairs'	Y	Y

		'like someone moving something'	Y	Y
Other	4	*'an alarm clock'*	N	N
		'white noise and buzzing'	N	N
		'as if my hearing has become super sensitive… I can hear everything'	N	Y
		'his car driving past or pulling up outside'	Y	Y

Table 8 Endorsement of taste and olfactory hallucination items

Item	N (%)
Do you ever detect smells which don't seem to come from your surroundings?	9 (9.5)
Do you ever experience unexplained tastes in your mouth?	16 (16.8)
Do you ever smell everyday odours and think that they are unusually strong?	10 (10.5)
Do you ever think that food or drink tastes much stronger than it normally would?	16 (16.8)
Do you ever find that common smells sometimes seem unusually different?	11 (11.6)
Do you ever notice smells or odours that people next to you seem unaware of?	11 (11.6)
Do you ever notice that food or drink seems to have an unusual taste?	21 (22.1)

Table 9 Endorsement of other hallucination items

Item	N (%)
Do you ever sense the presence of another being, despite being unable to see any evidence?	34 (35.8)
Do you ever experience unusual burning sensations or other strange feelings in or on your body?	29 (30.5)
Do you ever have the sensation that your body, or part of it, is changing or has changed shape?	11 (11.6)
Do you ever have the sensation that your limbs might not be your own or might not be properly connected to your body?	4 (4.2)
Do you ever feel someone is touching you but when you look no one is there?	25 (26.3)
Do you ever find that your skin is more sensitive to touch, heat or cold than usual?	39 (41.1)
Do you ever have the feeling of being uplifted, as if driving or rolling over a road while sitting quietly?	6 (6.3)

The taste and olfactory hallucination items were endorsed by between 9 and 21 participants. In relation to the last week, 34 participants (35.8%) reported sensing the

presence of another being, despite being unable to see any evidence while 24 participants had had the feeling that someone was touching them but when they looked no one was there.

Associations between symptom measures.

Correlations between psychotic experiences and PTSD symptoms are reported in Table 6. There were significant moderate correlations between paranoia, hallucinations and PTSD; an increase in one was associated with an increase in the others. Grandiosity was not significantly correlated with the other psychotic experiences or with PTSD.

Table 11 Correlations between outcome variables at baseline

		Hallucinations	Paranoia	Grandiosity	PTSD
Hallucinations	Pearson Correlation	1	0.50**	0.19	0.67***
	Sig. (2-tailed)		<0.001	0.068	<0.001
	N	95	95	95	95
Paranoia	Pearson Correlation	0.50**	1	0.11	0.62***
	Sig. (2-tailed)	<0.001		0.312	<0.001
	N	95	95	95	95
Grandiosity	Pearson Correlation	0.19	0.11	1	0.12
	Sig. (2-tailed)	0.068	0.312		0.245
	N	95	95	95	95
PTSD (PCL-5)	Pearson Correlation	0.67***	0.62***	0.12	1
	Sig. (2-tailed)	<0.001	<0.001	0.245	
	N	95	95	95	95

*** Correlation is significant at the 0.001 level (2-tailed).

Mechanism variables

Mean scores from the measures assessing cognitive processes are reported in Table 12.

Table 12 Mean scores of baseline measures

Measure	Mean (SD)	Score	
PTCI	87.20 (38.65)	34-196	
Vulnerable self	12.87 (8.55)	6-40	
Self-blame	10.71 (7.19)	5-30	
Overgeneralised danger	23.23 (8.52)	5-35	
Preoccupation with unfairness	14.57 (7.54)	5-35	
Permanent change	10.12 (7.05)	5-32	
Alienation	9.96 (6.65)	4-28	
Loss of hope	2.10 (1.92)	1-7	
Body	5.53 (4.031)	3-21	
Perceived threat to life	3.42 (2.35)	0-8	
Negative emotions during trauma	12.18 (8.00)	0-24	
Data-driven processing	15.36 (7.99)	0-24	
Peri-traumatic dissociation	8.80 (6.28)	0-20	
Lack of self-referent processing	7.21 (6.82)	0-20	
Mental defeat	7.06 (7.81)	0-24	
Assault memory	8.11 (6.69)	0-20	
Unwanted memories	187.67 (138.23)	0-600	
RIQ total			
Thought suppression	8.95 (4.714)	0-15	
Rumination	11.68 (7.481)	0-24	
Numbing	3.85 (3.61)	0-13	
Safety Behaviours	22.94 (10.20)	0-39	
BCSS positive self	14.56 (6.26)	0 – 24	
BCSS negative self	4.53 (6.62)	0 – 24	
BCSS positive other	13.15 (5.80)	0 – 24	
BCSS negative other	11.00 (6.99)	0 – 24	

PTCI, Post Traumatic Cognitions Inventory; RIQ, Response to Intrusions Questionnaire; BCSS, Brief Core Schema Scale

Past trauma

78 participants reported previous trauma, these are summarised in Table 13.

Table 13 Endorsement of past trauma items.

Trauma Type	N (%)
Serious accident, fire or explosion	27 (28.4)
Natural disaster	5 (5.3)
Non-sexual assault by a family member or someone you know (for example, being physically attacked, shot, stabbed or held at gunpoint)	36 (37.9)
Non- sexual assault by a stranger (for example being physically attacked, shot, stabbed or held at gunpoint)	38 (40)
Sexual assault by a family member or someone you know (for example, rape or attempted rape)	13 (13.7)
Sexual assault by a stranger (for example, rape or attempted rape)	4 (4.2)
Military combat or a war zone	4 (4.2)
Imprisonment or held hostage	15 (15.8)
Torture	3 (3.2)
Life-threatening illness	9 (9.5)
Other	33 (34.7)

During the course of the study there were 9 disclosures of historic child abuse, with a number of participants (n=5) reporting that this was the first time they had been asked about it or had talked about it. In all instances care was taken to assess current risk. Information was provided for all participants disclosing historic child abuse. A number of safe guarding issues arose and it was necessary, during the course of the study, to make two referrals to local Multi Agency Safeguarding Hub (MASH) due to immediate fears for a child's safety. This information was also fed back to the relevant A&E department to aid improvement of their safeguarding procedures. 5 participants (n=5) disclosed suicidal

ideation at some point during the study. On each occasion care was taken to assess risk and provide relevant signposting.

Sleep

54 (56.8%) participants reported that their sleep was worse now than it had been before the assault. Only one person reported that their sleep was better since the assault. The mean score of 12.34 (S.D. = 10.3) on the insomnia severity index is above the cutoff score of 10 that has been found to be optimal (86.1% sensitivity and 87.7% specificity) for detecting insomnia cases in the community sample (Morin et al., 2011). This represents 51 participants (53%) scoring above the cut off.

Nightmares

At baseline, 52.6% (n=50) of participants reported having nightmares. All 50 reported they had had more than one nightmare. Of these, 49 participants said that the content of the nightmares they were experiencing were new since the assault. One participant reported having a nightmare he had previously had *'at times of stress'.*

3 participants reported that the nightmares had only occurred in the first two nights, while the remainder (n=46) reported nightmares spread out over the 10 days following the assault. All participants reported the nightmares to be very distressing with 34 reporting that the nightmares resulted in them waking up, 40 reporting that the dreams were disrupting their sleep, and 6 reporting that they were acting out their dream (e.g. punching, screaming or shouting out).

Table 14 Example content of nightmares

Examples

'not exactly the same, but each time it is a horrible situation where 'he' [the perpetrator] turns nasty'
'it always ends differently… with me crushing his [the perpetrator's] chest, breaking his jaw etc'
'new one about being attacked'
'my bag is snatched, and I wake up really frightened'
'like flashbacks in my sleep'
''he [the perpetrator] is always in them [the nightmares]'
'dreams with really disgusting injuries that I didn't even get'
'It's always them attacking me'
'the same thing happens but it is even more violent in the dream'
'sometimes it's the same as what happened, sometimes it's just other bad situations'
'I just have dreams about being attacked'
'there is danger around but I can't see it'
'it's always about death and dying'
'about being followed… it's really scary'
'I'm alone and something bad is going to happen'

30 participants reported some aspects of the trauma were replayed in their nightmares. The most dominant images were frightening or humiliating scenes from the assault, such as being chased by attacker with a knife or having urine poured over them when naked. 40 participants reported similar affect in the dream to that felt at the time of the trauma. The most dominant theme was threat (e.g. being in a threatening situation, being alone and not being able to see where the danger was).

Many of the dreams were mixed with some similar aspects and some changed elements. For example, it was the same perpetrator, but the changed element was what happened (e.g. different scenarios in which [the perpetrator] suddenly turns nasty and aggressive). For some participants, the changed element increased risk to self (e.g. the incident being

more violent in the dream than in reality). For others, the changed element was their reaction to the assault with the dominant theme being anger and violent retaliation (e.g. breaking the attacker's jaw, crushing the attacker's chest or losing control and killing the attacker). Only 3 participants reported not being able to see any link between their nightmares and the trauma apart from the fact that the dreams started after the assault.

Discussion

A description of the participants and presentations ten days after the assault were described in this chapter.

The participants

Whilst the relatively young age of the sample mirrors previous findings, the demographic profile of the sample differed in a number of ways from those found in previous studies (e.g. Freeman et al., 2013; Kleim et al., 2008). A greater proportion of the sample (77%) identified as white British compared to previous studies. This reflects the local demographics where 74 % of people identify as white British. The unemployment rate among the sample (12%) is higher than the borough average of 1.3% but lower than rates reported in previous assault samples (e.g. 33% in Freeman et al, 2013). Whilst, as with previous studies there were more male than female participants, the difference was less in this sample with a ratio of men to women of 1.82:1 as compared to 2.93:1 (Freeman et al, 2013; Kleim et al 2008). This variation is likely due to the inclusion in this study of assaults that may be part of on-going abuse (e.g. domestic violence). All the individuals endorsing this type of assault (n=8) were women.

Levels of outcome variables

As would be expected in the week directly following an interpersonal assault, levels of endorsement of PTSD symptoms were relatively high with all participants endorsing at least one item 'moderately' or above. The mean score of 36.21 on the PCLV is above the cut-off of 34 used to assess for differential diagnosis of presumptive PTSD (Murphy et al, 2017). This represents 51 participants (53.6%) scoring over the cutoff.

This is the first study to provide a detailed assessment of the individual psychotic experiences, paranoia, grandiosity and hallucinations in the days following an interpersonal assault. The results show that 69% of participants endorsed at least one persecutory item. This rate of endorsement supports previous findings (Freeman et al., 2013); is similar to that of a high-paranoia non-clinical sample, and higher than the 49% reported for a general population sample (Freeman et al., 2010). The mean score of 31 (S.D., 17.9) indicates levels of paranoia slightly higher than those previously reported at 1 month post assault (Freeman et al., 2013). When asked to compare current levels of paranoia with levels prior to the assault the majority of participants (71%) reported that their paranoia was currently worse. Mean scores on the Cardiff Anomalous Perceptions scale (CAPS; Bell et al. 2006) in the immediate aftermath of an assault is similar to previous findings (see Chapter 3). When asked about pre-assault levels of hallucinatory experiences, 63 participants (66.3%) reported that the experiences were either new or, if they had been present prior to the assault, were now more frequent. Levels of grandiosity at 10 days post-assault are relatively high when compared to previous studies using the same measure (see Chapter 3). However, when asked about pre-trauma levels compared to now, only 36 (37.8%) felt that their grandiose ideas had increased.

The levels of the individual psychotic experiences present in this sample suggest that these psychotic experiences, in a similar way to PTSD symptoms, are not uncommon in the days following an interpersonal assault.

Anecdotally, it was clear that participants were expecting the questions related to PTSD symptoms, and despite the questionnaires and information sheet not explicitly referring to PTSD, many of the participants linked the questions to the label. What was interesting was the relief expressed by some participants when they were asked about other, less obvious, post-trauma experiences such as paranoid thoughts and anomalous experiences.

'I thought it was just me!'
'Does this mean that this is normal?'
'Good to know I'm not the only one going crazy'
'Are you reading my mind'? [referring to being asked the questions from one of the psychotic experiences questionnaires].

The fact that within a study entitled 'Reactions to Assault' participants were being asked about paranoia and anomalous experiences appeared to help normalise some of their experiences. This reflects the broader issue of what is considered 'normal' trauma sequalae.

Content of auditory and visual hallucinations and nightmares

A secondary aim of the chapter was to look at the content of auditory and visual hallucinations and nightmares reported by the sample. The proportion of the sample, 52.6% (n= 50), reporting nightmares is similar to that in a clinical group with PTSD (Leskin et al., 2002). Some type of correspondence was found in 47 (94%) of the reported nightmares.

24 individuals reported having a new auditory hallucinatory experience in the days since the assault and 21 (87.5%) of these new experiences were assessed as having content or thematic correspondence with the assault. Perhaps unsurprisingly, following an

interpersonal assault, the most common theme was threat, for example hearing sounds that meant the perpetrator was around. This is in line with findings that participants who had experienced a threatening trauma were more likely to experience hallucinations as threatening (Hardy et al., 2005). Fewer participants endorsed visual hallucinations (n=15) and of those who did only 8 reported new experiences. Whilst 5 of these were not perceived to share thematic or content links with the assault, 4 experiences were. As with auditory hallucinatory experiences the common theme linking the experience with the assault was threat. As suggested by Fowler et al. (2012) it appears that the nature of the relation between trauma and hallucination content was not one of re-experiencing but instead involved direct or indirect links.

This study, looking at hallucinatory experiences of a sample of assault survivors in the days immediately following their assault, suggests the frequent presence of content and thematic links between the assault and new auditory and visual hallucinatory experiences. This is in line with previous findings which found strong links between dominant content and themes of hallucinations and past experiences of trauma (Corstens and Longden, 2013; Hardy et al., 2005). The findings support the idea that trauma may impact not only on the occurrence of psychotic experiences but also on their content (Bentall et al, 2012, Bentall et al, 1989).

Interestingly the link with the assault may not only be negative content. One participant reported a new positive hallucinatory experience that was a source of comfort. Hearing the voice of his deceased wife, the participant interpreted this new experience as the loved one

knowing that he required extra support at this time. This finding is consistent with previous studies (e.g. Jones, 2010).

Limitations

This study has a number of limitations. First, despite the retrospective reports of pre-trauma levels of the individual psychotic experiences, it cannot be ascertained that the assault led to an increase in paranoia, grandiosity or hallucinations. Second, the extra questions regarding the hallucinations were only asked following endorsement of either auditory or visual hallucinations. No follow up information was gathered for other types of hallucinatory experience such as olfactory or tactile hallucinations which were endorsed by a significant minority of the sample. Furthermore, participants were encouraged to only think about the connection between their most dominant anomalous experience and the recent assault despite some participants reporting multiple hallucinatory experiences in the same modality. Given the finding of content and thematic links between the trauma and hallucinations and between the trauma and nightmares, a further area of research might be to look at the connections between the trauma, hallucinations and nightmares to assess any content or thematic correspondence that is shared across the three experiences.

Conclusions

The findings in this study suggest that in the days after an assault, experiences of paranoia, grandiosity, and hallucinations are not uncommon. It may be that the idea of typical trauma reactions requires broadening to include a more wide-ranging set of experiences.

The finding of significant levels of symptoms in the participants provides the opportunity to go on to look at whether the different experiences persist over time and, if so, what factors predict this persistence of difficulties. This is reported in the following chapter.

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Chapter 6

Paranoia, grandiosity, hallucinations and PTSD in the aftermath of an assault: shared and differential predictors.

Abstract

Background

There is evidence that in the aftermath of an assault there is an increased risk of PTSD. Initial evidence suggests that this might also be the case for paranoia, hallucinations, and grandiosity. The mechanisms underlying such associations have rarely been studied.

Aim

This study will investigate longitudinally the occurrence of paranoia, grandiosity, hallucinations, and PTSD in the months following an assault. It will investigate how distinguishable these outcomes are from each other and test the ability of theory derived factors to predict the different outcomes.

Method

10 days after receiving treatment in a hospital Accident and Emergency Department for injuries sustained in an interpersonal assault, 95 participants were assessed on the outcome measures and theory derived factors. These included factors from models of PTSD, paranoia, grandiosity and hallucinations. At 12 and 24 weeks the participants' current levels of paranoia, grandiosity, hallucinations and PTSD were re-assessed in order to investigate the persistence of these difficulties and the ability of baseline measures to predict the different outcomes.

Results

Factor analysis indicated that paranoia, grandiosity, hallucinations, and PTSD were distinct experiences. Over the 6 months there were significant reductions in all the

outcome measures. Processing style during the trauma, cognitive responses to intrusions, and negative trauma appraisals were among the variables derived from the PTSD model that predicted paranoia and hallucinations as well as PTSD. Jumping to conclusions bias was associated with all outcomes as was fantasy proneness. Positive self-schema differentially predicted grandiosity.

Conclusion

While there was a clear pattern of variables that differentially predicted grandiosity, there was little evidence of differential prediction of paranoia, hallucinations and PTSD.

Background

In the previous chapter, the results from the initial baseline assessments with 95 participants 10 days after an interpersonal assault, were reported. It was found that there was a high prevalence of paranoia, grandiosity, hallucinations, and PTSD in the days following an assault. This chapter reports whether the different outcomes are independent experiences and the ability of the theory-derived factors to predict the persistence of these problems.

It is hypothesised that there will be: (1) shared predictors of the different outcomes; and (2) differential predictors of the outcomes too.

From the literature it is hypothesised that shared predictors of PTSD, paranoia and hallucinations will include: maladaptive peri-traumatic processing; worry; safety behaviours; belief inflexibility; dissociation; negative schemas of self and others; and negative appraisals of the trauma and its effects. With regards differential prediction, it is hypothesised that: (i) perceptual anomalies will differentially predict psychotic experiences compared to PTSD; (ii) jumping to conclusions bias will show specificity for delusional thinking; (iii) source monitoring difficulties will show specificity for hallucinations; (iv) schemas of self and others will be differential predictors of grandiose ideation compared to paranoia with high scores in negative-self and negative-other predicting paranoia, and high scores in positive-self predicting grandiose ideation; and, (v) fantasy proneness will be a differential predictor of grandiose ideation compared to other psychotic experiences.

Method

Full methodology is reported in Chapter 4.

Participants

95 participants were recruited to the study. The inclusion criteria were: victim of an interpersonal assault; attended the Accident and Emergency (A&E) Department for injuries sustained in the assault; willing and able to give informed consent for participation in the study; aged over 18 years old. The only exclusion criteria were: insufficient command of English so that the assessments could not be completed; current diagnosis of severe psychiatric illness and known cerebral pathology.

Measures

For the assessment of PTSD symptoms at baseline the PTSD Checklist for DSM-5 (PCL-V; (Weathers et al., 2013) was used. Paranoia, Hallucinations, Grandiosity and Anhedonia were assessed using the Green et al paranoid thoughts scale; part B (GPTS; (Green et al., 2008); Cardiff Anomalous Perceptions Scale (CAPS; (Bell, Halligan, & Ellis, 2006); (SPEQ)- grandiosity subscale (Ronald et al., 2014) respectively.

At baseline, there were assessments of descriptive information on the recent assault (Dunmore, Clark, & Ehlers, 1999) and demographic information. Factors derived from the cognitive models of PTSD, paranoia, hallucinations and grandiosity were also assessed at this time point. For peri-traumatic factors the Thoughts and Feelings during the Assault scale (Halligan, Clark, & Ehlers, 2002; Halligan, Michael, Clark, & Ehlers, 2003); Mental Defeat Scale (Dunmore et al., 1999) and Cognitive Processing Questionnaire (Halligan et al., 2002, 2003) were used. Trauma memory was assessed with the Trauma Memory

Questionnaire (Halligan et al. 2003). Trauma appraisals were assessed with an updated version of the Posttraumatic Cognitions Inventory (PTCI; (Foa, Ehlers, Clark, Tolin, & Orsillo, 1999). Maintaining behaviours and cognitive strategies were assessed with the Safety Behaviour Questionnaire (Dunmore et al. 1999) and Response to Intrusions Questionnaire (Clohessy & Ehlers, 1999; Murray, Ehlers, & Mayou, 2002). A further trauma related phenomenon 'Affect without recollection' was assessed with a scale of the same name (Ehlers, unpublished)

Additional measures, not tied to the trauma event, but assessing affective processes and reasoning were used. The affective measures were: Worry Questionnaire (Freeman, unpublished); Brief Core Schema Scale (BCSS; (Fowler et al., 2006). Reasoning style was assessed using Cognitive Flexibility Scale (Martin & Rubin, 1995), Jumping to Conclusions (JTC): the beads task (Dudley, John, Young, & Over, 1997), the Jumping to Perceptions task (Bentall & Slade, 1985) and the Creative Experiences Questionnaire (CEQ; (Merckelbach, Horselenberg, & Muris, 2001).

Other measures included: the Insomnia Severity Index (Bastien, Vallières, & Morin, 2001); Maudsley Addiction Profile (Marsden et al., 1998); Trauma History (Kubany et al., 2000); Trait dissociation questionnaire (TDQ; (Murray et al., 2002); and Autobiographical memory test (AMT; (Williams & Broadbent, 1986).

At the week 12 and week 24 follow up assessments, participants completed measures for the main outcome variables; PTSD Checklist for DSM-5 (PCL-V; Weathers et al. 2013);

Green et al paranoid thoughts scale; part B (GPTS; Green et al. 2008); Cardiff Anomalous Perceptions Scale (CAPS; Bell et al. 2006); grandiosity subscale of the Specific Psychotic Experiences Questionnaire (SPEQ; Ronald et al. 2014). Participants were also asked about any changes in their circumstances, any further assaults or traumas that might have taken place since the last assessment, any new psychological treatments they were receiving and details on any ongoing nightmares.

Analysis

The first stage of the analysis was a description of the levels of paranoia, grandiosity, hallucinations and PTSD over the 6 months. The second stage explored patterns of correlation between the different outcome variables; measuring items using an exploratory factor analysis to look for evidence of structure in the correlation matrix and, in particular, evaluate whether paranoia, grandiosity, hallucinations and PTSD are distinct experiences. The individual items for the PCLV (20 items), GPTS (16 items), CAPS (31 items), and SPEQg (8 items) were standardised and included in a principal component factor analysis. The items were then included in a "promax" and "varimax" factor analysis. Items with loadings greater than 0.4 were retained within each factor.

The third stage of the analysis examined the separate prediction of paranoia, grandiosity, hallucinations and PTSD at 6 months using a series of simple univariate regressions. The fourth stage of the analysis examined the differential prediction of the four outcomes. Each of the four outcomes (PCLV, GPTS, CAPS and SPEQg) were standardised so that the outcome had a standard deviation equal to one. By means of a linear mixed effects model

(lme function in R from the nlme package), all the standardised outcomes were modelled, accounting for repeated measurements on the same participant by means of a random intercept and including the baseline predictor and indicator variables to distinguish between the outcomes as fixed effects in the model. Interactions between the indicator variables and the baseline predictor were included. The differential prediction of the baseline predictor between each pair of outcomes was determined by means of appropriate contrast statements.

Results

Demographics

Detailed demographic details of the sample at baseline are reported in chapter 5. 89 participants completed the follow-up assessment at 6 months. There were no differences in the baseline scores of paranoia (t_{93} = 0.87, p =0.385), grandiosity (t_{93} = 1.11, p =0.267), hallucinations (t_{93} = 1.09, p= 0.278) and PTSD (t_{93} = -0.31, p =0.756) for the 6 individuals who did not provide 6-month follow-up data compared with the rest of the sample

Outcome variables at 6 months

There were no significant differences between the 6-month and 3-month data. The 6-month data was prioritised. The occurrence of the outcome variables at baseline (10 days) and at 6 months are reported in Table 1. A paired samples t-test was conducted to compare outcome scores at 10 days and outcome scores at 6 months. Over the six months there was significant reduction in all outcomes. Paired differences are reported in Table 1.

Table 1:

	Baseline		6-month follow up		Paired difference	
Measure	*n*	Mean (S.D.)	*N*	Mean (S.D.)	t_{88}	*P*
Paranoia (GPTS)	95	31.15 (17.92)	89	24.54 (13.88)	3.69	<0.001
Grandiosity (SPEQ)	95	16.54 (6.73)	89	14.31 (5.65)	4.65	<0.001
Hallucinations CAPS	95	7.04 (6.86)	89	3.57 (5.13)	6.28	<0.001
PTSD PCLV	95	36.21 (21.99)	89	17.07 (18.46)	9.314	<0.001

S.D. Standard Deviation; GPTS, Green et al persecutory thoughts scale; SPEQ, Specific Psychotic Experiences Questionnaire; CAPS, Cardiff Anomalous Scale; PCLV, Posttraumatic symptoms checklist for DSM 5.

Relationship between the outcome variables.

There were moderate correlations between the paranoia, hallucinations and PTSD measures. The measure of grandiosity did not significantly correlate with any of the other outcome variable measures. Correlations are reported in Table 2.

Table 2 Correlation between outcomes at 6 months

		PTSD	Paranoia	Hallucinations	Grandiosity
PTSD	Pearson Correlation	1	0.77***	0.61***	-0.03
	Sig. (2-tailed)		<0.001	<0.001	0.762
	N	89	89	89	89
Paranoia	Pearson Correlation	0.77***	1	0.67***	0.02
	Sig. (2-tailed)	<0.001		<0.001	0.887
	N	89	89	89	89
Hallucinations	Pearson Correlation	0.61***	0.67***	1	0.08
	Sig. (2-tailed)	<0.001	<0.001		0.468
	N	89	89	89	89
Grandiosity	Pearson Correlation	-0.03	0.02	0.08	1
	Sig. (2-tailed)	0.762	0.887	0.468	
	N	89	89	89	89

*** Correlation is significant at the 0.001 level (2-tailed). PTSD, Posttraumatic Stress Disorder

The GPTS items (n = 16), the SPEQ grandiosity subscale items (n = 8), the CAPS items (n = 32) and the PCLV items (n = 20) were standardised and entered into a principal components analysis. In the principle component factor analysis, the first nine factors had eigenvalues greater than one. The scree plot seemed to indicate a six-factor factor analysis, but this could also be interpreted as requiring four factors. In a six-factor analysis, the first factor consisted of all but two of the PCLV items and four items from the GPTS questionnaire. The second factor consisted of GPTS items only, but not those included in the first factor. The third factor and fifth factors consisted of items from the CAPS

questionnaire, with no overlapping items. The fourth factor consisted of all the SPEQ items, and the sixth factor consisted of items from the GPTS questionnaire, with some items overlapping with the first and second factors. The factors were consistently made up from items from the same questionnaire. The little overlap indicates that the outcome measures are independent phenomena.

Predicting the persistence of paranoia, grandiosity, hallucinations and PTSD.

The ability of the individual baseline variables to predict paranoia, grandiosity, hallucinations and PTSD at the final follow-up assessment are reported in Table 3. There is a very consistent pattern of the variables predicting three outcomes: paranoia; hallucinations; and PTSD. Problematic peri-traumatic processing, including data-driven processing, peri-traumatic dissociation and lack of self-referent processing predicted all three. The same pattern was found for post trauma responses, with increased use of maladaptive cognitive responses to intrusions, increased use of safety behaviours and more negative thoughts about self being associated with increased levels of paranoia, hallucinations and PTSD. Negative self-schemas, worry, dissociation, insomnia, and increased source monitoring bias were predicters of higher levels of the three outcomes at 6 months.

In contrast a very different pattern of variables was found to predict the presence of grandiosity. Positive self-schema was predictive of grandiosity at 6 months. The only maladaptive peri-traumatic processing to predict grandiosity was data-driven processing and the only maladaptive post-trauma response was rumination.

The presence of a jumping to conclusion bias and increased fantasy proneness were associated with higher subsequent levels of all outcomes.

The predictor variables were assessed again after controlling for the baseline score of the dependent variable to assess variable prediction over and above initial symptom score. See Table 4.

1.1 Table 3. Ability of individual baseline variables to predict outcomes at 6 months

	Paranoia		**Grandiosity**		**Hallucinations**		**PTSD**	
	Standard Co-efficient	*P*	Standard Co-efficient	*P*	Standard Co-efficient	*p*	Standard Co-efficient	*P*
Severity of injuries	0.23	0.029*	0.15	0.168	0.19	0.074	0.26	0.015*
DURING TRAUMA PROCESSING								
Perceived threat to life	0.19	0.083	0.03	0.787	0.40	<0.001***	0.21	0.049*
Negative emotions during assault	0.25	0.020*	0.01	0.897	0.38	<0.001***	0.39	<0.001***
Data-driven processing	0.26	0.015*	0.22	0.037*	0.34	0.001**	0.24	0.022*
Peri-traumatic dissociation	0.33	0.002**	0.17	0.105	0.45	<0.001***	0.31	0.003**
Lack of self-referent processing	0.39	<0.001***	0.09	0.398	0.38	<0.001***	0.48	<0.001***
Mental defeat	0.33	0.001**	0.09	0.420	0.42	<0.001***	0.44	<0.001***
TRAUMA MEMORY								
Memory disorganisation	0.15	0.163	0.12	0.255	0.24	0.024*	0.28	0.008**
Characteristics of unwanted memories	0.52	<0.001***	0.12	0.279	0.51	<0.001***	0.51	<0.001***
POST-TRAUMA RESPONSES								
Thought suppression	0.36	0.001**	0.03	0.764	0.40	<0.001***	0.41	<0.001***

Rumination	0.36	0.001**	0.22	0.038*	0.470	<0.001***	0.43	<0.001***
Numbing	0.45	<0.001***	0.05	0.619	0.54	<0.001***	0.45	<0.001***
Safety behaviours	0.42	<0.001***	0.14	0.230	0.49	<0.001***	0.40	<0.001***
Vulnerable self	0.45	<0.001***	-0.14	0.199	0.54	<0.001***	0.55	<0.001***
Self-blame	0.30	0.005**	0.10	0.364	0.43	<0.001***	0.37	<0.001***
Overgeneralised danger	0.31	<0.001***	0.10	0.364	0.50	<0.001***	0.45	<0.001***
Preoccupation with unfairness	0.33	0.002**	0.05	0.653	0.35	0.001**	0.40	<0.001***
Permanent change	0.41	<0.001***	-0.05	0.634	0.45	<0.001***	0.53	<0.001***
Alienation	0.33	0.002**	0.07	0.508	0.44	<0.001***	0.45	<0.001***
Loss of hope	0.34	0.001**	0.10	0.355	0.44	<0.001***	0.40	<0.001***
Body	0.24	0.028*	0.21	0.059	0.24	0.027*	0.21	0.054
GENERAL PSYCHOLOGICAL PROCESSING								
BCSS positive self	-0.20	0.060	0.50	<0.001***	-0.22	0.041*	-0.27	0.015*
BCSS negative self	0.20	0.001**	-0.15	0.163	0.39	<0.001***	0.47	<0.001***
BCSS positive other	-0.08	0.453	0.05	0.661	-0.22	0.045*	-0.13	0.235
BCSS negative other	0.34	0.002**	0.14	0.223	0.36	0.001**	0.48	<0.001***
Past trauma	0.23	0.030*	0.05	0.648	0.34	0.001**	0.20	0.068
Worry	0.34	0.001**	0.00	0.982	0.36	0.001**	0.41	<0.001***
Cognitive flexibility	-0.252	0.042*	0.16	0.200	-0.227	0.066	-0.367	0.002**
Fantasy proneness	0.22	0.050	0.34	0.002**	0.37	0.001**	0.20	0.072

Jumping to conclusions	0.229	0.038*	0.293	0.008**	0.345	0.001**	0.208	0.061
Dissociation	0.59	<0.001***	0.003	0.981	0.64	<0.001***	0.56	<0.001***
Autobiographical memory	-0.465	<0.001***	-0.044	0.704	-0.23	0.045*	-0.547	<0.001***
Source monitoring	0.492	<0.001***	-0.043	0.741	0.387	0.002**	0.361	0.004**
Affect without recall			-0.017	0.884	0.53	<0.001***		
PSYCHOLOGICAL PROBLEMS								
Insomnia	0.42	<0.001***	-0.02	0.880	0.44	<0.001***	0.36	0.001**
PTSD					0.49	<0.001	0.54	<0.001
Paranoia			0.014	0.898	0.37	<0.001	0.420	<0.001***
Grandiosity			0.731	<0.001***	0.076	0.478	-0.326	0.745
Hallucinationss	0.520	<0.001***	0.075	0.484	0.698	<0.001***	0.460	<0.001***

*p<0.05, **p<0.01, ***p<0.001

Table 4. Ability of individual baseline variables to predict outcomes at 6 months controlling for baseline outcome measures.

	Paranoia		**Grandiosity**		**Hallucinations**		**PTSD**	
	Standard Co-efficient	*P*	Standard Co-efficient	*P*	Standard Co-efficient	*P*	Standard Co-efficient	*p*
DURING TRAUMA PROCESSING								
Perceived threat to life	0.07	0.476	-0.07	0.365	0.13	0.120	-0.47	0.641
Negative emotions during assault	0.09	0.390	-0.07	0.344	0.09	0.294	0.08	0.480
Data-driven processing	0.12	0.237	0.03	0.694	0.02	0.819	-0.15	0.191
Peri-traumatic dissociation	0.20	0.040*	0.00	0.986	0.08	0.380	0.02	0.879
Lack of self-referent processing	0.25	0.015*	-0.10	0.172	0.11	0.221	0.20	0.117
Mental defeat	0.14	0.211	-0.02	0.753	0.11	0.204	0.11	0.370
TRAUMA MEMORY								
Memory disorganisation	-0.015	0.879			-0.714	0.477	-0.08	0.480
Characteristics of unwanted memories	0.368	0.001**			0.064	0.541	0.224	0.131
POST TRAUMA RESPONSES								
Thought suppression	0.192	0.067	-0.088	0.252	0.027	0.774	0.022	0.872
Rumination	0.189	0.074	0.060	0.441	0.069	0.480	-0.022	0.889
Numbing	0.283	0.009**	-0.034	0.657	0.147	0.150	0.132	0.314

Safety behaviours	0.241	0.040*	-0.048	0.564	0.116	0.290	0.107	0.399
Vulnerable self	0.28	0.011*	-0.06	0.451	0.26	0.004**	0.34	0.010*
Self-blame	0.14	0.164	0.00	0.967	0.05	0.640	0.08	0.466
Overgeneralised danger	0.22	0.050*	-0.040	0.608	0.17	0.079	0.14	0.289
Preoccupation with unfairness	0.13	0.235	-0.14	0.083	-0.05	0.578	0.11	0.355
Permanent change	0.21	0.063	-0.02	0.783	0.17	0.059	0.30	0.019*
Alienation	0.12	0.297	-0.05	0.537	0.08	0.421	0.15	0.257
Loss of hope	0.18	0.085	-0.02	0.782	0.17	0.060	0.15	0.161
Body	0.11	0.284	0.00	0.993	-0.01	0.904	-0.03	0.752
GENERAL PSYCHOLOGICAL PROCESSING								
BCSS positive self	-0.10	0.307	0.12	0.200	-0.11	0.158	-0.147	0.117
BCSS negative self	0.18	0.067	0.03	0.679	0.22	0.007**	0.278	0.005**
BCSS positive other	0.044	0.645	0.12	0.133	0.02	0.857	-0.041	0.661
BCSS negative other	0.090	0.397	-0.04	0.618	0.04	0.640	0.22	0.049*
Past trauma	0.139	0.155			0.073	0.396	0.010	0.922
Worry	0.135	0.189	-0.034	0.653	-0.025	0.790	0.002	0.990
Cognitive flexibility	-0.130	0.219	0.047	0.599	-0.184	0.038	-0.256	0.016*
Fantasy proneness	0.156	0.278	0.718	<0.001***	0.040	0.784	-0.080	0.622
Jumping to conclusions			0.042	0.613				
Dissociation	0.163	0.633	0.057	0.793	-0.061	0.786	0.306	0.771

Autobiographical memory	-0.327	0.002**	0.097	0.219	-0.031	0.676	-0.383	<0.001***
Source monitoring	0.372	0.001**	-0.138	0.109	0.082	0.375	0.207	0.059
Affect without recall			-0.132	0.098	0.076	0.520		
PSYCHOLOGICAL PROBLEMS								
Insomnia	0.209	0.061	-0.133	0.071	-0.072	0.481	-0.138	0.324

*p<0.05, **p<0.01, ***p<0.001

Differential prediction

Differential prediction is reported in Table 5. There was little evidence of differential prediction between paranoia, hallucinations and PTSD. Only one variable, over general autobiographical memory, was found to differ significantly in its effect on hallucinations and PTSD. An increase in over general autobiographical memory at baseline increased the likelihood of hallucinations at follow-up but increased to an even greater degree the occurrence of PTSD.

The majority of variables differed significantly in their effects on grandiosity as opposed to paranoia, hallucinations and PTSD. Most of these variables predicted paranoia, hallucinations and PTSD but not grandiosity, for example maladaptive peri-traumatic processing, negative thoughts about self, worry and negative self-schema. In line with the hypothesis, positive-self schema predicted only grandiosity and not paranoia, hallucinations and PTSD. The presence of grandiosity at 10 days also differentially predicted grandiosity at 6 months.

Grandiosity was not uniquely predicted by fantasy proneness which was associated with increased levels of all the outcome variables. Likewise, the presence of a source monitoring deficit did not specifically predict hallucinations but also predicted paranoia and PTSD. Nor did the presence of the jumping to conclusions bias differentially predict delusions but instead, showed a pattern of predicting all outcomes.

Table 5:

	Paranoia vs grandiosity		Hallucinations vs paranoia		Paranoia vs PTSD		Hallucinations vs grandiosity		PCLV vs grandiosity		Hallucinations vs PTSD	
	DP	*p*		*P*		*p*		*P*		*P*		*p*
PTSD	-0.020	0.001**	-0.001	0.838	0.002	0.756	-0.021	<0.001***	-0.022	<0.001***	0.001	0.916
Paranoia	-0.02	0.003**	0.006	0.449	-0.005	0.570	-0.018	0.023	-0.020	0.014*	0.002	0.850
Grandiosity	0.075	<0.001***	-0.008	0.684	0.648	0.075	0.067	0.001**	0.084	<0.001***	-0.017	0.388
Hallucinations	-0.054	0.002**	-0.020	0.232	-0.009	0.590	-0.074	<0.001***	-0.045	0.009**	-0.029	0.083
SPEQ anhedonia	0.026	0.028*	0.012	0.322	-0.015	0.215	0.038	0.002**	0.041	0.001**	-0.003	0.800
Ongoing problem severity	-0.984	0.037*	0.037	0.435	0.007	0.876	-0.062	0.191	-0.106	0.025*	0.044	0.349
Perceived threat to life	-0.076	0.167	-0.087	0.112	0.005	0.926	-0.163	0.003**	-0.081	0.141	-0.082	0.135
Negative emotion during trauma	-0.031	0.059	-0.016	0.317	0.016	0.342	-0.047	0.004**	-0.046	0.005**	-0.001	0.960

Cognitive processing during trauma	-0.011	0.120	-0.004	0.317	0.000	0.948	-0.015	0.031*	-0.012	0.106	-0.004	0.586
Memory disorganisation	-0.009	0.636	-0.014	0.466	0.017	0.393	-0.024	0.230	-0.026	0.186	0.002	0.901
Characteristics of unwanted memories	-0.003	0.002**	-0.000	0.947	-0.000	0.861	-0.003	0.001**	-0.003	0.003**	-0.000	0.809
Cognitive response to trauma memories	-0.020	0.021*	-0.007	0.440	0.003	0.748	-0.027	0.002**	-0.023	0.009**	-0.004	0.652
Safety behaviours	-0.030	0.024*	-0.003	0.799	-0.004	0.782	-0.033	0.012*	-0.026	0.047*	-0.007	0.595
Negative Thought	-0.015	0.002**	-0.004	0.357	0.002	0.720	-0.020	<0.001***	-0.017	<0.001***	-0.003	0.573
Affect without recollection	-0.032	<0.001***	-0.005	0.570	0.002	0.789	-0.037	<0.001***	-0.035	<0.001***	-0.003	0.763
Worry	-0.023	0.013*	-0.003	0.765	0.006	0.539	-0.025	0.006**	-0.028	0.002**	0.003	0.751
Positive thoughts about self	0.107	<0.001***	0.003	0.879	-0.013	0.541	0.110	<0.001***	0.120	<0.001***	-0.010	0.646
Negative beliefs about self	-0.69	0.001**	-0.011	0.603	0.023	0.252	-0.079	<0.001***	-0.092	<0.001***	0.012	0.530

Negative beliefs about others	-0.030	0.137	-0.006	0.754	0.021	0.281	-0.036	0.072	-0.051	0.011*	0.015	0.444
Cognitive flexibility	0.037	0.008**	-0.000	0.995	-0.013	0.365	0.037	0.008**	0.050	<0.001***	-0.013	0.362
Fantasy proneness	0.010	0.683	-0.028	0.246	-0.004	0.849	-0.018	0.454	0.014	0.550	-0.03	0.177
Dissociation	-0.017	<0.001***	-0.002	0.670	-0.001	0.750	-0.018	<0.001***	-0.016	<0.001***	-0.003	0.457
Jumping to conclusions	0.083	0.776	-0.246	0.395	-0.066	0.821	-0,164	0.573	0.148	0.610	-0.312	0.282
OGM	0.176	0.002**	0.087	0.117	-0.022	0.694	0.088	0.115	0.198	<0.001***	-0.109	0.049*
Source monitoring	-0.495	<0.001***	0.014	0.914	-0.137	0.308	-0.481	<0.001***	-0.358	0.008**	-0.122	0.362

PTSD, post traumatic stress disorder; OGM, Over general autobiographical memory;

*p<0.05, **p<0.01, ***p<0.001

Discussion

This is the first study to examine concurrently paranoia, grandiosity, hallucinations and PTSD in the months after an interpersonal assault.

Changes in outcome over 6 months

Ten days after the assault the levels of the outcome variables were high in relation to established cut off points (see Chapter 5). In this chapter it was seen that there were significant reductions over time in all the outcome variables. The reduction in PTSD and hallucinations over time follows a pattern found in other studies (e.g. Kleim and Ehlers, 2008, see also Chapter 3). This is the first study investigating the occurrence of grandiosity in the months following an assault, therefore the finding that grandiosity levels significantly reduced over the 6 months is new. The significant reduction in paranoia as measured using the GPTS part B, was not found in a previous study (Freeman et al, 2013). This discrepancy may be due to the earlier time point of measurement in this study, 10 days as opposed to 1 month. It is possible that levels of paranoia at 10 days post-assault are higher than levels at 1-month post assault. As a consequence, the reduction over time is greater and reaches significance.

The high levels of the outcome variables at 10 days coupled with the reductions over time may be suggestive that levels of paranoia, grandiosity and hallucinations are raised in the direct aftermath of trauma. An idea that is further supported by the findings outlined in Chapter 5.

Factor analysis

Factor analyses indicates that the different outcome variables of paranoia, grandiosity, hallucinations and PTSD, are correlated but distinct experiences. As each outcome therefore needs to be explained, an analysis of shared and differential predictors was carried out.

Predictors

The study provides further evidence that the cognitive model of PTSD can explain the occurrence of PTSD symptoms (Dunmore, Clark, & Ehlers, 2001; Ehring, Ehlers, & Glucksman, 2008; Freeman et al., 2013; Halligan et al., 2003; Kleim, Ehlers, & Glucksman, 2007). Predictors included: maladaptive peri-traumatic processing; mental defeat; maladaptive responses intrusions; and negative post-traumatic appraisals. A number of these variables such as vulnerable self and permanent change predicted PTSD over and above the initial presence of PTSD symptoms.

The factors identified in the PTSD model were also found to predict higher levels of paranoia and hallucinations with increased maladaptive peri-traumatic processing, maladaptive responses to intrusions and negative post-traumatic appraisals being associated with subsequent occurrence of both paranoia and hallucinations. A number of these variables including vulnerable self, overgeneralised danger, peri-traumatic dissociation, and numbing predicted paranoia over and above initial presence of paranoia. Increased levels of vulnerable self also predicted hallucinations above initial presence of hallucinations These findings fit with previous research that has shown that processing style in relation to a recent assault and its aftermath may impact on the occurrence of

paranoia (Freeman et al, 2014) and hallucinations (see Chapter 3). What was interesting was the degree to which these different outcomes were associated with the factors drawn from the PTSD model. This clear pattern of findings suggests that the explanatory power of the PTSD model expands beyond PTSD to include other post trauma experiences such as paranoia and anomalous experiences. The factors identified in PTSD work may provide a framework for assessing trauma in relation to both paranoia and hallucinations.

As hypothesised, a number of variables, including worry, negative self and other schemas, insomnia and safety behaviours were found to be shared predicters of paranoia, hallucinations and PTSD with negative-self beliefs predicting outcomes even after controlling for baseline scores of the dependent variable. As predicted, and in line with findings from a previous study (Garety et al., 2013), a different pattern of schemas of self and others was predictive of grandiosity. Whilst high scores in positive-self predicted grandiosity, high scores in negative self and negative other predicted paranoia, hallucinations and PTSD.

Differential predictors

A surprising finding was that, other than positive self -schema and presence of grandiosity at 10 days which both uniquely predicted grandiosity, only one of the theory derived variables that were included as potential differential predictors was found to show any degree of specificity. Over-general memory bias, the reduction in the proportion of specific memories retrieved intentionally, was hypothesised to differentially predict PTSD. While it was not found to differ in its predictive ability of PTSD and paranoia, it was found to

differentially predict PTSD and hallucinations. While increased levels of over general autobiographical bias predicted hallucinations, they predicted to an even greater extent the occurrence of PTSD. However, even with the presence of an a prioiri hypothesis, it is possible that, due to the multiple testing, this finding is a type 1 error.

Source-monitoring difficulties, which had been hypothesised to be specific to hallucinations, were found to also predict paranoia and PTSD. Likewise, the variable hypothesised to be specific to delusions, the jumping to conclusions bias, not only predicted paranoia and grandiosity but also hallucinations and PTSD. Finally, fantasy proneness, hypothesised to show specificity for grandiosity was also associated with the subsequent occurrence of the other outcomes. It appears that, with the exception of grandiosity, specificity of predictors in the aftermath of trauma is difficult to account for empirically.

Limitations

The study has a number of strengths including recruitment of participants immediately after trauma and the longitudinal prospective design. However, there are also a number of important limitations. First, despite the inclusion of retrospective reports of pre-trauma levels of paranoia, grandiosity and hallucinations, the study design does not allow for conclusions about causality in relation to the traumatic event. It cannot be determined that the assault led to an increase in paranoia, grandiosity, or hallucinations. Second, the sample size was small considering the number of variables tested. Recruitment of a greater number of participants would have enhanced the ability of the study to detect differential

predictors. Third, there was no real objective measure of the severity of the assault. Inclusion of this would have allowed for the severity of assault and injuries to be controlled for. Finally, a large number of statistical tests were carried out. However, as in previous studies (see chapter 3), the significance levels were not altered for multiple testing as this thesis ascribes to the view that simply describing what tests of significance have been performed, and why, is the best method of dealing with multiple comparisons (Perneger, 1998). Despite these limitations the overall pattern of results is clear. Furthermore, the findings are in line with previous studies ((Freeman et al., 2013, see also Chapter 2 and 3). These findings have some clinical relevance. First, they highlight the need to broaden the understanding of trauma reactions, encouraging a normalising of these diverse experiences in the direct aftermath of an assault. Second, this study highlights potential new targets for intervention.

It was expected that there would be a number of shared predictors. Trauma likely exerts general effects on processes involved in many outcomes. Identifying specific differential predictors is difficult. The different outcomes, paranoia, hallucinations and PTSD, co-occur and have been shown in this study to be moderately correlated in the aftermath of an assault. In addition, it is probable that the experiences are sequentially and causally related. However, despite this, having been shown to be independent experiences, there was an expectation that there would be some specificity. Apart from for grandiosity, this was not found. The results reported in this chapter support the idea that the processing of a trauma and its aftermath may influence the occurrence of a range of responses including PTSD,

paranoia and hallucinations. Factors identified in the PTSD field provide an important framework for investigating trauma and individual psychotic experiences.

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Chapter 7

Sleep in the days after a trauma: associations with subsequent paranoia, grandiosity, hallucinations, and PTSD.

Abstract

Background

The relationship between sleep difficulties and PTSD has long been known. However, a recent role of sleep difficulties in contributing to paranoia and hallucinations suggests that sleep may be one mechanism linking trauma and psychosis. No study has yet investigated the role of sleep following a trauma in predicting subsequent paranoia, hallucinations, or grandiosity. Furthermore, the role of sleep in the aftermath of a trauma with respect to development of PTSD symptoms, specifically intrusions, is debated, with opposing views that either increasing sleep or restricting sleep is beneficial.

Aim

To test whether sleep in the direct aftermath of an assault predicts subsequent levels of paranoia, hallucinations, grandiosity and PTSD.

Method

25 participants were recruited on attendance at a hospital Accident and Emergency clinic for physical injuries sustained in an interpersonal assault. Participants filled in a sleep diary for the 7 nights directly following the assault and wore an actigraphy watch. PTSD, paranoia, grandiosity and hallucinations were assessed at follow up assessments at 10 days post-assault and at 6 months post-assault.

Results

Participants slept on average just 4 hours in the night directly following the assault. The amount of sleep increased over the week as did sleep efficiency and reported sleep quality.

Lower sleep duration, efficiency, and self-assessed quality over the 7 nights following the assault were associated with paranoia, hallucinations and PTSD at 10 days and at 6 months post assault.

Conclusion

The results are consistent with the idea that better sleep in the direct aftermath of trauma may be a protective factor in the development of not only PTSD symptoms, but also paranoia and hallucinations. Improving sleep may be a potential target of therapeutic intervention for recent victims of assault. Such future interventional studies have the potential to determine causal effects, unlike this longitudinal correlational study.

Introduction

In examining how trauma may lead to the occurrence of psychotic experiences, a number of putative mechanisms have been identified in this thesis. One of these factors is poor sleep. In the previous chapter it was shown that the occurrence of insomnia measured 10 days after an assault predicted later levels of paranoia, hallucinations and PTSD but not levels of grandiosity.

However, no studies have looked at sleep in the nights immediately following a personal assault and tested its relationship with the later occurrence of individual psychotic experiences. Furthermore, while a small number of studies have considered the role of sleep following a trauma in later onset of PTSD symptoms these have reached opposing conclusions on whether sleep is beneficial (Kleim, Wysokowsky, Schmid, Seifritz, & Rasch, 2016; Porcheret, Holmes, Goodwin, Foster, & Wulff, 2015).

This chapter reports on a study investigating sleep amount, sleep efficiency, and sleep quality in the immediate aftermath of trauma as predictors of the occurrence of later PTSD, re-experiencing symptoms, paranoia, grandiosity and hallucinations.

Sleep

Sleep disruption has traditionally been viewed as a secondary consequence of mental health problems. However, recently this view has been challenged by a range of studies indicating a contributory causal role of disturbed sleep in a range of mental health problems.(Freeman et al., 2017; Mellman, Bustamante, Fins, Pigeon, & Nolan, 2002; Reeve, Sheaves, & Freeman, 2015). This new perspective has important clinical implications,

highlighting treatment of sleep problems as a means to reduce other mental health difficulties.

Sleep and PTSD

There are currently two contrasting views regarding the role that sleep immediately post-trauma may play in the development of PTSD symptoms, specifically the development of intrusive emotional memories of the trauma.

One line of research supports the more intuitive view that sleep aids recovery. A recent experimental study by Kleim et al (2016) investigated the effect of sleep after exposure to a trauma film on the formation of intrusive memories in 65 non-clinical female participants. Their findings indicate that sleep in the early aftermath of trauma exposure, as compared to no sleep, reduces the amount and emotional distress of subsequent intrusive trauma memories. These effects were particularly evident by the end of the week. There is a clear rationale for the view that sleep may be protective against PTSD symptoms. Sleep has been shown to support the integration of traumatic memories into general semantic networks (Stickgold, 2002; 2008). Sleep, by contributing to memory integration and affective depotentiation, may lead to fewer intrusive memories and PTSD symptoms (Goldstein & Walker, 2014; Kleim et al., 2016). It is also worth noting in this context that many longitudinal studies identify disturbed sleep as a predictor of subsequent PTSD (Koren, Arnon, Lavie, & Klein, 2002; Van Der Helm et al., 2011; Van Liempt, Van Zuiden, Westenberg, Super, & Vermetten, 2013 and see chapter 6).

Another suggestion is that sleep deprivation post trauma may be protective against longer term development of PTSD symptoms. This has been indicated in animal behavioural studies (Cohen, Kaplan, Zohar, & Cohen, 2016) and replicated in humans by Porcheret and colleagues (2015). In this study sleep deprivation after watching a trauma film reduced intrusive memories on the initial 2 days after watching the film. It is worth noting however that this study used a non-clinical, low risk group, and the differences in intrusive memories between study groups was only present for the first 2 days of the 6 days study period. Nevertheless, there is a rationale for a possible protective role of sleep deprivation following a trauma. Sleep is known to have a role in the consolidation of memory (Hu, Stylos-Allan, & Walker, 2006; Rasch & Born, 2013) and some evidence suggests that emotional memories are preferentially reactivated and consolidated during sleep (Nishida, Pearsall, Buckner, & Walker, 2009; Payne, Stickgold, Swanberg, & Kensinger, 2008). Therefore, sleep, by selectively enhancing emotional trauma memories, may actually increase the frequency of intrusive memories and PTSD symptoms (Holland & Lewis, 2007; Porcheret et al., 2015). Thus, sleep deprivation or sleep disturbances in the direct aftermath of trauma might have a protective effect with respect to later PTSD symptoms by preventing the memory strengthening that occurs during sleep.

Sleep and psychotic experiences

The link between sleep and individual positive psychotic experiences has been the subject of growing interest. There is now evidence to suggest that sleep dysfunction is a cause of subsequent psychotic experiences. A large randomised controlled trial of a psychological

intervention for insomnia in students found that treating insomnia led to a reduction in paranoia and hallucinations, with improvement in sleep accounting for almost 60% of the change in paranoia (Freeman et al., 2017). Another manipulation study found that reducing sleep in non-clinical individuals caused an increase in levels of psychotic experiences, such as paranoia and hallucinations (Reeve, Emsley, Sheaves, & Freeman, 2018). However, sleep deprivation was not found to lead to an increase in grandiosity. This reflects individual psychotic experiences having differing strengths of association with insomnia, with paranoia and hallucinations displaying moderate and significant correlations and grandiosity showing lower correlation with sleep measures(Taylor, Gregory, Freeman, & Ronald, 2015)

The potential role of sleep in the development and persistence of psychotic experiences means that disrupted sleep could be one mechanism by which trauma can lead to the development of psychotic experiences, especially paranoia and hallucinations.

Current study

This study is the first to investigate sleep longitudinally in the week following an assault and to investigate whether sleep predicts the occurrence of hallucinations, paranoia, and grandiosity. It also aims to investigate the ability of sleep to predict subsequent severity of re-experiencing, intrusive images, and PTSD symptoms over 6 months. By recruiting individuals who have experienced an assault this study has significantly improved ecological validity compared with the experimental research previously discussed, which relied on analogues of trauma exposures in individuals without PTSD (Kleim et al., 2016;

Porcheret et al., 2015). In contrast however, unlike these other studies, it does not manipulate the variable of interest.

The primary hypothesis is that reduced sleep in the days following an assault will predict higher PTSD, re-experiencing symptoms, paranoia, and hallucinations, but not grandiosity. More specifically, it is proposed that: (i) first night sleep will predict PTSD, re-experiencing, paranoia and hallucinations at 10 days; (ii) average sleep over the week will predict PTSD, re-experiencing, paranoia and hallucinations, at both 10 days and at 6 months; and, (iii) sleep variables will not predict later grandiosity at either time point.

Method

Participants

This study used a subset of participants (n=25) from the Reactions to Assault study described in Chapter 4. Members of the general population, on the actual day of attendance at A&E for injuries resulting from an interpersonal assault, were invited to immediately take part in a sleep monitoring study (n = 28). The inclusion criteria included: being the victim of an assault that day; attendance at A&E for injuries sustained in the assault; willing and able to give informed consent for participation in the study; and aged 18 years or over. Exclusion criteria were: insufficient command of English so that the assessments could not be completed; current diagnosis of severe psychiatric illness; and known cerebral pathology. 26 participants consented to take part in the sleep monitoring, and 25 attended the first follow up assessment at 10-days post assault.

Procedure

Potential participants were identified by A&E staff and invited to meet with the researcher. They were then given a study information sheet (see Appendix 7.1 for a copy of the information sheet) and written informed consent was obtained (see Appendix 4.2 for a copy of the consent form). Participants were asked to complete a sleep diary, based on the Consensus Sleep Diary (Carney et al., 2012), for seven days. They were also invited to wear an actigraphic watch, a wristwatch style device which records the participants' movement, and from this can interpolate sleep patterns.

Participants were invited to attend an assessment with the researcher within 10 days of their admission and a further assessment at week 24. For further details on these assessments please refer back to Chapter 4.

It was recognised that those participants (n=25) taking part in the sleep monitoring would have little time between receiving the study information and providing written consent. It would not be possible to allow 24 hours consideration and record first night sleep. It was, therefore, emphasised that no data would be collected from them until the first follow-up assessment at 10 days and that they could withdraw from the sleep monitoring at any point by simply removing the actigraphic watch and no longer keeping the sleep diary. If they wished to withdraw from the whole study, they could return the actigraphy watch or contact the researcher to arrange for collection.

This study was approved by the NRES Committee South Central (15/SC/0288), and locally by the NHS site.

Clinical measures

Demographics

Demographics such as age, marital status, and employment were collected using a questionnaire.

Assault characteristics

Assault details were assessed with the assault interview (Dunmore, Clark, & Ehlers, 1999). This is composed of interview questions relating to the nature and severity of the assault and resultant injuries. See Appendix 4.4 for further details and a copy of the questionnaire.

Outcome variables

All outcome variables were assessed at 10 days and 6 months.

PTSD symptoms were assessed using the PTSD Checklist for DSM-5 (PCL-V; (Weathers et al., 2013). The PCL-V is a 20 item self-report measure that assesses the 20 DSM-5 symptoms of PTSD. Items are rated on a 5-point Likert-type scale; from 0 (not a lot) to 4 (extremely). Higher scores indicate higher levels of posttraumatic stress symptoms. Intrusions were measured using an item from the PCL-V, 'In the past week, how much have you been bothered by repeated, disturbing, and unwanted memories of the stressful experience?'. Higher scores indicate higher levels of intrusive trauma memories. See Appendix 4.5 for further details and a copy of the questionnaire.

Paranoia, grandiosity and hallucinations were assessed using the Green et al paranoid thoughts scale - part B (GPTS; Green et al., 2008), the Specific Psychotic Experiences Questionnaire grandiosity subscale (SPEQ; Ronald et al., 2014), and the Cardiff Anomalous Perceptions Scale (CAPS; Bell et al., 2006) respectively. See Appendices 4.6, 4.7 and 4.8 for copies of the questionnaires.

The GPTS is a 16-item scale that assesses ideas of persecution. It has been shown to have good internal consistency (α=.90), good test-retest reliability (correlation coefficient 0.81) and good convergent and criterion validity (Green et al., 2008). Items were rated on a 5-point Likert-type scale from 1 (Not at all) to 5 (Totally) based on thoughts and feelings in the last week. Mindful of 'the paranoia problem' (Freeman, 2008), the difficulty of determining whether persecutory ideation is unfounded, participants were explicitly asked

"not to include thoughts and feelings about the person or people who recently assaulted you".

The SPEQ, grandiosity subscale includes three items from the 'Myself' sub-scale of Cognition Checklist for Mania-Revised (CCL-M-R) (Beck, Colis, Steer, Madrak, & Goldberg, 2006), two items from Peters et al. Delusions Inventory (PDI) (Peters, Joseph, Day, & Garety, 2004), and three items developed by the authors from clinical case studies. Items are rated on a 4-point scale: *Not at all"* (0), *"Somewhat"* (1), *"A great deal"* (2), *"Completely"* (3). The subscale shows good internal consistency (α = 0.85) and stability across a nine-month interval (r = 0.66). Higher scores indicate higher levels of grandiosity.

The CAPS, selective for perceptual anomalies, is a 32-item scale. Yes/No answers are given based on sensations and perceptions experienced in the previous week. The scale has good internal reliability (α = 0.87), good test-retest reliability (correlation coefficient 0.77; Bell et al, 2006). Higher scores represent the reporting of a greater number of perceptual anomalies.

The outcome measures were repeated at the 6-month follow up.

Sleep measures

Daily sleep diaries

Participants completed a sleep diary for seven days in between their initial consent and the 10-day assessment. The sleep diary was based on the Consensus Sleep Diary (Carney et al., 2012) and was the primary subjective sleep assessment. The diaries took around 5 minutes to complete each day, with participants instructed to complete the diary each morning on

waking. The diaries assessed the time the participant woke up that morning, what time they got out of bed, the time they got into bed the night before, and the time it took to get to sleep (sleep onset latency) The diary also allowed recording of the number of times the participant woke in the night and the total amount of sleep lost. The sleep duration and the sleep efficiency (% of time in bed spent asleep) were calculated from the diary entries. Participants were also asked to rate whether their sleep each night was better (+1), worse (-1), or the same (0) as usual giving a measure of sleep quality. Diaries with less than 4 days completed were excluded from analysis (n=1). See Appendix 7.2 for further details and a copy of the sleep diary.

Actigraphy

A subset of participants (n= 18) also agreed to wear a wrist-based activity monitoring device (CamNTech Motionwatch 8) from the day of their admission to A&E to the day of their first follow up assessment at 10 days. This is a non-invasive measure of activity that can be worn in the home environment and used to assess sleep. The actigraph in this study was programmed to sample movement at 30 second intervals. The device was worn over the same period that the sleep diaries were being completed to allow an objective measure of activity. Participants were instructed to press the button on the device once when trying to go to sleep and once on waking up. The actigraphy was returned when the participant came in for their assessment at 10 days.

Data from the actigraphic watches was analysed using Motionware software package (V1.1.25, camNTech) that interpreted accelerometer data to quantify intensity and

duration of daily physical activity and measure night-time activity for estimating sleep duration and quality. Where less than 3 days of actigraphy data were available then the data were excluded from all further analyses. The actigraphic data were also checked against that provided in the sleep diary. If the actigraphic data did not match diary data, the actigraphic data were excluded from any further analyses. Each sleep period was analysed by entering the time to bed and time out of bed from the sleep diary. If there were no diary data for a particular day then a visual inspection was made to find the most likely sleep window – this process was used for a maximum of 3 nights per participant.

Data analyses

All data were analysed with SPSS Version 23 (IBM, 2015). The first stage of the analysis was a description of the sleep variables on the first night and averaged over the first week Paired samples t-tests were used to assess any differences in sleep duration, sleep efficiency and sleep quality between first night and first week. In order to test the ability of the sleep variables (sleep duration, sleep efficiency and sleep quality) to predict later outcomes (paranoia, grandiosity, hallucinations and PTSD) key tests of longitudinal relationship were carried out.

Results

Demographics

There were more male participants than female (16 men (64.0%) and 9 women (36.0%)). The average age was 31.4 (SD=12.1 years). Most participants (n = 18, 72.0%) identified as White British. Two individuals (8.0%) identified as Black African.

The types of assault reported included confrontations (e.g. hit by an acquaintance during an argument) (n=8), work related incidents (e.g. taxi driver attacked by passenger) (n= 6), domestic abuse incidents (e.g. attack by abusive ex-partner), one off attacks by family member or close friend (e.g. punched by father)(n = 3), and random attacks (walking past an arguing group and getting punched) (n = 3)

All participants reported sustaining injuries in the assault. 23 participants (92%) reported major cuts and bruises, 22 participants (88%) reported facial injuries, 13 participants (52%) reported broken bones, 8 participants (n = 32%) reported head injuries, 6 of whom reported loss of consciousness. The mean severity of injuries (maximum 10) was 7.36 (SD 1.38).

Sleep

Sleep duration, sleep efficiency, and sleep quality for the first night and for the first week (excluding the first night) are reported in Table 1. There was a significant improvement in sleep duration, sleep quality, and sleep efficiency between the first night and the weekly average.

Most participants (n=22 out of 25) reported that their sleep quality the first night post-assault was worse than their usual sleep quality. 2 people reported no change in sleep quality and one person reported that their sleep quality had been better than usual. Participants slept an average of 232.96 mins (SD = 138.93) on the first night, equivalent to approximately 4 hours.

Table 1: First night and average first week (excluding first night) measures of sleep variables.

	N	First Night	Average of first week (excluding first night)	Difference between the first night and average over first week	
				T_{24}	*p*
Sleep duration	25	232.96 (138.93)	335.29 (152.53)	-3.32	0.003**
Sleep efficiency	25	0.58 (0.26)	0.70 (0.25)	-2.80	0.010*
Sleep quality	25	-0.84 (0.47)	-0.57 (0.44)	-3.21	0.004**

*p<0.05, **p<0.01, ***p<0.001

Presence of PTSD and psychotic experiences

Mean scores of the outcome measures at both time points are displayed in Table 2. At baseline there were high rates of PTSD, paranoia, grandiosity and hallucinations. The mean PTSD score of 41.20 at baseline is above the cut off of 34 used to assess for differential diagnosis of presumptive PTSD (Murphy et al, 2017), while the 72% of participants who endorsed at least one persecutory item is higher than the 49% reported for a general population sample (Freeman, Pugh, Vorontsova, Antley, & Slater, 2010).

Table 2

	10-day follow up		**6-month follow up**		**Difference between two assessments**	
	N	**Mean (SD)**	**N**	**Mean (SD)**	t_{24}	*P*
PTSD (PCL-V)	25	41.20 (23.34)	24	22.92 (21.64)	4.59	<0.001***
Re-experiencing (PCLV items 1-5)	25	10.00 (6.81)	24	4.79 (6.03)	4.89	<0.001***
Paranoia (GPTS)	25	36.56 (22.79)	24	29.67 (18.26)	2.05	0.052

Grandiosity (SPEQ)	25	16.88 (6.88)	24	15.08 (5.72)	2.07	0.049*
Hallucinations (CAPS)	25	8.20 (8.11)	24	4.88 (6.57)	3.33	0.003***

PTSD, Post-traumatic stress disorder; S.D., standard deviation, PCL-V, Posttraumatic symptom checklist for DSM 5; GPTS, Green et al. Paranoid Thoughts Scale; SPEQ, Specific psychotic experiences questionnaire; CAPS, Cardiff Anomalous Perceptions Scale.

*p<0.05, **p<0.01, ***p<0.001

In line with the findings from the Reactions to Assault study (see Chapter 6), there were significant reductions in this sub-group in levels of PTSD, intrusions, grandiosity and hallucinations over the 6 months (see Table 2). Reduction in paranoia did not reach significance.

Predicting subsequent levels of PTSD, paranoia, grandiosity and hallucinations.

The ability of the first night sleep variables and the average week sleep variables to predict PTSD, re-experiencing symptoms, paranoia, grandiosity and hallucinations at 10 days and at 6 months is reported in Tables 3 and 4.

Lower sleep duration, efficiency, and quality on the first night predicted higher levels of paranoia, hallucinations, intrusions and PTSD at 10 days. Lower sleep duration, efficiency, and quality over the first week predicted higher levels of paranoia, hallucinations, intrusions and PTSD at 10 days and at 6 months. Lower sleep duration, efficiency, and quality did not predict grandiosity at either 10 days or 6 months.

Table 3: Ability of first night sleep variables to predict levels of the outcome variables at 10 days and at 6 months.

	Sleep amount on first night		**Sleep efficiency on first night**		**Sleep quality on first night**	
	Standard Coefficient	*P*	Standard Coefficient	*P*	Standard Coefficient	*P*
10 days post assault						
PTSD	-0.50	0.012*	-0.50	0.014*	-0.37	0.012*
Re-experiencing	-0.46	0.021*	-0.56	0.005**	-0.35	0.021*
Paranoia	-0.39	0.054	-0.47	0.019*	-0.29	0.054
Grandiosity	0.24	0.066	0.41	0.041*	0.01	0.066
Hallucinations	-0.39	0.052	-0.38	0.066	-0.32	0.052
6-month follow up						
PTSD	-0.12	0.575	-0.39	0.063	-0.13	0.575
Re-experiencing	-0.13	0.534	-0.30	0.168	-0.14	0.534
Paranoia	-0.29	0.169	-0.52	0.011*	-0.16	0.169
Grandiosity	0.17	0.342	0.38	0.077	0.00	0.342
Hallucinations	-0.25	0.234	-0.41	0.055	-0.06	0.234

*p<0.05, **p<0.01, ***p<0.001

Table 4: Ability of first week average (excluding first night) of sleep variables to predict presence of outcome variables at 10 days and at 6 months.

	Sleep amount first week		**Sleep efficiency first week**		**Sleep quality first week**	
	Standard Coefficient	*P*	Standard Coefficient	*P*	Standard Coefficient	*P*
10 days post assault						
PTSD	-0.40	0.045*	-0.57	0.003**	-0.49	0.012*
Re-experiencing	-0.37	0.066	-0.50	0.012*	-0.50	0.011*
Paranoia	-0.42	0.037*	-0.529	0.008**	-0.50	0.011*
Grandiosity	0.11	0.576	0.07	0.753	0.01	0.958
Hallucinations	-0.39	0.054	-0.658	<0.001***	-0.43	0.030*
6-month follow up						
PTSD	-0.48	0.019*	-0.58	0.003**	-0.41	0.044*
Re-experiencing	-0.44	0.033*	-0.50	0.014*	-0.40	0.049*
Paranoia	-0.63	0.001**	-0.70	<0.001***	-0.46	0.025*
Grandiosity	0.07	0.723	-0.13	0.557	0.08	0.716
Hallucinations	-0.51	0.010*	-0.69	<0.001***	-0.35	0.094

*p<0.05, **p<0.01, ***p<0.001

Discussion

This is the first study to take a detailed look at sleep in the nights after an actual assault and test the ability of sleep variables to predict the occurrence of paranoia, grandiosity and hallucinations, re-experiencing, and PTSD.

The majority of participants reported that their sleep on the first night was worse than normal; this is supported by the average sleep duration being only 3 hours and 58 minutes. Sleep improved over subsequent nights. By the end of the study period 15 (60%) participants had reported at least one night of 'normal' sleep that they felt reflected their sleep prior to the assault. The average sleep duration reported over the week was still relatively low at 5 hours and 35 minutes, by the seventh night average sleep duration was just over 6 hours. The findings indicate that poor sleep occurs for many people throughout the first days after being the victim of an assault.

In line with the study hypothesis, there is a clear pattern of lower sleep duration, efficiency, and sleep quality on the first night predicting higher levels of paranoia, hallucinations, intrusions and PTSD at 10 days with a number of these associations reaching statistical significance. The same pattern was found for sleep measured over the first week (excluding the first night) with lower total sleep duration, efficiency, and quality in the week following the assault predicting the presence of paranoia, hallucinations, intrusions and PTSD 10 days and 6 months following the assault. The finding that poorer sleep in the days after a trauma did not predict grandiosity is also in line with the study hypothesis and with previous studies (Reeve et al., 2018; Taylor et al., 2015).

This pattern of results could be understood within the context that reduced sleep has been shown to increase negative affect (Banks & Dinges, 2007; Reeve et al., 2015). Models of paranoia and hallucinations place anxiety and depression at the centre of the development and maintenance of these experiences (Freeman, 2016; Garety, Kuipers, Fowler, Freeman, & Bebbington, 2001; Waters et al., 2012). In contrast, according to an emotion-congruent account of grandiosity, grandiosity is more likely in the context of positive affect (Smith, Freeman, & Kuipers, 2005). The role of affect is likely to provide an explanatory step in the association between poor sleep in the aftermath of trauma and individual psychotic experiences.

Other mechanisms that may be involved in the association between disrupted sleep in the aftermath of trauma and the development of PTSD, re-experiencing, paranoia and hallucinations, may be the impact it has on perpetuating problematic autobiographical representations and/or exacerbating intrusions (Ehlers & Clark, 2000; Freeman & Garety, 2014) Williams et al, 2007; Brewin et al., 2010; Ricarte et al, 2017). It is feasible that, in the aftermath of trauma, there may be additional, unique factors that impact on the relationship between sleep and psychotic experiences. For example, there is some evidence to suggest that disrupted sleep can disrupt emotional processing, including consolidation of extinction memory (i.e. learning that something that once signalled danger no longer does) (Pace-Schott, Germain, & Milad, 2015). The failure of extinction memory to persist may be one mechanism by which poor sleep in the direct aftermath of trauma may contribute to the development of PTSD, paranoia and hallucinations.

With reference to the contrasting views on the value of sleep in the immediate aftermath of a trauma, the findings of this study clearly indicate that poor sleep is associated with worse outcomes, including for the occurrence of intrusive images. This supports a protective role for sleep in the aftermath of trauma (Goldstein & Walker, 2014; Kleim et al., 2016; Koren et al., 2002; Nishida et al., 2009). Intrusions may actually be lessened by sleep's contribution to memory integration and affective depotentiation (Van Der Helm et al., 2011).

This study provides evidence that sleep disturbance (lower sleep duration, lower sleep efficiency, and lower sleep quality), during the initial days following an assault is associated with the presence and persistence of later PTSD, paranoia and hallucinations up to 6 months later. Kleim et al (2016) argued that sleep may be a viable target for intervention in the early aftermath of an assault that may decrease the likelihood of individuals developing PTSD symptoms. This study goes further to suggest that sleep in the direct aftermath of an assault may also decrease the development and persistence of paranoia and hallucinations. Sleep may prove to be an important, novel, target for recent assault survivors. In the immediate aftermath of an assault, in line with preliminary studies (for review see Fletcher, 2010), there may be a potential role for chemoprophylaxis (e.g. propranolol; Vaiva et al, 2003).

Limitations

The results of this study should be interpreted in the context of a number of limitations. First, the correlational design prevents making assumptions about causal connections.

Sleeping well in the aftermath of an assault may be a characteristic of people who do not go on to develop PTSD, paranoia and/or hallucinations. Future studies employing a manipulation design are needed to examine whether sleep the night after trauma has a causal role in mental health outcomes. The findings of this study however, suggest that in contrast to previous studies (Porcheret et al., 2015), the obvious manipulation would be to increase sleep to aid recovery. An evaluation of the effects of improving sleep in the direct aftermath of trauma on the occurrence of subsequent paranoia, hallucinations and PTSD would be of considerable clinical interest.

A further limitation is that all the participants had been involved in an interpersonal assault and therefore it is unclear if these findings could be generalised to other types of trauma, for example car accidents. Finally, the outcome variables were assessed using self-report questionnaires. While these have been validated in their development against clinical interviews, rater-assessed measures would have strengthened confidence in the results.

Despite these limitations, the pattern of findings is consistent. These results not only add further support to the research that posits sleep in the aftermath of trauma may have a protective role in the occurrence of PTSD symptoms, but it also suggests that sleep in the direct aftermath of an assault may protect against the development of paranoia and hallucinatory experiences. This highlights a potentially important target for intervention for victims of an interpersonal assault.

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Chapter 8

Conclusions.

In this chapter a summary of the findings of the thesis and its limitations will be presented. Based on these, future directions for research and clinical practice will be discussed.

Summary of the thesis

This thesis used longitudinal design to assess the ability of theory derived factors to predict the occurrence of individual psychotic experiences and PTSD in the aftermath of trauma. The findings outlined in this thesis suggest that the processing of a trauma may impact on the occurrence of several outcomes including paranoia and hallucinations. The explanatory power of the PTSD model appears to extend beyond PTSD. The findings suggest a benefit to conceptualising reactions to trauma more broadly and longitudinally

Chapter one set up the context for the work that was subsequently undertaken. The review gave an overview of the existing literature, highlighting the issue that there were few studies which investigated the predictors of independent psychotic experiences in the aftermath of trauma. Specifically, only one longitudinal study was identified and no studies investigating the relationship between trauma and grandiosity were found.

The study reported in Chapter 2 was the first longitudinal study to look developmentally at grandiosity. The results of this secondary analysis suggest that a pattern of overestimating own ability and perception of a hostile external environment in childhood is predictive of higher adolescent grandiosity. The other secondary analysis, reported in Chapter 3, is the first study to explore the role that processing of a recent trauma has on the occurrence of

hallucinations. It was found that the way in which a trauma is processed may partly determine the occurrence and persistence of hallucinations.

The first chapters fed into the development of the main empirical study, the methodology which is reported in Chapter 4. This was the first study to investigate prospectively PTSD and individual psychotic experiences (paranoia, grandiosity and hallucinations) in the months after an interpersonal assault. It looked at the occurrence of these different outcomes, how distinguishable they were from each other, and the shared and differential factors that predict the problems persisting. Chapter 5 reported on the cross-sectional data from the assessment 10-days post assault. The results indicate that psychotic experiences, as well as PTSD, may not be uncommon in the aftermath of an assault. There was also evidence found that there may be content and thematic correspondence between trauma and hallucinatory experiences at this early time point. Chapter 6 reports on the investigation into the ability of the theory derived factors to predict the different outcomes. It was clear that, with the exception of grandiosity, differential prediction was difficult to identify.

The last empirical chapter picked up on the contentious issue of sleep in the aftermath of trauma. Lower sleep amount, lower sleep efficiency and lower sleep quality were associated with subsequent occurrence of paranoia, hallucinations and PTSD. The results support a protective role for sleep in the direct aftermath of trauma.

Limitations

Each chapter covers the specific limitations linked with the study it reports on. The discussion below refers to more general limitations.

A methodological limitation identified is the use of self-report measures. It is likely that rater assessed measures would have strengthened confidence in the findings, however, the self-report questionnaires (for the most part) have been validated in their development against clinical interviews so the results are unlikely to have changed significantly. In addition, there were no pre-trauma measures of the outcomes. As a result, despite attempts to capture pre-trauma levels (e.g. retrospective reports), it cannot be determined that the interpersonal trauma led to an increased in the outcome (e.g. paranoia, hallucinations or grandiosity). The main ways of overcoming this (e.g. natural experiment, or recruiting individuals likely to come into contact with traumatic material) were not possible in the current study.

A large number of statistical tests were carried out. It was decided that the significance levels would not be altered for multiple testing (e.g. Bonferroni). In line with Perneger (1998) it was felt that simply describing what tests of significance have been performed, and why, is the best method of dealing with multiple comparisons.

There are limitations to the conclusions that can be drawn from this thesis. Due to the complexity of the relationships between trauma and psychotic experiences it was necessary for this thesis to have a relatively narrow focus. A consequence of this was that, while individual positive psychotic experiences (particularly paranoia, grandiosity and

hallucinations) were included, individual negative experiences, such as anhedonia, avolition and flat affect, were not.

The rationale for focusing on individual psychotic experiences as opposed to diagnostic categories such as schizophrenia was covered in Chapter 1. In summary, factor analytic studies have demonstrated the independence of the individual psychotic experiences (Ronald et al., 2014; Wigman et al., 2011) and different factors associated with different experiences (e.g. Garety et al., 2013) have been found. The success of the single psychotic experience approach in allowing detailed specification of mechanisms has been evidenced in the literature (e.g. Freeman, 2016). There are two main reasons for focusing on positive versus negative psychotic experiences. First, the association between trauma and positive psychotic experiences is more established than for negative psychotic experiences (Bentall et al., 2014). Whilst a phenomenological overlap between negative psychotic experiences and the avoidance and numbing symptoms of PTSD has been identified, the current findings on a link between trauma and negative psychotic experiences are mixed (Lysaker & LaRocco, 2008; Resnick, Bond, & Mueser, 2003; van Dam et al., 2015). Second, the availability of specific models that explain the individual positive psychotic experiences, particularly paranoia and hallucinations, contrasts with the lack of single experience models for negative psychotic experiences.

Another limitation is the primary focus on cognitive psychological models. Cognitive theories represent just one level of explanation. There are also biological, neurodevelopmental and computational theories that could also be applied to the

relationship between trauma and psychotic experiences and which represent different but perhaps complementary levels of explanation. Whilst the focus on cognitive psychological models was based on a necessity of limiting the scope of the thesis, it was also because reactions to trauma are most often conceptualised within cognitive models (e.g. Ehlers & Clark, 2000). It was felt that a matching focus on cognitive models of trauma reactions and cognitive models of individual psychotic experiences would be the most effective approach for investigating the relationship between trauma and individual psychotic experiences.

There are conceptual difficulties in researching the inter-relationships between psychotic experiences, trauma exposure and PTSD symptoms. PTSD symptoms and psychotic experiences are conceptually and phenomenologically similar. This may result in an inflation of any correlations and makes it hard to tease apart the different outcomes and their unique predictors.

It should be noted that the very act of assessing the different experiences may have impacted on the natural course of their development. By providing the opportunity for participants to reflect on their experiences and by unintentionally normalising some of their more unexpected experiences (e.g. hallucinations), this study may have impacted on the very responses it was measuring. This is suggested by the following message from one of the participants regarding their assessments:

Thank you so much for everything you have done. If it wasn't for our talks I wouldn't have been able to get over this so quick. Thankyou :)

However, it should be noted that monitoring of PTSD symptoms has shown limited success in reducing PTSD symptoms (Ehlers et al., 2003).

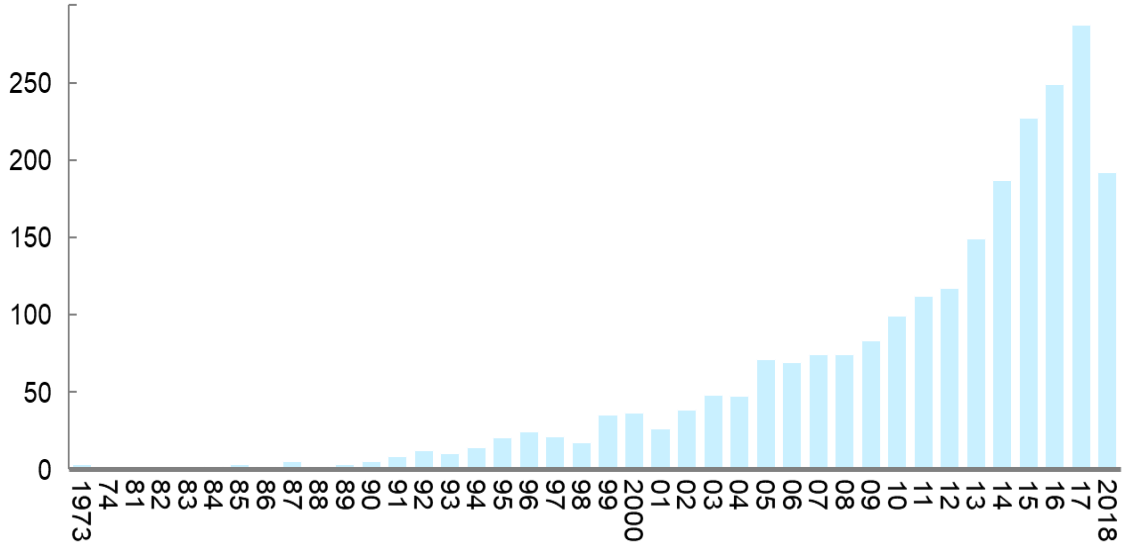
Excepting the odd quote and the brief reports on hallucination and nightmare content, there is a relative lack of participants' voices. An inclusion of a qualitative study would have provided different data on the experiences. Increasing patient input might also have allowed additional theoretical mechanisms linking trauma and psychotic experiences to be identified. Voices of individuals with lived experience has been invaluable in understanding psychotic experiences however, it has been less widely included in relation to trauma and individual psychotic experiences (Williams, 2016). Going forward it would be helpful to get participant input on the acceptability of any potential intervention.

A final limitation identified is the lack of focus on post-traumatic growth. Studies have shown that some individuals exposed to trauma report positive psychological changes in the aftermath. This might include increased levels of well-being, psychological growth and sense of coherence (Veronese & Pepe, 2017). Assessing these more positive reactions to trauma is an important future area and research in this domain may help identify protective factors.

Future directions

In recent years there has been increased interest in understanding the relationship between trauma and individual psychotic experiences as evidence in the increasing number of publications.

Figure 1: Publications per year



Whilst differential prediction of the varying reactions to trauma has been a focus of this thesis, the picture is far from complete. With the exception of grandiosity, little evidence of differential prediction has been found. Despite this, future research should ensure that individual psychotic experiences and PTSD in the aftermath of trauma are measured, as it is likely that there remains undiscovered differential factors between them.

Regarding the data already available, advances in probabilistic graphical models in the form of Directed Acyclic Graphs (DAGS) may allow researchers to better ascertain which

casual patterns best fit the cross-sectional datasets (Moffa et al. 2017). DAGS are the representation of Bayesian networks and model the overall dependence structure of multiple variables. While it should be noted that causal discovery through DAG remains controversial (Dawid, 2010), it has been argued that the probabilistic DAG-based inference is capable of pointing to the most likely directional links between multiple variables, thereby locating them in a putative casual cascade. Applying DAG discovery to longitudinal data may illuminate the characteristics of specific causal relationships, in particular because it may allow the identification of the feedback loops.

Going forward, there is huge scope for these findings to further bridge the gap between work in the area of PTSD and work in the areas of the individual psychotic experiences. The highlighted shared predictors of paranoia, hallucinations and PTSD suggest that a more transdiagnostic approach is viable and that treatments found to be effective for the reduction of one experience may have benefit in targeting reduction of other experiences. An alternative research design for future studies would be to move beyond detection of association and use designs that manipulate the variable of interest and examine the impact on the different reactions to an assault (Kendler & Campbell, 2009). There are a variety of predictors identified in this thesis, e.g. sleep and worry, that are potentially modifiable and for which effective treatments are already in use.

It is necessary to recognise the historical challenges of applying psychotherapy in the context of some mental health setting where there can be a ‘clash of philosophy’ with the predominant medical model (Clarke, 2009, p.7). Despite the growing evidence, there

remains resistance to the notion of trauma playing a key aetiological role in mental distress, including psychotic experiences. Instead, mental health difficulties are often viewed as a scientific, medical and pharmacological problem. In addition, many core principles of trauma specific and trauma informed approaches, such as developing normalizing understandings of distressing experiences and collaboratively planning/undertaking interventions, may be fundamentally at odds with the traditional medical approach.

This thesis highlights the need to take a more trauma informed approach. It has been suggested that best practice is to apply universal trauma precautions to all (Elliott et al, 2005). It could be argued that an absence of understanding about the impact of trauma is the equivalent of denying the existence and significance of trauma in an individual's life and leaves the service open to inadvertently creating an unsupportive environment. It is important to reflect on power differentials and to highlight the re-traumatising aspects of certain practices such as seclusion and restraint. An understanding of the psychological impact of trauma on survivors also encourages an understanding of each individual in the context of their life experience and cultural background. Many patients regard traumatic life experiences as an important cause of their mental distress (Read et al, 2013). There is evidence that disclosure and talking about traumatic experience can be beneficial and support recovery (Pietruch & Jobson, 2012). Encouraging an open dialogue about traumatic events helps to create an environment where patients' experiences are acknowledged, symptoms of mental distress are normalised and self-understanding is stimulated. Furthermore, the provision of this type of approach by first line responders (e.g. A&E staff, police) could prevent catastrophic interpretations of intrusions, rectify

faulty self and social knowledge and make the formation of culturally unacceptable interpretations less likely.

It is worth noting that whilst this thesis has focused on interventions in the immediate aftermath of trauma, there is ongoing work looking at preventative intervention. For example, studies identifying targets for resilience interventions in populations exposed to regular trauma (e.g paramedics) (Wild et al., 2016). It is felt that the findings in this thesis are complimentary to this work. Of the predictors of psychotic experiences and PTSD in the aftermath of trauma identified in this thesis a number of them may be present pre-trauma (e.g. worry). They are therefore also potential targets of preventative intervention.

Finally, as noted in the limitations, more positive consequences of trauma exposure were not examined. The idea that some individuals can experience positive effects following trauma has become more of a focus in the last few years and is discussed in the literature under a variety of labels including 'benefit finding', post-traumatic growth' and 'stress related growth'(Park & Helgeson, 2006). Studying adaptive as well as maladaptive predictors and processes will help disentangle one from the other. Work in this area also highlights the possible benefits of not only focussing on the reduction of negative trauma reactions, but on encouraging positive changes in the aftermath of trauma.

Psychology has an important role in investigating how trauma impacts on a range of outcomes. It is hoped that the findings of this study can contribute, not only to a better understanding of the predictors of the different trauma reactions, but also to the

development of more targeted interventions that might be of use to victims of interpersonal trauma.

In conclusion, this thesis contributes to the literature by demonstrating that in the direct aftermath of trauma individual psychotic experiences as well as PTSD are not uncommon. Furthermore, with the exception of grandiosity, these different outcomes appear to be predicted by a strikingly similar pattern of factors. This posits that the model traditionally used to account for PTSD may have greater explanatory power than previously recognised. The findings support a broadening of the concept of typical trauma reactions and indicate that there may be benefits to a more transdiagnostic approach to intervention.

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Predictors of individual psychotic experiences after trauma: a series of longitudinal studies

Appendices

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Appendix 2.1 Publication 1

Grandiosity in adolescence: childhood predictors

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Webster, Neil Harvey, and Rachel Ogden.

Background: Grandiosity is an under-researched delusion type.

Aims: To identify childhood predictors of adolescent grandiosity.

Method: A community sample of 4997 adolescent twins self-reported on their grandiose thoughts at age 16. They had completed measures of self-perceived ability, academic achievement, cognitive ability, parental discipline and life events at age 9 and for bullying victimisation, depression, and height at age 12. Assessments of ability and achievement were done at age 16.

Results: There was appreciable endorsement of grandiosity items at age 16. A substantial subgroup of the adolescents, ranging from 8.6% to 31.3% endorsed the grandiosity items with "a great deal" or "totally". Grandiose ideas were not significantly associated with objective measures of ability or achievement taken at age 9 or age 16. Higher perceived ability and reporting being smacked/slapped by parent at age 9 and reporting peer victimisation at age 12 were associated with adolescent grandiose ideas.

Conclusions: Grandiosity is reliably measured in adolescents in the community, capturing self-perceived grandeur that does not align with objective ability. Children endorsing grandiose ideas were overestimating individual success, while perceiving a harsh external environment. It may be that grandiose ideas are a strategy to deal with difficult circumstances.

Declaration of interest: There is no conflict of interest.

Grandiosity is characterised by unfounded or exaggerated ideas of exceptional abilities, knowledge, or power. Factor analytic studies have demonstrated the independence of grandiosity from other psychotic experiences (Garety *et al.*, 2013). However, grandiosity has rarely been a specific focus of research, particularly in comparison to paranoia. There is a spectrum of severity of grandiose ideas within the general population (van Os *et al.*, 2003), where grandiose delusions, typically seen in psychotic disorders, represent the severe end of this dimension. A recent behavioural genetics study assessing degree of grandiose ideas in five thousand adolescent twin pairs found heritability to be around 44%, with the extent of genetic contribution to causation similar across the spectrum of severity (Zavos *et al.*, 2014). This study indicates a significant role for environmental factors in the occurrence of grandiosity. In this paper, we analysed childhood data collected on this cohort to identify early environmental and individual predictors of later grandiosity.

One of the most robust environmental risk factors for the development of psychotic experiences is childhood adversity and trauma (Read *et al.*, 2005; Bendall *et al.*, 2013). Grandiosity may be one strategy that young people use to cope with difficult circumstances. We therefore tested whether life events and bullying victimisation in childhood predicted later reports of grandiosity specifically. Grandiose ideas are unlikely to come from nowhere. They may build upon, may be an exaggeration of, existing raised areas of self-esteem, and perceived strengths (6,7). We therefore tested whether higher perceptions of own ability in childhood predicted later grandiosity. Furthermore, an established correlate of social rank is height. Taller adults are more likely to have higher social esteem and report higher levels of well-being (Judge and Cable, 2004; Carrieri and De Paola, 2012). As a result, we included measures of height and pubertal onset. To assess genuine grandiosity with greater precision we repeated the analyses throughout, controlling for markers of objective ability. In addition,

it has been found in general adolescent population cohorts that males have higher levels of grandiosity that females (Wigman *et al.*, 2011) and therefore, we also tested whether the childhood predictors differed by gender.

Methods

Participants

The Longitudinal Experiences and Perceptions (LEAP) study (Ronald *et al.*, 2014) is part of the Twins Early Development Study (TEDS) which comprises a community sample of monozygotic and dizygotic twins born in England and Wales between 1994 and 1996 (Haworth, Davis and Plomin, 2013). 10,874 families from TEDS were invited to take part in the LEAP study. One twin per pair (selected randomly for birth order to avoid birth order effects) was included for psychometric analyses and only those with complete grandiosity scores were included, giving a final sample of 4,997.

Individuals were excluded (n=327) if they did not provide consent at first contact (when TEDS was started), if they had a severe medical disorder, had experienced severe perinatal complications or if zygosity was unknown. Exclusions for medical disorders included individuals with cystic fibrosis, cerebral palsy, fragile X syndrome, autism spectrum disorder, and those with chromosomal abnormalities such as Down Syndrome. Participating and non-participating families were largely similar with regard to sex, ethnicity, and mother education level. The non-participating families had higher scores on childhood psychopathology than the participating families, although the difference was very small (Ronald *et al.*, 2014).

Measures

Grandiosity: Grandiosity was assessed with the grandiosity subscale of the Specific Psychotic Experiences Questionnaire (SPEQ) (Ronald *et al.*, 2014). The full list of items can be seen in table 1. Participants were asked how much they agreed with eight statements, based on their thoughts and feelings over the last month. Responses were given on a 4-pont scale: *"Not at all"* (0), *"Somewhat"* (1), *"A great deal"* (2), *"Completely"* (3). The SPEQ was developed by selecting and combining items from existing scales for adults and adapting wording to be age appropriate and by clinical experience. The grandiosity subscale includes three items from the 'Myself' sub-scale of Cognition Checklist for Mania-Revised (CCL-M-R) (Beck *et al.*, 2006), two items from Peters et al. Delusions Inventory (PDI) (Peters *et al.*, 2004), and three items developed by the authors from clinical case studies. The age appropriateness of items was ensured by obtaining expert clinical opinion and by piloting with this age group (Ronald *et al.*, 2014). The grandiosity subscale shows good internal consistency (Cronbach's alpha = 0.85) and stability across a nine-month interval (r = 0.66). Validity was assessed in terms of agreement with a second known measure of adolescent Psychosis-LIKe Symptoms the PLIKS (Zammit *et al.*, 2011). The grandiosity subscale showed a significant positive correlation with the PLIKS score (r =0.27, p<0.001) (Zammit *et al.*, 2011; Ronald *et al.*, 2014).

Adolescents with a family history of schizophrenia score significantly higher on the grandiosity scale than those without a family history of schizophrenia (Zavos *et al.*, 2014).

Perceived ability: Children's perceptions of their own abilities was assessed using the Perceived Ability in School Scale (Spinath *et al.*, 2006). The scale contains 12 items, three items for English, three for mathematics, three for science, and three for physical education

(PE). The child was asked *"How good do you think you are"* about the different activities listed in the UK's National Curriculum (for full list see appendix i). Responses were on a 5-point scale from *"Very good"* to *"Not at all good".* The summed total was used, with lower scores indicating higher perception of ability.

Perceived ability for individual subjects: Children's reports of their perceived abilities in English, mathematics, science, and physical education at age 9 years were created by summing standardised scores for the three skill areas within their respective subjects.

Parental discipline: Parents were asked to rate how often ('*often', 'sometimes', 'rarely or never'*) they used the following methods when their child misbehaves: *'Give a smack'* and *'Tell him/her off or shout at him/her'*. Children were asked to rate how true it was (*'very true', 'quite true', not true'*) that, when they misbehaved, they were '*smacked or slapped'* and *'told off or shouted at'*.

Bullying Victimisation: Bullying victimisation was assessed at the age of 12 years using the Multidimensional Peer Victimisation Scale (Mynard and Joseph, 2000). Consisting of 16 items, this self-report measure has been shown to be a reliable and valid measure of bullying victimisation (Mynard and Joseph, 2000) , encompassing physical abuse, verbal abuse, social manipulation, and property damage.

Life events: Parents were asked about *'any changes or events that have had an impact on the family'* in the past two years such as, divorce/separation of natural parents, death of a sibling.

Affect: Depressive symptoms were measured at 12 years using the Short Moods and Feelings Questionnaire (SMFQ*)* (Angold *et al.*, 1995). This is an 11-item self-report measure assessing how often depressive symptoms occurred in the past fortnight and is suitable for use in adolescents (Brooks and Kutcher, 2001). A total symptom score was used (Angold *et al.*, 1995).

Puberty and height: Pubertal status was assessed using the Petersen Pubertal Development Scale (Petersen *et al.*, 1988), a 9 item self-report measure. Height was self-reported

Objective measures

Academic achievement: Teachers rated children's ability on National Curriculum criteria using their knowledge of the child's achievement over the academic year (14). Responses were on a 5 point scale from *"Very good"* to *"Not at all good".* The summed total was used, with lower scores indicating higher perception of ability.

Parent's perception of their child's abilities: Parent's perceptions of their children's abilities was assessed using the Perceived Ability in School Scale (Spinath *et al.*, 2006).

Cognitive ability at age 9: Children completed the Vocabulary and General Knowledge Multiple-choice tests from the Wechsler Intelligence Scale for Children, third edition (WISC-III-PI) (Kaplan *et al.*, 1999) were completed by the children under the supervision of the

parent (guided by an instruction booklet). The Vocabulary Multiple Choice subtest of the WISC requires the child to retrieve and recognise word meaning (e.g., "What does transparent mean?"). This subtest encompasses 20 out of the 30 original WISC items with a maximum raw score of 40. The information Multiple Choice subtest assesses the child's ability to retrieve and recognise learned information (e.g., "What must you do to make water boil?"). It includes 18 of the 30 original WISC items yielding a maximum raw score of 18.

IQ at 16

Non-verbal cognitive ability was tested with a version of the Ravens Matrices test (Raven, Raven and Court, 1998). The test consisted of incomplete patterns and participants were asked to identify the missing part of the pattern from a choice of 8 possible missing parts. There were 30 items giving a total possible score of 30 correct answers. Verbal cognitive ability was assessed using a web test based on the Mill Hill vocabulary scale (Raven, Raven and Court, 1988). The test consists of 33 multiple choice questions. In each question, a single word is presented. The participant is asked to choose the response, out of a possible 6 options, that they think is closest in meaning to the word. Total scores were out of 33.

Analyses

All analyses were conducted using R (version 3.2.4) (R Development Core Team, 2016) and two-tailed p-values are reported. The first stage was to provide a description of levels of grandiose ideas in the participant group at age 16. Key tests of longitudinal relationships, with grandiosity as the main outcome, were carried out. A log transformation of the grandiosity outcome was used to improve the normality of the residuals. First, univariate relationships were tested between grandiosity and the variables of interest (Miller and

Chapman, 2001). Separate multivariate analyses were then carried out in order to adjust for cognitive ability and academic achievement at age 9, and IQ at age 16. To determine if predictors of grandiosity were moderated by gender, the same univariate and multivariate relationship as above with interaction term between gender and the variable of interest and the main effect for gender in each relationship was also considered. This allows for separate estimates by gender of the relationship between the variable of interest and grandiosity.

Results

Demographic details

The adolescents had a mean age of 16.32 years. 2219 (44.4%) of the participants were male and 2777 (55.6%) were female. Nearly all participants (94%) identified their ethnicity as white.

Presence of grandiosity in adolescence

The number and percentage of participants endorsing each individual item of the SPEQ grandiosity subscale are displayed in Table 1. A substantial subgroup of the adolescents, ranging from 8.6% ("I have a special mission") to 31.3% (I have many great ideas") endorsed the grandiosity items with "a great deal" or "totally". Boys endorsed significantly more grandiose items than girls with mean total scores of 6 and 4.8 respectively.

Table 1*: The number of participants (%) endorsing each of the items in the SPEQ grandiosity subscale.*

Statement	Never n (%)	Somewhat n (%)	A great deal n (%)	Totally n (%)	Mean (S.D)
I have a special mission	3378 (68.6)	1188 (23.7)	275 (5.5)	155 (3.1)	0.44 (0.73)
I have many great ideas	852 (17.1)	2579 (51.6)	1234 (24.7)	331 (6.6)	1.21 (0.80)
Everything I do is great	2209 (44.2)	2171 (43.5)	490 (9.8)	126 (2.5)	0.71 (0.74)
I am, or am destined to be someone very important	2279 (45.6)	1859 (37.2)	605 (12.6)	253 (5.2)	0.77 (0.85)

I am a very special or unusual person	2251 (45.1)	1806 (36.1)	656 (13.1)	283 (5.6)	0.79 (0.88)
I have special abilities that others do not	3153 (63.1)	1235 (24.7)	439 (8.8)	169 (3.4)	0.52 (0.79)
I am much more unique than anyone else	3105 (62.1)	1269 (25.4)	434 (8.7)	188 (3.8)	0.54 (0.80)
Everyone is going to know about me because of my greatness	3706 (74.1)	930 (18.6)	210 (4.2)	150(3.2)	0.36 (0.70)

Predicting grandiosity at 16

The ability of the individual variables to predict self-reported grandiosity at age 16 years is reported in Table 2. None of the objective measures of ability (academic achievement, cognitive ability, and parent perceptions of ability at 9 and non-verbal IQ at age 16) were significantly positively associated with grandiosity reported in adolescence. Verbal IQ at 16 was negatively associated with grandiosity. Male gender, higher perceptions of own ability and reports of smacking/slapping by parents at age 9 and reports of peer victimisation and increased height at age 12 were all associated with the presence of grandiose ideas in adolescence.

Table 2*: Childhood predictors of grandiosity*

SEE BELOW

Controlling for cognitive ability

To assess genuine grandiosity with greater precision, the predictor variables were assessed again taking account of cognitive ability measured at age 9 (see Table 3). Many of the same variables remained significantly associated. Height and reports of being socially manipulated, when accounting for cognitive ability, were no longer significant predictors. The same pattern of associations was found when accounting separately for objective measures of academic achievement at age 9 and verbal and non-verbal IQ measured at age 16.

Table 3: *Childhood predictors of grandiosity adjusted for cognitive ability at age 9.*

Cognitive ability at 9 significantly correlated with non-verbal IQ at 16 (r=0.24, $p<0.001$) and verbal IQ at 16 (r=0.34, $p<0.001$). Cognitive ability also correlated with teachers' reports of academic achievement (r=0.34, $p<0.001$), parents' reports of ability (r=0.36, $p<0.001$) and with children's reports of ability (r=-0.27, $p<0.001$).

Controlling for Gender

The moderation by gender of the relationship between the variable of interest and grandiosity was tested. However, all interaction terms were non-significant (see supplementary material Table 1). Therefore, only linear regression models which adjusted for gender as a main effect were considered (see Table 4). As before, higher perceived ability at age 9, reports of peer victimisation, and reports of smacking/slapping by parents were all associated with the presence of grandiose ideas in adolescence. Earlier onset of puberty was also significantly predictive once gender was taken into account.

Table 4: Childhood predictors of grandiosity adjusted for gender.

Discussion

This is the first study to test a range of childhood predictors of adolescent grandiose ideas. It tested longitudinally the predictive relationship of a number of factors assessed in childhood, including perceived academic ability, parental discipline, bullying victimisation, life events, depression, height, and puberty onset. Within the large sample there was a relatively high frequency of reported grandiose experiences, similar to those found in other cohort-based studies, for example Wigman et al (Wigman *et al.*, 2011), who found prevalence rates of 12% and 7.7% in two separate cohorts. Endorsement of the grandiosity items was not significantly correlated with more objective measures of ability taken at age 9, such as cognitive ability scores and teacher perceptions of academic and sporting achievement. In addition, grandiosity was negatively correlated with verbal IQ measured at 16. This supports the idea that the SPEQ grandiosity sub-scale is not simply measuring actual ability. The presence of grandiose ideas allowed for the examination of the predictive ability of childhood factors. Findings suggest that being male, having a higher perceived ability in mathematics, science and physical education, and perceptions of being disciplined with smacks/slaps by a parent at age 9 and of peer victimisation at age 12 may be contributing factors in the occurrence of grandiose ideas in adolescence. Speculatively it could be that grandiose thoughts are a strategy for coping with a perceived, or actual, hostile environment.

One of the most prominent predictors of endorsement of grandiose ideas in adolescence was being male. This supports previous findings of a gender imbalance in the reporting of grandiose ideas in adolescents and college student cohorts (Wigman *et al.*, 2011; Grijalva *et al.*, 2014). However, this is not reflected in the grandiose delusions literature where there is

no evidence that rates of grandiose delusions differ between men and women (de Portugal *et al.*, 2010). It is feasible that at the less severe end of this spectrum societal ideas of masculinity and femininity play a more prominent role, impacting on whether individuals report grandiose ideas. Thus, the difference is a social phenomenon, a result of females adopting a more modest self-presentation style than males (Zook and Russotti, 2013). Alternatively, the lower rates of grandiosity may be a reflection of the fact that females experience more depression and anxiety (Freeman and Freeman, 2014), though notably depression measured at age 12 in this study was not negatively associated with grandiosity at age 16.

We predicted that higher self-reports of perceived ability at 9 years of age would be associated with adolescent grandiose ideas. This was the case, with only the child's perceived ability, and not objective measures of achievement or ability, being a predictor of grandiose thoughts. This association remained even after separately adjusting for cognitive ability, academic achievement, IQ and gender. This suggests a discrepancy between the child's view of their own abilities and more objective measures of achievement. Adolescents who endorse grandiose ideas at age 16 overestimated their abilities at age 9, indicating that grandiose thinking might already be present at this earlier time point.

This overestimation of own abilities appears to be coupled with a view of the external environment as more hostile. Adolescents with higher grandiosity reported increased rates of smacking/slapping by parents at age 9 and increased bullying victimisation at age 12. These results suggest a potential role for perceived physical victimisation as a factor in the development of grandiose ideas. This is consistent with a cross-sectional study (18) that

found a relationship between physical abuse and higher levels of grandiosity in ultra-high-risk individuals of similar age and with previous studies that have highlighted the importance of physical abuse in the development of positive psychotic symptoms (Rubino *et al.*, 2009).

This pattern of children overestimating their own abilities together with reports of a more hostile environment, raises the issue of whether grandiose thoughts play a role in helping some children cope with perceived, or actual, harsh external environments. There is evidence to suggest that young children tend to overestimate their own abilities but that their judgements become more accurate over time (Yussen and Levy, 1975; Spinath and Spinath, 2005). It may be that for some children, overestimating their own abilities plays an important role in helping them to deal with perceived hostile social environments. As a result, the tendency to overestimate ability in these individuals does not diminish in later childhood and forms the foundations for grandiose thoughts in adolescence. This study however, is not able to test this hypothesis.

Limitations

There are a number of limitations. Firstly, grandiosity was not assessed at the earlier time points. This means that original levels of grandiose thinking could not be controlled for. While the design of the study is longitudinal it is unable to determine causality. In the same way that inherited characteristics may make individuals jointly vulnerable to both bullying and feelings of paranoia (Shakoor *et al.*, 2015) the factors associated with grandiosity may not be causal but instead be linked via a shared genetic propensity. Finally, it should be noted that all participants were a twin. Whilst previous studies have found no differences between twins and non-twins in the prevalence rates of bullying (Arseneault *et al.*, 2006) or behaviour

problems (Gjone and Novik, 1995) it is possible that being a twin may impact on feelings of grandiosity. For example, by the increased social closeness that being a twin can bring (Johnson *et al.*, 2002). Importantly however, this study demonstrates that grandiosity can be reliably measured in adolescents in the community, capturing self-perceived grandeur that does not align with objective ability as measured here. It is hoped that future research will continue to explore the relationship between childhood factors and later endorsement of grandiose ideas

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Table 2*: Childhood predictors of grandiosity*

	Univariate			
	Coefficient	Standard Error	p-value	R^2
Objective measures				
Academic achievement at 9 (Teacher)	0.003	0.101	0.302	0.000
Good at total at 9 (Parent)	0.013	0.027	0.627	0.000
Measure cognitive ability at 9	0.001	0.002	0.538	0.000
Verbal IQ at age 16	-0.008	0.003	0.012	0.011
Non-verbal IQ at 16	-0.003	0.004	0.439	0.000
Variables				
Perceived ability at 9 (Child report)				
Perceived academic ability total	0.123	0.028	<0.001	0.008
Perceived ability at English	0.020	0.024	0.404	0.000
Perceived ability at Maths	0.090	0.017	<0.001	0.014
Perceived ability at Science	0.054	0.023	0.0159	0.004
Perceived ability at PE	0.102	0.024	<0.001	0.009
Parental discipline at 9				
Smacking (Child report)	0.083	0.021	0.002	0.004
Smacking (Parent report)	0.084	0.043	0.493	0.001
Shouting (Child report)	0.032	0.028	0.257	0.000
Shouting (Parent report)	-0.007	0.031	0.828	0.000
Life event at 9 (Parent report)	0.037	0.078	0.259	0.000
Victimisation at 12 (Child report)				
Physical	0.034	0.006	<0.001	0.008
Verbal	0.015	0.005	0.001	0.002
Social manipulation	0.011	0.005	0.047	0.0008
Property	0.024	0.007	<0.001	0.0033
Depression at 12 (Child report)	0.004	0.004	0.296	0.000
Height at 12 (Child report)	0.004	0.002	0.012	0.002
Puberty at 12 (Child report)	0.037	0.022	0.087	0.000
Gender	0.211	0.022	<0.001	0.018

Table 3: *Childhood predictors of grandiosity adjusted for cognitive ability at age 9.*

Covariate	Coefficient	Standard Error	p-value	R^2
Objective measures of ability				
Good at total (Parent)	0.003	0.029	0.910	0.001
Academic achievement (Teacher)	0.021	0.031	0.501	0.001
Verbal IQ at 16	-0.009	0.004	0.020	0.003
Non-verbal IQ at 16	-0.004	0.005	0.387	0.001
Variables				
Perceived ability at 9 (Child report)				
Perceived academic ability total	0.124	0.029	<0.001	0.008
Perceived ability at English	0.016	0.024	0.516	0.001
Perceived ability at Maths	0.092	0.017	<0.001	0.013
Perceived ability at 9 Science	0.052	0.022	0.022	0.001
Perceived ability at 9 PE	0.102	0.024	<0.001	0.008
Parental discipline at 9				
Smacking (Child report)	0.086	0.029	0.002	0.004
Smacking (Parent report)	0.085	0.042	0.047	0.001
Shouting (Child report)	0.031	0.028	0.274	<0.001
Shouting (Parent report)	0.002	0.031	0.940	0.001
Victimisation at 12 (Child report)				
Physical	0.037	0.009	<0.001	0.007
Verbal	0.015	0.007	0.025	0.002
Social manipulation	0.010	0.009	0.239	0.000
Property	0.033	0.010	0.001	0.005
Life event at 9 (Parent report)	0.033	0.033	0.311	<0.001
Depression at 12 (Child report)	0.005	0.006	0.425	0.001
Height at 12	0.002	0.002	0.425	0.001
Puberty at 12 (Child report)	0.005	0.030	0.878	0.001

Table 4: Childhood predictors of grandiosity adjusted for gender.

Covariate	Coefficient	Standard Error	p-value	R^2
Objective measures of ability				
Academic achievement (Teacher)	0.023	0.028	0.41	0.017
Good at total (Parent)	0.007	0.027	0.778	0.020
Measure cognitive ability at 9	0.000	0.002	0.858	0.018
Verbal IQ at 16	-0.009	0.003	0.007	0.03
Non-verbal IQ at 16	-0.006	0.004	0.171	0.027
Variables				
Perceived ability at 9 (Child report)				
Perceived academic ability total	0.110	0.028	<0.001	0.025
Perceived ability at English	0.031	0.024	0.183	0.019
Perceived ability at Maths	0.07	0.017	<0.001	0.027
Perceived ability at Science	0.052	0.022	0.021	0.021
Perceived ability at PE	0.097	0.024	<0.001	0.026
Parental discipline at 9				
Smacking (Child report)	0.069	0.025	0.010	0.022
Smacking (Parent report)	0.070	0.042	0.099	0.021
Shouting (Child report)	0.022	0.028	0.438	0.019
Shouting (Parent report)	0.016	0.031	0.603	0.019
Victimisation at 12 (Child report)				
Physical	0.021	0.006	<0.001	0.025
Verbal	0.009	0.005	0.047	0.023
Social manipulation	0.014	0.005	0.008	0.023
Property	0.017	0.006	0.008	0.023
Life event at 9 (P)	0.036	0.032	0.271	0.020
Depression at 12	0.004	0.004	0.347	0.021
Height at 12	0.004	0.002	0.009	0.024
Puberty at 12	0.105	0.022	<0.001	0.028

Supplementary Table 1: Interactions with gender.

Covariate	Coefficient	Standard Error	p-value
Objective measures of ability			
Academic achievement (Teacher)	0.011	0.057	0.841
Good at total (Parent)	0.024	0.054	0.655
Measure cognitive ability at 9	-0.001	0.005	0.827
Verbal IQ at age 16	0.005	0.007	0.466
Non-verbal IQ at age 16	0.007	0.009	0.387
Variables			
Self perceived academic ability	-0.003	0.005	0.581
Perceived ability at 9 (c) – English	0.035	0.048	0.468
Perceived ability at 9 (c) – Maths	-0.001	0.035	0.978
Perceived ability at 9 (c) – Science	0.062	0.045	0.168
Perceived ability at 9 (c) – PE	-0.008	0.049	0.875
Parental discipline at 9			
Smacking (c)	-0.024	0.054	0.658
Smacking (parent)	-0.022	0.085	0.793
Shouting (c)	-0.062	0.057	0.274
Shouting (parent)	0.041	0.062	0.516
Victimisation at 12 (c)- Physical	0.008	0.012	0.525
Victimisation at 12 (c)- Verbal	0.015	0.009	0.120
Victimisation at 12 (c)– social manipulation	0.007	0.011	0.482
Victimisation at 12 (c)– property	0.013	0.013	0.335
Life event at 9 (P)	0.057	0.065	0.386
Depression at 12	0.009	0.008	0.240
Height at 12	-0.002	0.003	0.555
Puberty at 12	0.002	0.048	0.964

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Hallucinations in the months after a trauma: An investigation of the role of cognitive processing of a physical assault in the occurrence of hallucinatory experiences

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ABSTRACT

The role that cognitive processing of a recent trauma has in the occurrence of hallucinations has not been examined longitudinally. This study investigated trauma-related cognitive predictors of hallucinations in the months following an interpersonal assault. Four weeks after treatment at an emergency department for interpersonal assault injuries, 106 participants were assessed for peri-traumatic cognitive processing, cognitive responses to trauma memories, negative beliefs about the self, Posttraumatic-stress disorder (PTSD), and hallucinatory experiences. Hallucinatory experiences were reassessed six months later. Cognitive processing during trauma (lack of self-referential processing, and dissociation), beliefs about permanent negative change, self-vulnerability, and self-blame and cognitive response styles (thought suppression, rumination, and numbing) were significant predictors of later hallucinations. The way in which trauma is processed may partly determine the occurrence of hallucinations.

1. Introduction

Many clinical researchers consider childhood trauma as a possible contributory factor in the occurrence of hallucinations, based upon substantial evidence of an association found in retrospective studies (e.g. Read et al., 2005). An alternative, though complementary, perspective suggests that exposure to more proximal 'life events', recent negative occurrences that bring about a substantial change in personal circumstances for the worse, increases the risk in the subsequent weeks of psychotic experiences such as hallucinations (for review see Beards et al., 2013). The implication of trauma in the occurrence of hallucinations has led to cross-sectional studies of trauma-related processes and hallucinations (e.g. Gracie et al., 2007; Morrison and Petersen, 2003). Cognitive processing related to recent trauma in the prediction of subsequent hallucinations has not yet been tested. This paper reports such a test: examining cognitive processing in the aftermath of a recent physical assault in relation to the occurrence of hallucinations.

1.1. Cognitive processing during and in the aftermath of trauma Cognitive

processes during and after trauma have been extensively examined as factors in the development and persistence of posttraumatic stress disorder (PTSD) (e.g. Dunmore et al., 1999; Ehring et al., 2008; Kleim et al., 2007). At the centre of Ehlers and Clark's (2000) model is the idea that PTSD occurs when individuals process the trauma in a way that leads to a sense of current threat. This is thought to result from a combination of problematic information processing during trauma and negative appraisals of the trauma and its consequences. Problematic peri-traumatic cognitive processing, such as predominance of data-driven processing (focussing on sensory impressions), lack of self-referential processing (i.e. insufficient linking of the event to other autobiographical knowledge) and peri-traumatic dissociation results in a poorly elaborated and poorly

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contextualised memory of the event. As such, these memories are easily and involuntarily triggered into consciousness and have a strong sense of occurring in the present ('nowness', Michael et al., 2005). PTSD is thought to persist because negative appraisals of the trauma and its effects motivate a series of maintaining cognitive and behavioural strategies; these include cognitive responses to the intrusive memories such as rumination and thought suppression (Ehlers and Clark, 2000), persistent dissociation (Murray et al., 2002) and excessive precautions (safety behaviours).

1.2. Understanding trauma and hallucinations

A number of ways that trauma may lead to hallucinations have been proposed, five of which are highlighted here. First, the phenomenological overlap between hallucinations and the intrusive images and 'flashback' experiences often considered the hallmark symptoms of PTSD (Ehlers and Steil, 1995) has been noted, leading to suggestions that a minority hallucinations may be simply better understood as reexperiencing phenomena (e.g. McCarthy-Jones and Longden, 2015). Second, a 'weaker' version of the first account is that trauma related intrusive cognitions, including poorly contextualised trauma memories, are the type of low cognitive effort mental events that are most prone to source monitoring errors (e.g.Laroi et al., 2004) and hence lead to an increase in the occurrence of hallucinatory experience. Third, having been found to positively mediate the effect of childhood trauma on hallucination proneness (Varese et al., 2012), dissociation has been considered one explanatory factor. Dissociation may be particularly relevant to hallucinations as it is characterised by a sense of disconnect from reality. However the mechanism through which dissociation might promote hallucinations remains to be clarified. Fourth, exposure to trauma can cause negative changes in thoughts about the self (e.g. Foa et al., 1999), such as the sense of being permanently changed for the worse (e.g.Dunmore et al., 2001), resulting in previous conscious content being experienced as alien (e.g. Morrison, 2001). Finally, maladaptive cognitive responses to intrusive memories and thoughts (e.g. rumination and thought suppression), may amplify the chances of hallucinatory experiences as they not only increase the occurrence of intrusive cognitive events but also increase their intensity (Guastella and Moulds, 2007; Yoshizumi and Murase, 2007).

1.3. Current study

In this study, hallucinations are examined in relation to the processing of a recent interpersonal assault. This secondary analysis of a study focussing primarily on paranoia (Freeman et al., 2013) aimed to investigate associations between trauma-related processing and cognitions, derived from Ehlers and Clark's (2000) model of PTSD, and hallucinations. It was hypothesised that problematic peri-traumatic processing (data-driven processing, lack of self-referential processing and dissociation), negative appraisals of the consequences of trauma (permanent change, vulnerable self, self-blame) and maladaptive cognitive control strategies (thought suppression, rumination and numbing) would all predict the presence and maintenance of hallucinations.

2. Method

For a full description of methods see Freeman et al. (2013). The method used paralleled that of prospective studies of PTSD after assault previously conducted (e.g. Dunmore et al., 2001; Kleim et al., 2007). All individuals attending A & E Department for injuries relating to an interpersonal assault were written to and invited to take part in the study. Participants had an initial assessment between 4 and 6 weeks after the assault and were followed up over the following six months.

2.1. Participants

106 individuals were recruited. In order to meet the inclusion criteria individuals must have experienced a distressing assault within the previous month, attended the Accident and Emergency (A & E) Department at King's College Hospital, London for related injuries, been aged 18–65 years, and been able to attend a baseline assessment between 4 and 6 weeks after the assault. The main exclusion criteria were that the assault was part of on-going abuse, that there was a history of diagnosed severe mental illness, that they had a diagnosed alcohol or drug dependence, or that they had insufficient command of English so that the assessments could not be completed.

Broadly the types of assault experienced were confrontations (n=33), random attacks (n=24), muggings (n=22), one-off attacks from family member or friends (n=19) and attacks in the context of work (n=8). All participants reported sustaining injuries during the assault.

2.2. Measures

The subset of study variables used in this analysis are summarized below.

Hallucinatory experience at baseline was assessed with the selfreport Cardiff Anomalous Perceptions Scale (CAPS) (Bell et al., 2006) and the interviewer-rated hallucinatory behaviour item of the Positive and Negative Symptoms Scale (PANSS) (Kay et al., 1987). At the 6 month follow up only the hallucinatory behaviour item of the PANSS was used. The interrater reliability of the two assessors (postgraduate psychologists) for the PANSS positive items was assessed using 12 audiotapes of the assessments. The intra-class correlation coefficient (0.92) indicated very high levels of reliability.

PTSD severity at baseline and at 6 months was measured with selfreport Posttraumatic Diagnostic Scale (PDS) (Foa et al., 1999) and the interviewer versions of the PTSD symptom scale (PSSI) (Foa et al., 1993), combined with the PTSD section of the structured Clinical Interview for DSM-IV (SCID; First et al., 1996). Re-experiencing was assessed with the first 5 items of the PDS.

For assessment of peri-traumatic cognitive processing the Thoughts and Feelings During the Assault scale (Halligan et al., 2003, 2002); Mental Defeat Scale (Dunmore et al., 1999) and Cognitive Processing Questionnaire (Halligan et al., 2003, 2002) were used. Trauma appraisals were assessed with an updated version of the
Posttraumatic Cognitions Inventory (Foa et al., 1999) and cognitive responses to trauma memories were assessed with the Response to Intrusions Questionnaire (Clohessy and Ehlers, 1999; Murray et al., 2002). Affective symptoms were assessed using the Depression Anxiety Stress Scales (Lovibond, 1995).

2.3. Statistical analysis

All analyses were carried out using SPSS version 13. A similar analytic strategy to Freeman et al. (2013) was used for comparability. The first stage was to provide a description of levels of hallucinatory experience within the participant group in the months following an assault. The patterns of correlation between PTSD re-experiencing and hallucinatory experience were then examined. The third stage used a series of simple univariate linear regressions to examine the prediction of hallucinatory experience at baseline and at 6 months. Finally predictor variables were assessed again after controlling for the baseline score of the dependent variable. 3. Results

3.1. Demographic details

There were more male than female participants (79 men and 27 women); the mean age was 34.4 years (S.D.=11.6 years).

3.2. Presence of hallucinations/anomalous experience

Mean scores of the hallucination and re-experiencing measures are displayed in Table 1.

There was a high correlation between the total scores for the selfreport (CAPS) and the interviewer-rated (PANSS) hallucination assessments at baseline, r=0.54, p < 0.001. Seven people (6.6%) were rated as having mild to moderate hallucinatory behaviour as measured by the

Table 1
Hallucination scores.

	Baseline		6-monthfollow-up	
Measure	n	Mean (S.D.)	N	Mean (S.D)
PANSS (Hallucinatory behaviour)	106	1.26 (0.61)	93	1.11 (0.37)
CAPS	106	7.81 (6.56)		
PDS (re-experiencing items)	106	4.92 (3.81)	94	3.77 (3.9)

PANSS, Positive and Negative Symptom Scale; CAPS, Cardiff Anomalous Perceptions Scale; PDS, Posttraumatic Diagnostic Scale

PANSS. By the six month follow up there was a statistically significant reduction in hallucinatory behaviour as assessed by the PANSS hallucinatory behaviour item, t (92)=3.01, p=0.003. Of the 20 participants rated as having at least minimal hallucinatory behaviour at baseline, 16 had follow up data. Of these, 11 showed a decrease in their hallucinatory behaviour and 5 showed no change.

3.3. Hallucinatory behaviour and PTSD re-experiencing

Measures of re-experiencing at baseline positively correlated with baseline hallucinatory measures, CAPS: r=0.308, p=0.001; PANSShallucinations r=0.202, p=0.038. At six months there was a significant correlation between re-experiencing as assessed by items in the Posttraumatic Diagnostic Scale and hallucinatory behaviour as assessed by PANSS item, r=0.313, p=0.002. There was a statistically significant reduction in re-experiencing over the six months, t(93) =2.79, p=0.006.

3.4. Factors associated with the presence and persistence of hallucinatory behaviour

Table 2 provides the tests of the baseline variables predicting baseline hallucination scores. The majority of variables was associated with presence of hallucinatory behaviour as assessed by the PANSS item at baseline, and all correlated with self-reports of baseline hallucinatory behaviour (CAPS). Higher scores at baseline increased the likelihood of baseline hallucinatory behaviour.

Table 3 shows the ability of the individual baseline variables to predict hallucinatory experience as assessed by PANSS hallucination item at 6 months. Of the 12 trauma related baseline variables, 10 predicted the likelihood of hallucinatory experience at follow up. The individual predictor variables were assessed again after controlling for the baseline score of the dependent variable (i.e. to assess variable prediction above initial symptoms score). Even after controlling for baseline score of hallucinatory behaviour, 8 out of the 12 trauma related baseline variables significantly predicted hallucinations at 6 months.

4. Discussion

The study tested longitudinally the predictive relationship of cognitive processing of recent trauma to hallucinations. Whilst PTSD and, more recently, paranoia (Freeman et al., 2013), have been the focus of previous research, hallucinations in the months after an assault have not. The results of the exploratory study supported the hypothesis that particular styles of processing trauma (e.g. lack of selfreferential processing, and peri-traumatic dissociation), negative appraisals of the consequences of trauma (e.g. permanent change, vulnerability, and self-blame), and maladaptive cognitive control strategies (e.g. thought suppression, rumination, and numbing) would

Table 2
Individual baseline predictors of baseline hallucination scores.

	Baseline			
	CAPS		PANSS	
	Standard coefficient	P	Standard coefficient	P
PTSD				
PTSD severity	0.468	< 0.001	0.277	0.004
PTSD- re-experiencing	0.308	0.001	0.202	0.038
Peri-traumatic cognitions				
Perceived threat to life	0.309	0.001	0.174	0.075
Negative emotions during trauma	0.212	0.029	0.168	0.084
Data-driven processing	0.191	0.050	0.071	0.473
Lack of self-referent processing	0.308	0.001	0.216	0.026
Dissociation	0.289	0.003	0.242	0.012
Mental Defeat	0.198	0.042	0.143	0.145
Cognitive responses to trauma memories				
Suppression	0.240	0.013	0.151	0.122
Rumination	0.256	0.008	0.186	0.056
Numbing	0.397	< 0.001	0.256	0.008
Post trauma cognitions				
Vulnerable self	0.502	< 0.001	0.391	< 0.001
Permanent change	0.483	< 0.001	0.375	< 0.001
Self blame	0.349	< 0.001	0.378	< 0.001

PTSD, Post Traumatic Stress Disorder; CAPS, Cardiff Anomalous Scale; PANSS, Positive and Negative Symptom Scale

Table 3
Individual baseline predictors of hallucinatory behaviour (PANSS) at 6 month follow-up and adjusted for original PANSS hallucination symptom score.

	6 month			Controlling for baseline score of DV		
	Standard coefficient	P	r2	Standard coefficient	P	r2
Peri-traumatic cognitions						
Perceived threat to life	0.314	0.002	0.099	0.104	0.166	0.549
Negative emotions during trauma	0.168	0.107	0.028	0.021	0.772	0.539
Data-driven processing	0.160	0.125	0.026	0.072	0.318	0.544
Lack of selfreferent processing	0.303	0.003	0.092	0.154	0.034	0.562
Dissociation	0.308	0.003	0.095	0.153	0.035	0.561
Mental Defeat	0.282	0.006	0.079	0.204	0.004	0.580
Cognitive responses to trauma memories						
Suppression	0.275	0.008	0.076	0.175	0.014	0.569
Rumination	0.298	0.004	0.089	0.181	0.011	0.571
Numbing	0.307	0.003	0.094	0.106	0.155	0.549

Post trauma cognitions						
Vulnerable self	0.464	< 0.001	0.215	0.261	< 0.001	0.592
Permanent change	0.398	< 0.001	0.158	0.233	0.001	0.590
Self blame	0.344	0.001	0.118	0.177	0.015	0.569

all predict the presence and maintenance of hallucinations. How a trauma is processed may well impact on the likelihood of subsequent hallucination occurrence. This is, however, in the context that clear hallucinatory experience, such as hearing a voice, occurred infrequently in this non-clinical population and that the study design cannot rule out the influence of unmeasured confounders.

A new finding was the rates of hallucinatory experience at one month after assault and the reductions over time. Using the PANSS, 18.9% of participants were rated as having at least minimal hallucinatory experiences and 6.6% of participants having hallucinatory experiences rated as mild or moderate. There was a statistically significant reduction in hallucinatory behaviour between the baseline assessment and the six month follow up. One interpretation of these findings is that in the direct aftermath of trauma there is a raised likelihood of experiencing hallucinations. This increase in hallucinatory behaviour is, for the majority of participants, only temporary, and reduces over the following six months. This pattern also indicates that the higher rates of hallucinatory experience at one month were probably not simply a reflection of associations between high levels of hallucinatory behaviour and the likelihood of being a victim of assault.

The presence of hallucinatory experience allowed for the examination of the predictive ability of trauma-related processes derived from a cognitive model of PTSD (Ehlers and Clark, 2000). Findings suggest that trauma-related processing predicted the occurrence and maintenance of hallucinations. Re-experiencing, as measured by items 1–5 of the PDS, was found to correlate with all measures of hallucinatory experience, however, the correlation was only moderate, indicating that the hallucinatory experience scales were most likely not simply a measure of severe re-experiencing. This suggests that hallucinatory experience is unlikely to be just re-experiencing phenomena.

Certain peri-traumatic cognitive processing styles are linked with an increase in intrusive cognitions, individuals experiencing intrusive thoughts are at increased risk of developing hallucinations (Jones and Fernyhough, 2009). Both peri-traumatic dissociation and lack of selfreferent processing were predictive of the occurrence and persistence of hallucinations. Whilst data-driven processing was a significant predictor of anomalous experiences as assessed by CAPS it did not significantly predict the presence or persistence of hallucinatory behaviour as assessed by the hallucinatory behaviour item on the PANSS. Whilst this is most likely due to methodological issues, it is interesting that it did not emerge as one of the stronger predictors as it has, like lack of self referent processing and peri-traumatic dissociation, been consistently linked with intrusive memories after trauma (Ehring et al., 2008; Halligan et al., 2003).

Post-trauma cognitions about a vulnerable self, permanent change and self-blame, along with mental defeat, predicted the presence of hallucinatory experience even after controlling for baseline hallucination symptom scores. These results highlight a potential role for negative appraisals of trauma and a sense of changed or defeated self in determining the occurrence of hallucinations. Mental defeat has previously also been shown to be one of the strongest predictors of PTSD after interpersonal trauma (Kleim et al., 2007). All three cognitive responses to trauma-related intrusions (rumination, thought suppression and numbing) included in this study also significantly predicted the persistence of hallucinatory experience. Thought suppression and rumination predicted later hallucinations, even after controlling for baseline hallucination score. It is possible that this is due to their impact on the frequency and intensity of intrusive cognitive events.

The main strength of this study was its longitudinal design. The prevalence of hallucinations provided the opportunity to examine the predictive ability of certain cognitive variables linked to trauma. However as this study is a secondary analysis of a study focussed upon paranoia, several limitations are apparent. It cannot be determined that the assault led to an increase in hallucinatory behaviour, it is likely that this could only be researched in a natural experiment. It may have been useful to have a measure of symptom severity at a time closer to the assault as it is possible that levels of hallucinatory behaviour may have already been reducing by 1 month. In addition a retrospective evaluation of pre-trauma hallucinatory behaviour might help support the supposition that the hallucinatory behaviour is a result of the assault. It is also worth noting that this study did not include sexual trauma, a type of trauma that has been specifically related to hallucinations (Read et al., 2003; Hardy et al., 2005).

The primary outcome measure, the PANSS item, is a very brief clinical tool for use in psychiatric settings and, as a result, it is insensitive to hallucinatory behaviour at the less severe end of the spectrum. Individual psychotic symptoms show quantitative variation, existing on a continuum with normal experiences. By extending the search for psychological mechanisms predictive of specific psychotic symptoms to samples at lower levels of the continuum (Garety and Freeman, 1999) our understanding of psychosis could potentially be enhanced (Johns and van Os, 2001). It would have been beneficial to include the CAPS in the 6 month assessment in order to give a more detailed account of hallucinatory behaviour at the lower levels of the continuum. It is important, when investigating how trauma reactions can include hallucinations, to consider both a) psychological processes which are common to PTSD and hallucinations and b) distinct psychological processes which are specifically associated with hallucinations. This may include source monitoring and reasoning biases. It would be useful to include measures of these in any future investigations of hallucinations in the direct aftermath of trauma.

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4.1 Participant Information Sheet

Milton Keynes University Hospital NHS
NHS Foundation Trust

UNIVERSITY OF OXFORD

Participant Information Sheet – Psychological Reactions to an Assault

You are being invited to take part in a research study. Before you decide, you need to understand why the research is being carried out and what it would involve for you. This information sheet should provide you with all the information you require to make a decision, but please ask if anything is unclear or if you would like further information.

Key Information:

- Everyone attending Milton Keynes' Accident and Emergency Department (A&E) for treatment of injuries sustained in an assault are being invited to participate in this study.
- The aim of the study is to learn about typical reactions to an assault.
- The study is in three parts:
  - A two hour assessment within 10 days of your A&E admission;
  - Completion of a 30 minute self-report questionnaire at 12 weeks (this can be done by email or over the phone);
  - A final 30 minute self-report questionnaire at 24 weeks (this can be done by email or over the phone).
- You will be compensated for your time.
- You are free to leave the study and withdraw your data at any time, without giving a reason and without any negative consequences.

What is the purpose of this study?

Every year thousands of people attend A&E Departments as a result of an assault. This study concerns reactions to the assault in the weeks following. We want to find out how many people have difficulties coping with the incident (e.g. remain distressed by it) and how many people are relatively unaffected by the incident (e.g. rarely think about it). Importantly, we want to identify the factors that may predict the different reactions. This information will be written up and can be used to help others who experience an assault in the future.

The study is a collaboration between the Accident and Emergency Department at Milton Keynes Hospital and the University of Oxford. The data from this study will contribute to a doctoral thesis.

Why have I been invited to take part?

Over the course of a year we are contacting everyone who has experienced an assault and attended the A&E Department in order to invite them to participate in this study.

Do I have to take part?

No, it is completely up to you whether or not you take part in the study. If you do decide to take part you can leave the study and withdraw your data at any time, without giving a reason and without any negative consequences.

What will happen if I do take part?

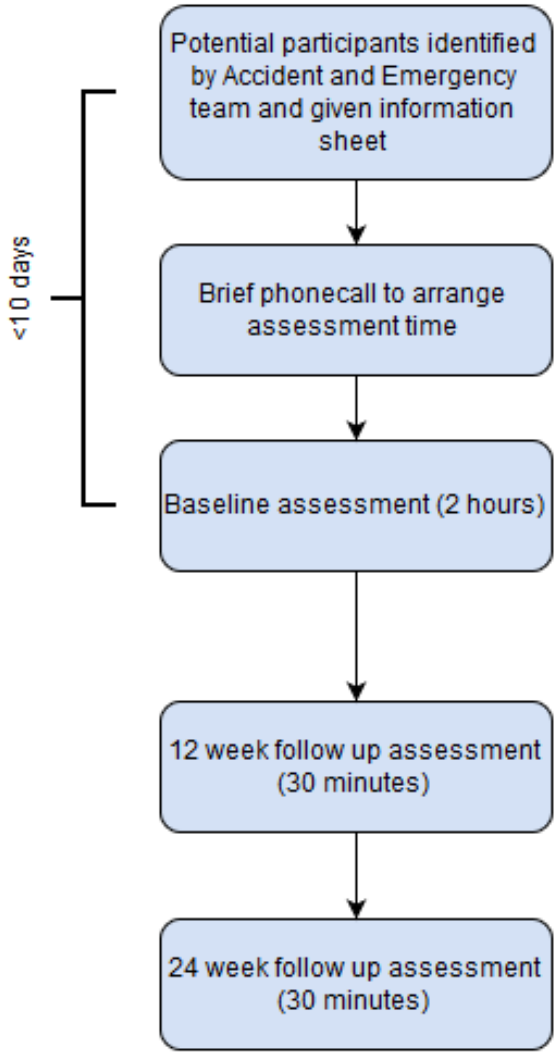
The study is in three parts over the next 24 weeks. Everybody who takes part will complete a two hour assessment within 10 days of their A&E admission. The assessment will include questions concerning:

- Brief details about the assault (e.g. *how many people were involved?*)
- Your thoughts and feelings during the assault (e.g. *How much does the statement 'I felt frozen' apply to your personal experience during the assault?*)
- How the assault has impacted on you (e.g. *In the past week how much were you bothered by repeated, disturbing dreams of the stressful event?*)
- Your emotional state and thoughts about yourself and others (e.g. *How much do you believe the statement 'I am successful'*?)
- Whether negative events have happened in your life (e.g. *Have you experienced or witnessed military combat or a warzone?*)
- Psychological processes such as worry and rumination (e.g. *In the past week has worry stopped you from sleeping?*)
- Certain experiences (e.g. *Do you ever find yourself doing things without knowing why?*)

While the assessment will be carried out sensitively it is possible that you may find some of the questions upsetting. You are free to ask for a break at any time and do not have to answer any questions you are uncomfortable answering.

At the 12 week and 24 week follow up assessments you will be sent, by post or by email, a questionnaire that will ask you questions relating to how you are currently feeling. This should take no longer than 30 minutes to complete. It would be possible to arrange for these assessments to be done over the telephone if preferred.

STUDY OUTLINE



Will I be compensated for my time?

You will be compensated for your time. For completion of the whole study you would receive £30. In the event of withdrawal from the study compensation will be appropriate to the proportion of the study completed. Travel expenses will not be covered.

Are there any potential risks in taking part?

The potential for risk in this study is very low. However, you will be asked about how you feel and for some brief details of the assault (although you will not be required to talk about the incident in any depth). It is possible that some people may find this upsetting, although some people find it helpful. Of course, you do not have to answer any question you do not want to and are free to take a break whenever you feel the need. If any problems are identified during the assessment you will be offered information and contact details for local services and, if you want, the researcher can write to inform your GP.

What are the possible benefits of taking part?

Participants sometimes find the research process helpful but it is not possible to guarantee any direct benefits of taking part.

Will my taking part in the study be kept confidential?

All information collected during the study will be kept in strict confidence subject to legal requirements. You will be allocated a participant identification number so your name will not appear on any of your assessments. No individual data will be shared with anyone outside the immediate team. The only exception to this is that responsible members of the University of Oxford may be given access to data for monitoring and/or auditing purposes to ensure we are complying with all regulations. Data will be stored securely in a locked database.

What will happen with the data from this study?

The data from this study will contribute to a doctoral thesis. On successful submission of the thesis, it will be deposited both in print and online in the University archives, to facilitate its use in future research. The data will also be used to generate research papers that will be distributed online and on paper in academic journals – some of these may be openly accessible. No data which can identify individuals will be published in the scientific report of the study. If you would like, you can receive a copy of the report.

What will happen if I don't want to carry on with the study?

Participation in the study is voluntary. You are free to withdraw from the study at any point by informing the researcher or by not completing the assessments. You are not required to give a reason for your withdrawal and it will not affect the care you receive.

Who is organizing and funding the study?

The study is a collaboration between the Accident and Emergency Department at Milton Keynes Hospital and the University of Oxford. The study is funded and sponsored by the University of Oxford.

Who has reviewed the study?

All research in the NHS is looked at by an independent group of people, called a Research Ethics Committee, to protect your interests. This study has been reviewed and given favourable opinion by South-Central Oxford C Research Ethics Committee.

What if there is a problem?

The University of Oxford, as Sponsor, has appropriate insurance in place in the unlikely event that you suffer any harm as a direct consequence of your participation in this study. If you wish to complain about any aspect of the way in which you have been approached or treated during the course of this study, you should contact Georgina Geddes at georgina.geddes@psych.ox.ac.uk or on 01865 223949. Alternatively you may contact the University of Oxford Clinical Trials and Research Governance (CTRG) office on 01865 572224, or the head of CTRG, email ctrg@admin.ox.ac.uk

Where Can I find independent information about taking part?

You are free to seek independent advice from your GP and/or care team or you can contact NHS Patient Advisory Liaison Service. www.pals.nhs.uk

THANK YOU FOR TAKING THE TIME TO READ THIS INFORMATION SHEET

Key Contact Details

Georgina Geddes
Department of Psychiatry
Warneford Hospital,
Headington,
Oxford, OX3 7JX
Email: georgina.geddes@psych.ox.ac.uk
Tel: 07528 205339

Antoanela Colda
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Professor Daniel Freeman
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9 South Parks Rd,
Oxford, OX1 3UD
Email: anke.ehlers@psy.ox.ac.uk

Victim Support

Victim Support is an independent national charity which helps people affected by crime. They provide free and confidential support to help you deal with your experience, whether or not you report the crime. Their national telephone number is 0808 16 89 111 and their website address is www.victimsupport.org.uk

4.2 Consent Form

Milton Keynes University Hospital NHS
NHS Foundation Trust

Consent Form – Psychological Reactions to an Assault

Please initial box

1. I confirm that I have read the information sheet dated_____ for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving a reason, and without my medical care or legal rights being affected. ☐
3. I understand that data collected during the study may be looked at by individuals from University of Oxford, from regulatory authorities and from the NHS Trust, where it is relevant to my taking part in this research. I give permission for these individuals to have access to the data. ☐
4. I am aware of the procedure for raising a concern or making a complaint. ☐
5. I understand who will have access to my personal data, how the data will be stored and what will happen to that data at the end of the study. ☐
6. I am aware that I can ask the researcher to contact my GP on my behalf should I become distressed by my reaction to the assault. ☐
7. I agree to the use of anonymised quotes in research reports and publications ☐
8. I understand that the information collected about me will be used to support other research in the future, and may be shared anonymously with other researchers. ☐

9. I agree to take part in the study.

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Name of participant	Date	Signature
---	---	---
Name of researcher	Date	Signature

4.3 Ethics approval

RESEARCH SERVICES
Clinical Trials and Research Governance
Joint Research Office
Block 60
Churchill Hospital
Headington
Oxford
OX3 7LE

Clinical Trials and Research Governance

To whom it may concern

Date: 17/04/2015

Dear Sir/Madam,

Title: Psychological reactions to an assault

PID: 11343

Protocol Date/Version: 15-04-15, version 1.0

The above study has been designed by Mrs Georgina Geddes and colleagues at the University of Oxford and funded by Departmental Resources (Internal Funding) I confirm that the University will accept the role of Research Sponsor of this Study and will comply with the requirements of the Department of Health Research Governance Framework for Health and Social Care 2005, in so far as these apply in the United Kingdom.

Insurance-provided indemnity arrangements are in place for the project:
Newline Underwriting Management Ltd., at Lloyd's of London.

Sponsorship is confirmed subject to the condition that the following are sent to Clinical Trials and Research Governance for review prior to submission to the Research Ethics Committee. Failure to do so may compromise insurance cover for the project.

- Any substantial amendment
- Any extension to the study end date
- Addition of any new research site or patient identification centre

In addition, annual progress reports must be copied to Clinical Trials and Research Governance.

Any communications relating to Research Sponsorship should be directed to the undersigned, whose contact details are given in this letter.

Yours Faithfully

Dr Karen Melham
Clinical Trials and Research Governance

NHS
Health Research Authority

NRES Committee South Central - Oxford C
Level 3, Block B
Whitefriars Building
Lewins Mead
Bristol
BS1 2NT

Telephone: 0117 342 1387

29 June 2015

Mrs Georgina Geddes
Department of Psychiatry
Warneford Hospital
Oxford
OX3 7JX

Dear Mrs Geddes

Study title:	**Psychological reactions to an assault.**
REC reference:	**15/SC/0288**
IRAS project ID:	**170085**

Thank you for your letter of 10th of June, responding to the Committee's request for further information on the above research and submitting revised documentation.

The further information has been considered on behalf of the Committee by the Alternate Vice-Chair.

We plan to publish your research summary wording for the above study on the HRA website, together with your contact details. Publication will be no earlier than three months from the date of this favourable opinion letter. The expectation is that this information will be published for all studies that receive an ethical opinion but should you wish to provide a substitute contact point, wish to make a request to defer, or require further information, please contact the REC Manager, Mr Mark Dawson, nrescommittee.southcentral-oxfordc@nhs.net. Under very limited circumstances (e.g. for student research which has received an unfavourable opinion), it may be possible to grant an exemption to the publication of the study.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised, subject to the conditions specified below.

Conditions of the favourable opinion

The favourable opinion is subject to the following conditions being met prior to the start of the study.

You should notify the REC in writing once all conditions have been met (except for site approvals from host organisations) and provide copies of any revised documentation with updated version numbers. The REC will acknowledge receipt and provide a final list of the approved documentation for the study, which can be made available to host organisations to facilitate their permission for the study. Failure to provide the final versions to the REC may cause delay in obtaining permissions.

Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.

Management permission ("R&D approval") should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements.

Guidance on applying for NHS permission for research is available in the Integrated Research Application System or at http://www.rdforum.nhs.uk.

Where a NHS organisation's role in the study is limited to identifying and referring potential participants to research sites ("participant identification centre"), guidance should be sought from the R&D office on the information it requires to give permission for this activity.

For non-NHS sites, site management permission should be obtained in accordance with the procedures of the relevant host organisation.

Sponsors are not required to notify the Committee of approvals from host organisations

Registration of Clinical Trials

All clinical trials (defined as the first four categories on the IRAS filter page) must be registered on a publically accessible database. This should be before the first participant is recruited but no later than 6 weeks after recruitment of the first participant.

There is no requirement to separately notify the REC but you should do so at the earliest opportunity e.g. when submitting an amendment. We will audit the registration details as part of the annual progress reporting process.

To ensure transparency in research, we strongly recommend that all research is registered but for non-clinical trials this is not currently mandatory.

If a sponsor wishes to request a deferral for study registration within the required timeframe, they should contact hra.studyregistration@nhs.net. The expectation is that all clinical trials will be registered, however, in exceptional circumstances non registration may be permissible with prior agreement from NRES. Guidance on where to register is provided on the HRA website.

It is the responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

Ethical review of research sites

NHS sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

Document	*Version*	*Date*
IRAS Checklist XML [Checklist_05062015]		05 June 2015
IRAS Checklist XML [Checklist_10062015]		10 June 2015
Letter from sponsor [SponsorLetter]		
Letter from statistician	1	15 April 2015
Non-validated questionnaire [AffectWithoutRecollection]	1	27 February 2015
Non-validated questionnaire [WorryQuestionnaire]	1	27 February 2015
Other [CVEhlers]	1	15 April 2015
Other [SleepDiary]	1	15 April 2015
Other [Home visit policy]	4	20 October 2014
Other [Response Cover Letter]		
Other [Response letter]		
Participant consent form	2	04 June 2015
Participant information sheet (PIS) [PIS A]	2	04 June 2015
Participant information sheet (PIS) [PIS-B]	2	04 June 2015
REC Application Form [REC_Form_29042015]		29 April 2015
Referee's report or other scientific critique report	1	15 April 2015
Research protocol or project proposal	3	10 June 2015
Summary CV for Chief Investigator (CI)	1	15 April 2015
Summary CV for supervisor (student research)	1	15 April 2015
Validated questionnaire		
Validated questionnaire		
Validated questionnaire		
Validated questionnaire [CreativeExperiences]		
Validated questionnaire [GPTS]		
Validated questionnaire [InsomniaSeverityIndex]		
Validated questionnaire [PCL-V]		
Validated questionnaire [PDS]		
Validated questionnaire [PTCI]		
Validated questionnaire [ResponseToIntrusions]		
Validated questionnaire [SafetyBehaviour]		
Validated questionnaire [TDQ]		

Validated questionnaire [ThoughtsFeelingsDuringAssault]		
Validated questionnaire [TraumaMemories]		
Validated questionnaire [AssaultInterview]		

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Reporting requirements

The attached document *"After ethical review – guidance for researchers"* gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Notification of serious breaches of the protocol
- Progress and safety reports
- Notifying the end of the study

The HRA website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

User Feedback

The Health Research Authority is continually striving to provide a high quality service to all applicants and sponsors. You are invited to give your view of the service you have received and the application procedure. If you wish to make your views known please use the feedback form available on the HRA website:
http://www.hra.nhs.uk/about-the-hra/governance/quality-assurance/

HRA Training

We are pleased to welcome researchers and R&D staff at our training days – see details at
http://www.hra.nhs.uk/hra-training/

15/SC/0288	**Please quote this number on all correspondence**

With the Committee's best wishes for the success of this project.

Yours sincerely



Mrs Susan Lousada
Alternate Vice-Chair

Email:nrescommittee.southcentral-oxfordc@nhs.net

Enclosures: "After ethical review – guidance for researchers" *[SL-AR2]*

Copy to: *Ms Heather House*
Mrs Rowena Fletcher, Milton Keynes

4.4 Assault Interview

1. Where did the assault happen?	❑ Close to home ❑ far from home ❑ at home ❑ Familiar place ❑ unfamiliar place
2. How many people were involved?	_____
3. What was your relationship to the attacker?	❑ Stranger ❑ Acquaintance ❑ Close friend / member of family
ⓘ *interviewer decision:* 4. Who started the fight?	_____ ❑ self ❑ other
5. Did the attacker/s have a weapon?	❑ no What kind of weapon: _____ ❑ yes Did they use it? ❑ yes ❑ no
6. Did *you* have a weapon yourself?	❑ no What kind of weapon: _____ ❑ yes Did *you* use it? ❑ yes ❑no
7. Did the attacker abuse you verbally?	❑ no ❑ yes
8. Did someone else get injured or did anyone die in the assault?	❑ no ❑ injured 0 ----- 1 ----- 2 ----- 3 ----- 4 ----- 5 ----- 6 ----- 7 ----- 8 ----- 9 ----- 10 Not at all severe very severe/life threatening ❑ died Was it someone close to you? ❑ yes ❑ no Who was it? _____
9. How long did it approximately take for the assault to happen? How long did it take for help to arrive?	assault itself: _____ until bystanders came to help: _____ until police arrived: _____ until ambulance arrived: _____
10. How long was it (from the time when the assault began) before you felt that the worst was over?	Time until stopped feeling in danger: _____

11. At what point did you feel the worst was over?

12. Were you under the influence of drugs or alcohol at the time of the assault?

- ❑ no
- ❑ yes: _____

13. Are you involved in court proceedings or police investigations following the assault?

- ❑ no
- ❑ yes since when? _____
  details: _____

14. Are you claiming compensation following the assault?

- ❑ no
- ❑ yes
- ❑ no, but intend to claim compensation in the future

15. Did you suffer any injuries during the assault?

- ❑ no injuries
- ❑ minor cuts/ bruises
- ❑ major cuts/ bruises
- ❑ unconsciousness
- ❑ other injuries:_____
- ❑ broken bones
- ❑ head injuries
- ❑ injuries to internal organs
- ❑ facial injuries/scars
- ❑ stab wounds

15a. How severe were your injuries?

0 ----- 1 ----- 2 ----- 3 ----- 4 ----- 5 ----- 6 ----- 7 ----- 8 ----- 9 ----- 10

not at all severe — very severe/life threatening

16. Are you suffering from any ongoing problems with your physical health from the assault?

- ❑ No
- ❑ Yes, please specify:
  - ❑ scars
  - ❑ problems walking
  - ❑ back pain
  - ❑ headaches
  - ❑ problems with internal organs
  - ❑ problems with reproductive organs
  - ❑ vision problems
  - ❑ problems with arm/hand
  - ❑ other injuries: _____

16a. How severe are these problems overall?

0 ----- 1 ----- 2 ----- 3 ----- 4 ----- 5 ----- 6 ----- 7 ----- 8 ----- 9 ----- 10

Not at all severe — very severe/couldn't be worse

17. Have you been suffering from pain since the assault?

- ❑ Yes
- ❑ No

17a. How severe is the pain?

0 ----- 1 ----- 2 ----- 3 ----- 4 ----- 5 ----- 6 ----- 7 ----- 8 ----- 9 ----- 10

Not at all severe very severe/couldn't be worse

Below is a list of problems that people sometimes have in response to a very stressful experience. Please read each problem carefully and then circle one of the numbers to the right to indicate how much you have been bothered by that problem in the past week

In the past week, how much were you bothered by:	*Not a lot*	*A little bit*	*Moderately*	*Quite a bit*	*Extremely*
Repeated, disturbing, and unwanted memories of the stressful experience?	0	1	2	3	4
Repeated, disturbing dreams of the stressful experience?	0	1	2	3	4
Suddenly feeling or acting as if the stressful experience were actually happening again (*as if you were actually back there reliving it)*?	0	1	2	3	4
Feeling very upset when something reminded you of the stressful experience?	0	1	2	3	4
Having strong physical reactions when something remindsed you of the stressful experience (*for example, heart pounding, trouble breathing, sweating)*?	0	1	2	3	4
Avoiding memories, thoughts, feelings related to the stressful experience?	0	1	2	3	4
Avoiding external reminders of the stressful experience (*for example. People, places, conversations, activities, objects, or situations*)?	0	1	2	3	4
Trouble remembering important parts of the stressful experience?	0	1	2	3	4
Having strong negative beliefs about yourself, other people, or the world (*for example, having thoughts such as: I am bad, there is something seriously wrong with me, no one can be trusted, the world is completely dangerous*)?	0	1	2	3	4
Blaming yourself or someone else for the stressful experience or what happened after it?	0	1	2	3	4
Having strong negative feelings such as fear, horror, anger, guilt or shame?	0	1	2	3	4

Loss of interest in activities that you used to enjoy?	0	1	2	3	4
Feeling distant or cut off from other people?	0	1	2	3	4
Trouble experiencing positive feelings (*for example, being unable to feel happiness or have loving feelings for the people close to you*)?	0	1	2	3	4
Irritable behaviour, angry outbursts, or acting aggressively?	0	1	2	3	4
Taking too many risks or doing things that could cause you harm?	0	1	2	3	4
Being "super alert" or watchful or on guard?	0	1	2	3	4
Feeling jumpy or easily startled?	0	1	2	3	4
Having difficulty concentrating?	0	1	2	3	4
Trouble falling or staying asleep?	0	1	2	3	4

4.6 Green et al Paranoid Thoughts Scale

The following statements refer to thoughts and feelings you may have had about others over the last week. Think about the last week and indicate the extent of these feelings from 1 (Not at all) to 5 (Totally).

N.B. Please do not include thoughts and feelings about the person or people who recently assaulted you. Please also do not rate items according to any experiences you may have had under the influence of drugs.

1. Certain individuals have had it in for me	1	2	3	4	5
2. I have definitely been persecuted	1	2	3	4	5
3. People have intended me harm	1	2	3	4	5
4. People wanted me to feel threatened, so they stared at me	1	2	3	4	5
5. I was sure certain people did things in order to annoy me	1	2	3	4	5
6. I was convinced there was a conspiracy against me	1	2	3	4	5
7. I was sure someone wanted to hurt me	1	2	3	4	5
8. I was distressed by people wanting to harm me in some way	1	2	3	4	5
9. I was preoccupied with thoughts of people trying to upset me deliberately	1	2	3	4	5
10. I couldn't stop thinking about people wanting to confuse me	1	2	3	4	5
11. I was distressed by being persecuted	1	2	3	4	5
12. I was annoyed because others wanted to deliberately upset me	1	2	3	4	5
13. The thought that people were persecuting me played on my mind	1	2	3	4	5
14. It was difficult to stop thinking about people wanting to make me feel bad	1	2	3	4	5
15. People have been hostile towards me on purpose	1	2	3	4	5
16. I was angry that someone wanted to hurt me	1	2	3	4	5

4.7 Specific Psychotic Experiences Questionnaire – grandiosity subscale

4.8 Cardiff Anomalous Perceptions Scale

This questionnaire asks questions about sensations and perceptions you may have experienced. Some of the experiences are unusual, some of them are more everyday.

We realise circling answers may not always represent your experience as accurately as you might like. However, we would ask you to circle the answers that most closely match your experiences in the last 10 days. Please read each question and circle either YES or NO.

We would appreciate it if you could be as honest as possible when giving your answers.

The only experiences we are not interested in are those that may have occurred whilst under the influence of drugs.

1. Do you ever notice that sounds are much louder than they normally would be?	YES	NO
2. Do you ever sense the presence of another being, despite being unable to see any evidence?	YES	NO
3. Do you ever hear your own thoughts repeated or echoed?	YES	NO
4. Do you ever see shapes, lights or colours even though there is nothing really there?	YES	NO
5. Do you ever experience unusual burning sensations or other strange feelings in or on your body?	YES	NO
6. Do you ever hear noises or sounds when there is nothing about to explain them?	YES	NO
7. Do you ever hear your own thoughts spoken aloud in your head, so that someone near might be able to hear them?	YES	NO
8. Do you ever detect smells which don't seem to come from your surroundings?	YES	NO
9. Do you ever have the sensation that your body, or a part of it, is changing or has changed shape?	YES	NO
10. Do you ever have the sensation that your limbs might not be your own or might not be properly connected to your body?	YES	NO
11. Do you ever hear voices commenting on what you are thinking or doing?	YES	NO
12. Do you ever feel that someone is touching you, but when you look nobody is there	YES	NO
13. Do you ever hear voices saying words or sentences when there is no-one around that might account for it?	YES	NO

14. Do you ever experience unexplained tastes in your mouth?	YES	NO
15. Do you ever find that sensations happen all at once and flood you with information?	YES	NO
16. Do you ever find that sounds are distorted in strange or unusual ways?	YES	NO
17. Do you ever have difficulty distinguishing one sensation from another?	YES	NO
18. Do you ever smell everyday odours and think that they are unusually strong?	YES	NO
19. Do you ever find the appearance of things or people seems to change in a puzzling way, e.g. distorted shapes or sizes or colour?	YES	NO
20. Do you ever find that your skin is more sensitive to touch, heat or cold than usual?	YES	NO
21. Do you ever think that food or drink tastes much stronger than it normally would?	YES	NO
22. Do you ever look in the mirror and think that your face seems different from usual?	YES	NO
23. Do you ever have days where lights or colours seem brighter or more intense than usual?	YES	NO
24. Do you ever have the feeling that of being uplifted, as if driving or rolling over a road while sitting quietly?	YES	NO
25. Do you ever find that common smells sometimes seem unusually different?	YES	NO
26. Do you ever think that everyday things look abnormal to you?	YES	NO
27. Do you ever find that your experience of time changes dramatically?	YES	NO
28. Have you ever heard two or more unexplained voices talking with each other?	YES	NO
29. Do you ever notice smells or odours that people next to you seem unaware of?	YES	NO
30. Do you ever notice that food or drink seems to have an unusual taste?	YES	NO
31. Do you ever see things that other people cannot?	YES	NO
32. Do you ever hear sounds or music that people near you don't hear?	YES	NO

4.9 Thoughts and Feelings during the Assault

In the following, you will find a number of statements that describe thoughts and feelings that people may experience during stressful events.

Please rate the extent to which these statements apply to your personal experience DURING YOUR ASSAULT by circling the appropriate number.

There are no right and no wrong answers to these questions. Please try to remember how you felt and thought AT THE TIME of the assault, not what you think now with the benefit of hindsight.

My Thoughts and Feelings during the Assault

	This applied to me				
During the assault...	not at all	a little	moderately	strongly	very strongly
1. I thought I was going to die.	0	1	2	3	4
2. I thought I was going to be seriously injured.	0	1	2	3	4
3. I was seriously injured.	0	1	2	3	4
4. I felt terrified.	0	1	2	3	4
5. I felt fearful.	0	1	2	3	4
6. I felt frozen.	0	1	2	3	4
7. I felt horrified.	0	1	2	3	4
8. I felt helpless.	0	1	2	3	4
9. I felt hopeless.	0	1	2	3	4

What Went Through my Mind

During the worst moments of the assault…	This applied to me: not at all	a little	moderately	strongly	very strongly
1. I couldn't really take it all in.	0	1	2	3	4
2. It was just like a stream of unconnected impressions following each other.	0	1	2	3	4
3. I could not think clearly.	0	1	2	3	4
4. I was overwhelmed by sensations and couldn't put everything together.	0	1	2	3	4
5. It felt like nothing linked all that was happening together.	0	1	2	3	4
6. I felt dazed, unable to take in what was happening.	0	1	2	3	4
7. The world around me seemed strange or unreal.	0	1	2	3	4
8. My body felt as if it was not really mine.	0	1	2	3	4
9. I felt emotionally numb.	0	1	2	3	4
10. I felt as if I was in a dream or a film, rather than in real life.	0	1	2	3	4
11. I felt as if the assault was happening/ had happened to someone else.	0	1	2	3	4
12. I felt like I was a different person from the person I used to be.	0	1	2	3	4
13. I felt cut off from my past.	0	1	2	3	4
14. I felt cut off from my future.	0	1	2	3	4
15. I couldn't imagine anything beyond this experience.	0	1	2	3	4
16. I felt there was no way back to my normal life after this.	0	1	2	3	4
17. I lost any will-power.	0	1	2	3	4
18. I no longer felt like a human being.	0	1	2	3	4

During the worst moments of the assault…	This applied to me: not at all	a little	moderately	strongly	very strongly
19. In my mind, I gave up.	0	1	2	3	4
20. I felt destroyed as a person.	0	1	2	3	4
21. I lost any inner resistance.	0	1	2	3	4
22. I felt completely humiliated and lost any sense of inner dignity.	0	1	2	3	4

4.10 Trauma Memory Questionnaire

The following questions are related to the ways in which people sometimes describe how they remember their assault.

Please rate the extent to which these statements apply to how you remember your assault by circling the appropriate number. There are no right and wrong answers.

		Statement applies to me				
SINCE THE ASSAULT...		not at all	a little	moderately	strongly	very strongly
1.	I have trouble remembering the order in which things happened during the assault.	0	1	2	3	4
2.	My memory of the assault is muddled.	0	1	2	3	4
3.	I cannot get what happened during the assault straight in my mind.	0	1	2	3	4
4.	I remember different parts of the assault like separate experiences.	0	1	2	3	4
5.	When I remember a particularly upsetting part of the assault, it is hard to remember that I was safe in the end.	0	1	2	3	4

Unwanted Memories of the Assault

1.	In the last week, approximately how often did unwanted memories of the assault pop into your mind? Circle one of the following.	never	once	twice	every other day	once a day	several times a day	many times a day
2.	How *distressing* were these memories? Please circle a number from 0 to 100.	0 --- 10 --- 20 --- 30 --- 40 --- 50 --- 60 --- 70 --- 80 --- 90 --- 100 Not at all Moderately Very strongly						
3.	To what extent did they seem to be happening *now* instead of being something from the past?	0 --- 10 --- 20 --- 30 --- 40 --- 50 --- 60 --- 70 --- 80 --- 90 --- 100 Not at all Moderately Very strongly						
4.	To what extent were you *reliving* your experience from the assault?	0 --- 10 --- 20 --- 30 --- 40 --- 50 --- 60 --- 70 --- 80 --- 90 --- 100 Not at all Moderately Very strongly						

5. To what extent did the memories seem to be *isolated* fragments that were *disconnected* from what happened immediately before and afterwards?

0 --- 10 --- 20 --- 30 --- 40 --- 50 --- 60 --- 70 --- 80 --- 90 --- 100

Not at all Moderately Very strongly

6. When something about the assault popped into your mind, to what extent did it seem to be something in the *outside world* rather than a memory in your own mind?

0 --- 10 --- 20 --- 30 --- 40 --- 50 --- 60 --- 70 --- 80 --- 90 --- 100

Not at all Moderately Very strongly

7. Many different things trigger memories of the assault. *(please rate how strongly this applies to you)*

0 --- 10 --- 20 --- 30 --- 40 --- 50 --- 60 --- 70 --- 80 --- 90 --- 100

Not at all Moderately Very strongly

4.11 Response to Intrusions Questionnaire

What do you do when memories of the assault pop into your mind? Please circle the answer that applied best to you during the past week.

1. I try to push them out of my mind.	Never	Sometimes	Often	Always
2. I try to erase the memory of the event.	Never	Sometimes	Often	Always
3. I try hard to control my emotions.	Never	Sometimes	Often	Always
4. I distract myself with something else.	Never	Sometimes	Often	Always
5. I think of something else.	Never	Sometimes	Often	Always
6. I work hard at keeping busy with other things.	Never	Sometimes	Often	Always
7. I think about how life would have been different if the event had not occurred.	Never	Sometimes	Often	Always
8. I dwell on how the event could have been prevented.	Never	Sometimes	Often	Always
9. I think about why the event happened to me.	Never	Sometimes	Often	Always
10. I dwell on how I used to be before the event.	Never	Sometimes	Often	Always
11. I dwell on what other people have done to me.	Never	Sometimes	Often	Always
12. I dwell on what I should have done differently.	Never	Sometimes	Often	Always
13. I go over what happened again and again.	Never	Sometimes	Often	Always
14. I worry that something similar will happen to me or my family.	Never	Sometimes	Often	Always
15. I detach myself from the memories.	Never	Sometimes	Often	Always
16. I drift off into a world of my own.	Never	Sometimes	Often	Always
17. I numb my feelings.	Never	Sometimes	Often	Always
18. I drink alcohol, take medication or use drugs.	Never	Sometimes	Often	Always
19. I put on loud music or TV.	Never	Sometimes	Often	Always

4.12 Posttraumatic Cognitive Inventory

This questionnaire lists different thoughts that people may have after an assault. We are interested in the way that you thought in regard to the assault that you have experienced.

Please read each statement carefully and choose a number from the scale below which best describes how much you agreed or disagreed with the statement.

People react in many different ways; there are no right or wrong answers to these statements.

1	2	3	4	5	6	7
Totally Disagree	Disagree Very Much	Disagree Slightly	Neutral/ Neither Agree nor Disagree	Agree Slightly	Agree Very Much	Totally Agree

		Totally Disagree						Totally Agree
1.	My reactions since the assault mean that I am going crazy.	1	2	3	4	5	6	7
2.	I have to be on guard all the time.	1	2	3	4	5	6	7
3.	If people knew what happened they would look down on me.	1	2	3	4	5	6	7
4.	I feel different from other people because of my experience.	1	2	3	4	5	6	7
5.	I want to punish the people who did this to me.	1	2	3	4	5	6	7
6.	If I think about the assault, I will not be able to handle it.	1	2	3	4	5	6	7
7.	My life has been destroyed by the assault.	1	2	3	4	5	6	7
8.	People are not what they seem.	1	2	3	4	5	6	7
9.	I can't deal with even the slightest upset.	1	2	3	4	5	6	7
10.	If I stop being angry, the people who caused the assault will get away with it.	1	2	3	4	5	6	7
11.	I will never be able to feel normal emotions again.	1	2	3	4	5	6	7
12.	I disgraced myself during the assault.	1	2	3	4	5	6	7
13.	Nobody cares about me.	1	2	3	4	5	6	7

		Totally Disagree						Totally Agree
14.	I don't know myself any more.	1	2	3	4	5	6	7
15.	If people knew what happened, they would not respect me.	1	2	3	4	5	6	7
16.	Nothing good can happen to me anymore.	1	2	3	4	5	6	7
17.	The world is a dangerous place.	1	2	3	4	5	6	7
18.	I will never be able to forgive the people who did this to me.	1	2	3	4	5	6	7
19.	I have permanently changed for the worse.	1	2	3	4	5	6	7
20.	I am inadequate.	1	2	3	4	5	6	7
21.	People can't be trusted.	1	2	3	4	5	6	7
22.	If I stop being angry, what happened to me will be forgotten.	1	2	3	4	5	6	7
23.	Stopping feeling guilty is letting myself off the hook.	1	2	3	4	5	6	7
24.	I have to be especially careful because you never know what can happen next.	1	2	3	4	5	6	7
25.	People do not understand me.	1	2	3	4	5	6	7
26.	There is something wrong with me as a person.	1	2	3	4	5	6	7
27.	I feel dead inside.	1	2	3	4	5	6	7
28.	I will not be able to control my anger and will do something terrible.	1	2	3	4	5	6	7
29.	The way I behaved/thought/felt during the assault is unforgivable.	1	2	3	4	5	6	7
30.	I can't rely on myself.	1	2	3	4	5	6	7
31.	I will never be able to feel close to other people again.	1	2	3	4	5	6	7
32.	The assault has ruined my body/parts of my body.	1	2	3	4	5	6	7
33.	Since the assault, I feel like a cripple.	1	2	3	4	5	6	7
34.	I cannot accept the way my body has changed since the assault.	1	2	3	4	5	6	7

4.13 Safety Behaviours Questionnaire

After an assault, some people take extra precautions to make their lives and those of significant others safer. Since the assault, have you started to do any of the following things to feel safer?

Please indicate how often you take these precautions by circling the appropriate answer.

Please also indicate whether or not you have done them more often since the assault.

		This applies to me:				More often since the assault?	
1.	I overprotect those close to me.	Never	Sometimes	Often	Always	YES	NO
2.	I take precautions whatever I do.	Never	Sometimes	Often	Always	YES	NO
3.	I check carefully whether doors/ windows are locked.	Never	Sometimes	Often	Always	YES	NO
4.	I check for the quickest way to leave the situation.	Never	Sometimes	Often	Always	YES	NO
5.	I try to keep tight control of my mind.	Never	Sometimes	Often	Always	YES	NO
6.	I try not to let my feelings show.	Never	Sometimes	Often	Always	YES	NO
7.	I make sure I can always see what is going on.	Never	Sometimes	Often	Always	YES	NO
8.	I make extra efforts to make sure my surroundings are safe.	Never	Sometimes	Often	Always	YES	NO
9.	I check whether the people around me look suspicious.	Never	Sometimes	Often	Always	YES	NO
10.	I make sure I have a telephone near me so that I can call for help.	Never	Sometimes	Often	Always	YES	NO

11.	I plan what to do if things go wrong.	Never	Sometimes	Often	Always	YES	NO
12.	I check closely what is going on around me.	Never	Sometimes	Often	Always	YES	NO
13.	I put off going to sleep because of nightmares or in case of intruders.	Never	Sometimes	Often	Always	YES	NO

4.14 Affect Without Recall

Below is a list of experiences people sometimes have following a traumatic event. We are interested in times where people suddenly experience a feeling (e.g., afraid, horrified, sad, angry) or physical sensation (e.g., heart beating fast shortness of breath, feeling sick,) unrelated to what they were doing at the time, or stronger that they would have expected in that situation.

Please read each statement carefully and choose the answer that best describes how often this has happened to you in the past week.

0 Not at all

1 Once

2 2 to 4 times a week/half the time

3 5 or more times a week/nearly every day

I experienced a sudden change in how I felt for no apparent reason	0	1	2	3
I suddenly felt waves of feelings or physical sensations similar to how I felt in my trauma, when I hadn't noticed anything that reminded me of the event	0	1	2	3
I suddenly had a feeling or physical sensation unrelated to what I was doing at the time, or stronger that I would have expected in that situation.	0	1	2	3
I suddenly felt similar to how I felt in my trauma but without any pictures or memories of the trauma coming to mind	0	1	2	3
I suddenly experienced a particular feeling similar to how I felt in my trauma (please circle how often for each):				
Angry/irritable	0	1	2	3
Afraid	0	1	2	3
Sad	0	1	2	3
Ashamed	0	1	2	3
Guilty	0	1	2	3
Horrified	0	1	2	3
Helpless	0	1	2	3
Disgusted	0	1	2	3
My heart suddenly started beating fast for no apparent reason	0	1	2	3
I suddenly experienced another bodily sensation (e.g., breading into sweat, feeling sick, short of breath, etc.) for no apparent reason	0	1	2	3

I suddenly felt like something awful was about to happen	0	1	2	3

4.15 Dunn Worry Questionnaire

Please read the following statements and circle the numbers that best describe your experience in the past week.

None of the time 0

Rarely 1

Some of the time 2

Often 3

All of the time 4

I've been worrying a lot	0	1	2	3	4
In my mind I have been going over problems again and again	0	1	2	3	4
There was little I could do to stop worrying	0	1	2	3	4
I have been worrying even though I didn't want to	0	1	2	3	4
Worry has stopped me focussing on important things in my day	0	1	2	3	4
Worry has stopped me sleeping	0	1	2	3	4
Worry has caused me to feel upset	0	1	2	3	4
Worry has made me feel upset	0	1	2	3	4
Worry has made me feel stressed	0	1	2	3	4
Worry has made me feel anxious	0	1	2	3	4

4.16 Cognitive Flexibility Scale

The following statements deal with your beliefs and feelings about your own behaviour. Read each statement and respond by circling the number that best represents your agreement with each statement. i.e.:

1 = I "strongly disagree" with the statement

2 = I "disagree" with the statement

3 = I "slightly disagree" with the statement

4 = I "slightly" agree with the statement

5 = I "agree" with the statement

6 = I "strongly agree" with the statement

	Strongly Disagree					Strongly Agree
1. I can communicate an idea in many different ways	1	2	3	4	5	6
2. I avoid new and unusual situations	1	2	3	4	5	6
3. I feel like I never get to make decisions	1	2	3	4	5	6
4. I can find workable solutions to seemingly unsolvable problems	1	2	3	4	5	6
5. I seldom have choices when deciding how to behave	1	2	3	4	5	6
6. I am willing to work at creative solutions to problems	1	2	3	4	5	6
7. In any given situation, I am able to act appropriately	1	2	3	4	5	6
8. My behaviour is a result of conscious decisions that I make	1	2	3	4	5	6
9. I have many possible ways of behaving in any given situation	1	2	3	4	5	6
10. I have difficulty using my knowledge on a given topic in real life situations	1	2	3	4	5	6

11. I am willing to listen and consider alternatives for handling a problem	1	2	3	4	5	6
12. I have the self-confidence necessary to try different ways of behaving	1	2	3	4	5	6

4.17 Creative Experiences Questionnaire

Please read the following statements.

Answer Yes (by circling the Y) if you feel the statement applies to you.

Answer No (by circling the N) if you feel the statement does not apply to you.

As a child, I thought that the dolls, teddy bears, and stuffed animals that I played with were living creatures.	Y	N
As a child, I strongly believed in the existence of dwarfs, elves, and other fairy tale figures.	Y	N
As a child, I had my own make believe friend or animal.	Y	N
As a child, I could very easily identify with the main character of a story and/or movie.	Y	N
As a child, I sometimes had the feeling that I was someone else (e.g., a princess, an orphan, etc.).	Y	N
As a child, I was encouraged by adults (parents, grandparent, brothers, sisters) to fully indulge myself in my fantasies and daydreams.	Y	N
As a child, I often felt lonely.	Y	N
As a child, I devoted my time to playing a musical instrument, dancing, acting, and/or drawing.	Y	N
I spend more than half the day (daytime) fantasising or daydreaming.	Y	N
Many of my friends and/or relatives do not know that I have such detailed fantasies.	Y	N
Many of my fantasies have a realistic intensity.	Y	N
Many of my fantasies are often just as lively as a good movie.	Y	N
I often confuse fantasises with real memories.	Y	N
I am never bored because I start fantasising when things get boring.	Y	N
Sometime I act as if I am somebody else and I completely identify myself with that role.	Y	N
When I recall my childhood, I have very vivid and lively memories.	Y	N
I can recall many occurrences before the age of three.	Y	N

When I perceive violence on the television, I get so into it that I get really upset.	Y	N
When I think of something cold, I actually get cold.	Y	N
I often have the feeling that I can predict things that are bound to happen in the future.	Y	N
I often have the experience of thinking of someone and soon afterwards that particular person calls or shows up.	Y	N
I sometimes feel that I have had an out of body experience.	Y	N
When I sing or write something, I sometimes have the feeling that someone of something outside myself directs me.	Y	N
During my life, I have had intense religious experiences which influenced me in a very strong manner.	Y	N

4.18 Brief Core Schema Scale

This questionnaire lists beliefs that people can hold about themselves and other people. Please indicate whether you hold each belief by circling either NO or YES.

If you hold the belief (YES), then please indicate how strongly you hold it by circling a number 1-4. Try to judge the beliefs on how you have viewed yourself and others over the past week.

MYSELF			Believe it slightly	Believe it mod.	Believe it very much	Believe it totally
I am unloved	NO	YES →	1	2	3	4
I am worthless	NO	YES →	1	2	3	4
I am weak	NO	YES →	1	2	3	4
I am vulnerable	NO	YES →	1	2	3	4
I am bad	NO	YES →	1	2	3	4
I am a failure	NO	YES →	1	2	3	4
I am respected	NO	YES →	1	2	3	4

I am valuable	NO	YES → 1 2 3 4
I am talented	NO	YES → 1 2 3 4
I am successful	NO	YES → 1 2 3 4
I am good	NO	YES → 1 2 3 4
I am interesting	NO	YES → 1 2 3 4

OTHER PEOPLE			Believe it slightly	Believe it mod.	Believe it very much	Believe it totally
Other people are hostile	NO	YES →	1	2	3	4
Other people are harsh	NO	YES →	1	2	3	4
Other people are unforgiving	NO	YES →	1	2	3	4
Other people are bad	NO	YES →	1	2	3	4
Other people are devious	NO	YES →	1	2	3	4
Other people are nasty	NO	YES →	1	2	3	4
Other people are fair	NO	YES →	1	2	3	4
Other people are good	NO	YES →	1	2	3	4
	NO	YES →	1	2	3	4

Other people are trustworthy		
Other people are accepting	NO	YES → 1 2 3 4
Other people are supportive	NO	YES → 1 2 3 4
Other people are truthful	NO	YES → 1 2 3 4

4.19 Trait Dissociation Questionnaire

This questionnaire is concerned with how often people have certain experiences. Please read each question carefully, but do not spend too much time on each one. Please circle ONE response in answer to each question (For example, if you OFTEN find yourself doing things without knowing why, circle the '3' (often) on question 1. Remember, there are no right or wrong answers. We are interested in your personal experience

		Never	Rarely	Sometimes	Often	Mostly	Always
1.	I find myself doing things without knowing why.	0	1	2	3	4	5
2.	I cannot get angry about the things that should annoy me.	0	1	2	3	4	5
3.	I do many things which I regret afterwards.	0	1	2	3	4	5
4.	I feel that I am more than one person.	0	1	2	3	4	5
5.	I feel as if other people live in a different world.	0	1	2	3	4	5
6.	I feel that my mind is divided.	0	1	2	3	4	5
7.	I can't understand why I get so cross and grouchy.	0	1	2	3	4	5
8.	I feel distant from my own emotions.	0	1	2	3	4	5
9.	I don't know how to stop myself from doing something.	0	1	2	3	4	5
10.	I have problems remembering important details of stressful events.	0	1	2	3	4	5
11.	I have conflicting desires.	0	1	2	3	4	5
12.	I feel as though I am standing next to myself or watching myself do something and I actually see myself as if I were looking at another person.	0	1	2	3	4	5
13.	I feel unable to think straight.	0	1	2	3	4	5
14.	I feel emotionally numb (eg. feel sad but can't cry, unable to have loving feelings).	0	1	2	3	4	5
15.	I feel that I am floating beside my body, and watching it from "outside".	0	1	2	3	4	5

16. I feel that my personality is split into distinct parts. 0	1	2	3	4	5
17. I find it difficult to feel real emotions, such as pain, happiness, sadness or anger. 0	1	2	3	4	5
18. I feel that other people, objects, and the world around me are not real. 0	1	2	3	4	5
19. I find it difficult to respond to others in a sympathetic way. 0	1	2	3	4	5
20. Things seem to go by faster or slower than they really do. 0	1	2	3	4	5
21. I find myself dressed in clothes that I don't remember putting on. 0	1	2	3	4	5
22. I find myself in a place and have no idea how I got there. 0	1	2	3	4	5
23. I find new things among my belongings that I do not remember buying. 0	1	2	3	4	5
24. My moods can really change. 0	1	2	3	4	5
25. I find writings, drawings, or notes among my belongings that I must have done but cannot remember doing. 0	1	2	3	4	5
26. I have no memory for some important events in my life (for example, a wedding or graduation). 0	1	2	3	4	5
27. I live in a world of my own where no one can reach me. 0	1	2	3	4	5
28. I look at my watch and am surprised at the time it shows. 0	1	2	3	4	5
29. My memory of upsetting events is patchy. 0	1	2	3	4	5
30. I say things without meaning to. 0	1	2	3	4	5
31. I underestimate or overestimate the amount of time that has passed. 0	1	2	3	4	5
32. If something upsetting happens, I find it difficult to remember afterwards. 0	1	2	3	4	5
33. I feel like I don't belong. 0	1	2	3	4	5
34. The world seems unreal or strange. 0	1	2	3	4	5
35. I am able to ignore pain. 0	1	2	3	4	5

36. I feel that there are two of me. 0 1 2 3 4 5

37. I feel distant and cut off from others around. 0 1 2 3 4 5

38. I have difficulty concentrating. 0 1 2 3 4 5

4.20 Insomnia Sleep Index

1. Please rate (by circling) whether in the past week you have had:

a. Difficulties falling asleep: None Mild Moderate Severe Very severe

b. Difficulty staying asleep: None Mild Moderate Severe Very severe

c. Problem waking up too early: None Mild Moderate Severe Very severe

2. How satisfied/dissatisfied are you with your current sleep pattern?

Very satisfied Satisfied Neutral Dissatisfied Very dissatisfied

3. If you have problems with sleep, to what extent do you consider it to interfere with your daily functioning (e.g. daytime fatigue, ability to function at work/daily chores, concentration, memory, mood etc):

Not at all interfering A little Somewhat Much interfering Very much interfering

4. If you have problems with sleep, how noticeable to others do you think it is in terms of impairing the quality of your life?

Not at all noticeable A little Somewhat Much noticeable Very much noticeable

5. How worried/distressed are you about a current sleep problem?

Not at all A little Somewhat Much Very much

7.1 Participant Information Sheet (sleep study)



Milton Keynes University Hospital NHS
NHS Foundation Trust

Participant Information Sheet – Psychological Reactions to an Assault.

(Including Sleep Monitoring)

You are being invited to take part in a research study. Before you decide, you need to understand why the research is being carried out and what it would involve for you. This information sheet should provide you with all the information you require to make a decision, but please ask if anything is unclear or if you would like further information.

Key Information:

- Everyone attending Milton Keynes' Accident and Emergency Department (A&E) for treatment of injuries sustained in an assault are being invited to participate in this study.
- The aim of the study is to learn about typical reactions to an assault.
- The study is in four parts:
  - Sleep monitoring phase;
  - A two hour assessment within 10 days of your A&E admission;
  - Completion of a 30 minute self-report questionnaire at 12 weeks (this can be done by email or over the phone);
  - A final 30 minute self-report questionnaire at 24 weeks (this can be done by email or over the phone).
- You will be compensated for your time.
- You are free to leave the study and withdraw your data at any time, without giving a reason and without any negative consequences.

What is the purpose of this study?

Every year thousands of people attend A&E Departments as a result of an assault. This study concerns reactions to the assault in the weeks following. We want to find out how many people have difficulties coping with the incident (e.g. remain distressed by it) and how many people are relatively unaffected by the incident (e.g. rarely think about it). Importantly, we want to identify the factors that may predict the different reactions. This information will be written up and can be used to help others who experience an assault in the future.

The study is a collaboration between the Accident and Emergency Department at Milton Keynes Hospital and the University of Oxford. The data from this study will contribute to a doctoral thesis.

Why have I been invited to take part?

Over the course of a year we are contacting everyone who has experienced an assault and attended the A&E Department in order to invite them to participate in this study.

Do I have to take part?

No, it is completely up to you whether or not you take part in the study. If you do decide to take part you can leave the study and withdraw your data at any time, without giving a reason and without any negative consequences.

What will happen if I do take part?

The study is in four parts over the next 24 weeks.

You will be loaned a small wristwatch-style device, an actigraphic watch, to wear in the days following your A&E admission. This will collect data on your activity levels – allowing us to record your sleeping patterns. You will also be asked to fill in a diary-style sheet for each day, reporting hours of sleep.

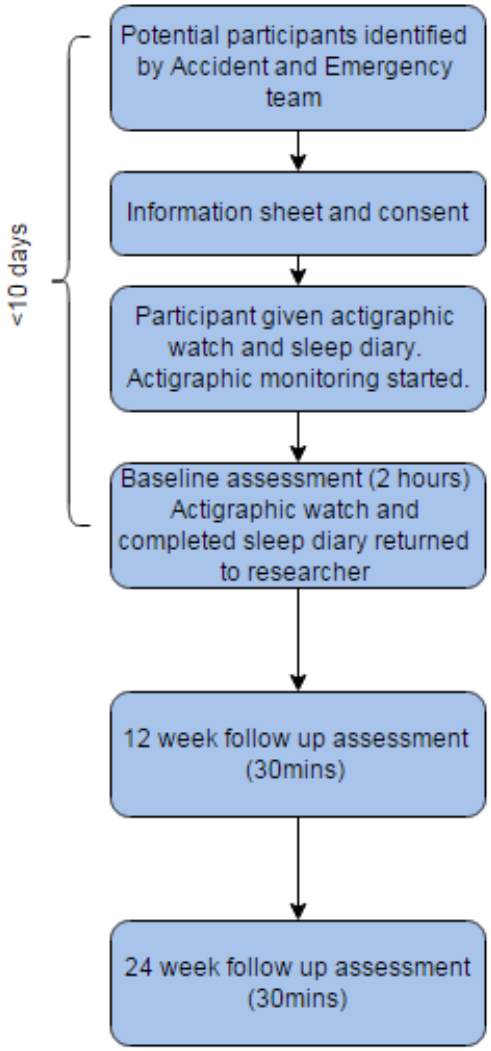
You will then be asked to come back to the hospital to complete a two hour assessment within 10 days of your A&E admission. The assessment will include questions concerning:

- Brief details about the assault (e.g. *how many people were involved?*)
- Your thoughts and feelings during the assault (e.g. *How much does the statement 'I felt frozen' apply to your personal experience during the assault?*)
- How the assault has impacted on you (e.g. *In the past week how much were you bothered by repeated, disturbing dreams of the stressful event?*)
- Your emotional state and thoughts about yourself and others (e.g. *How much do you believe the statement 'I am successful'*?)
- Whether negative events have happened in your life (e.g. *Have you experienced or witnessed military combat or a warzone?*)
- Psychological processes such as worry and rumination (e.g. *In the past week has worry stopped you from sleeping?*)
- Certain experiences (e.g. *Do you ever find yourself doing things without knowing why?*)

While the assessment will be carried out sensitively it is possible that you may find some of the questions upsetting. You are free to ask for a break at any time and do not have to answer any questions you are uncomfortable answering

At the 12 week and 24 week follow up assessments you will be sent, by post or by email, a questionnaire that will ask you questions relating to how you are currently feeling. This should take no longer than 30 minutes to complete. It would be possible to arrange for these assessments to be done over the telephone if preferred.

STUDY OUTLINE



Will I be compensated for my time?

You will be compensated for your time. For completion of the whole study you would receive £40. (If you would prefer not to do the sleep monitoring and did only the assessments you would receive £30). In the event of withdrawal from the study compensation will be appropriate to the proportion of the study completed. Travel expenses will not be covered.

Are there any potential risks in taking part?

The potential for risk in this study is very low. However, you will be asked about how you feel and for some brief details of the assault (although you will not be required to talk about the incident in any depth). It is possible that some people may find this upsetting, although some people find it helpful. Of course, you do not have to answer any question you do not want to and are free to take a break whenever you feel the need. If any problems are identified during the assessment you will be offered information and contact details for local services and, if you want, the researcher can write to inform your GP.

If you decide to take part in the sleep monitoring there will necessarily be limited time between being given this information and giving your consent to participate. It is very important, therefore, that you are aware that we will not receive any of the data from the watch and your sleep diaries until your baseline assessment. If, in the run up to the baseline assessment, you change your mind about taking part in the sleep monitoring then you are free to take off the watch and request that all data be deleted.

What are the possible benefits of taking part?

Participants sometimes find the research process helpful but it is not possible to guarantee any direct benefits of taking part.

Will my taking part in the study be kept confidential?

All information collected during the study will be kept in strict confidence subject to legal requirements. You will be allocated a participant identification number so your name will not appear on any of your assessments. No individual data will be shared with anyone outside the immediate team. The only exception to this is that responsible members of the University of Oxford may be given access to data for monitoring and/or auditing purposes, to ensure we are complying with all regulations. Data will be stored securely in a locked database.

What will happen with the data from this study?

The data from this study will contribute to a doctoral thesis. On successful submission of the thesis, it will be deposited both in print and online in the University archives, to facilitate its use in future research. The data will also be used to generate research papers that will be distributed online and on

paper in academic journals – some of these may be openly accessible. No data which can identify individuals will be published in the scientific report of the study. If you would like, you can receive a copy of the report.

What will happen if I don't want to carry on with the study?

Participation in the study is voluntary. You are free to withdraw from the study at any point. You are not required to give a reason for your withdrawal and it will not affect the care you receive. You can withdraw from the sleep monitoring by simply removing the actigraphic watch and no longer completing the sleep diary. If you wish to withdraw from the whole study then you can return the actigraphic watch to Milton Keynes hospital or contact the researcher to arrange collection. If you are only withdrawing from the sleep monitoring then you can bring the actigraphic watch to your baseline assessment.

Who is organising and funding the study?

The study is a collaboration between the Accident and Emergency Department of Milton Keynes Hospital and the University of Oxford. The study is funded and sponsored by the University of Oxford.

Who has reviewed the study?

All research in the NHS is reviewed by an independent group of people, called a Research Ethics Committee to protect your interests. This study has been reviewed and given favourable opinion by South-Central Oxford C Research Ethics Committee.

What if there is a problem?

The University of Oxford, as sponsor, has appropriate insurance in place in the unlikely event that you suffer any harm as a direct consequences of your participation in this study. If you wish to complain about any aspect of the way in which you have been approached or treated during the course of the study, you should contact Georgina Geddes at georgina.geddes@psych.ox.ac.uk or on 01865223949. Alternatively you can contact the University of Oxford Clinical Trials and Research Governance (CTRG) office on 01865 572224, or the head of CTRG, email ctrg@admin.ox.ac.uk.

Where can I find independent information about taking part?

You are free to seek independent advice about taking part from your GP and/or care team or you can contact the NHS Patient Advisory Liaison Service. www.pals.nhs.uk.

THANK YOU FOR TAKING THE TIME TO READ THIS INFORMATION SHEET

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Victim Support

Victim Support is an independent national charity which helps people affected by crime. They provide free and confidential support to help you deal with your experience, whether or not you report the crime. Their national telephone number is 0808 16 89 111 and their website address is www.victimsupport.org.uk