University of Southampton

Faculty of Environmental and Life Sciences

School of Psychology

An Investigation of Associations Between Attachment, Dissociation, and Psychotic Type Experiences

by

Joseph Francis Puckett

ORCID ID 0000-0002-6447-5190

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Abstract

Psychosis is characterized by several different symptoms, particularly auditory hallucinations and paranoia. These symptoms are recognized to occur across a continuum from healthy, non-clinical individuals to clinical populations. Research has begun to consider what psychological mechanisms may explain these symptoms and be targeted for treatment. Theory suggests early relational trauma leads to insecure attachment styles which predisposes dissociation and, which in turn, leads to psychotic symptoms. Insecure attachment styles and dissociation are associated with psychotic-type symptoms, but little research has considered them together in studies. Furthermore, limited experimental research has considered how they relate to each other and, in turn, to psychotic experiences.

This thesis incorporates a systematic review investigating the role of attachment styles and dissociation in psychotic symptoms. A small number of studies examined the associations between these factors, several of which were unpublished, and nearly all taking a correlational approach. The main finding of this systematic review was that dissociation and psychotic symptoms are associated, with some evidence that dissociation served a mediating and possibly moderating role between both early trauma and insecure attachment styles and the development of psychotic symptoms.

An experimental study aimed to test the proposed theoretical relationship between disorganized attachment, dissociation and auditory hallucinations using attachment imagery priming and to explore the possible benefits of secure imagery priming. One-hundred and twenty-eight individuals highly predisposed to auditory hallucinations were recruited online and randomized into two conditions and exposed to either secure or disorganized attachment imagery. This study hypothesized disorganized attachment imagery would increase dissociation and hallucinatory experiences, while secure imagery would decrease them. This study found dissociation increased across conditions, but auditory hallucinatory experiences did not increase as expected. Secure imagery priming decreased paranoia, suggesting that it may have clinical value in managing distress for people who hear voices.

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Research Thesis: Declaration of Authorship

Print name: JOSEPH PUCKETT

Title of thesis: An investigation of associations between attachment, dissociation, and psychotic type experiences

I declare that this thesis and the work presented in it are my own and has been generated by me as the result of my own original research.

I confirm that:

This work was done wholly or mainly while in candidature for a research degree at this University;

Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;

Where I have consulted the published work of others, this is always clearly attributed;

Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;

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Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;

None of this work has been published before submission.

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Definitions and Abbreviations

AHs – Auditory hallucinations

AHE/AHEs – Auditory hallucinatory experiences

The Role of Attachment and Dissociation in Psychotic Experiences: A Systematic Review

Joseph. F. Puckett

Department of Psychology, University of Southampton

Doctorate of Clinical Psychology

Katherine Newman-Taylor & Monica Sood

The following paper has been prepared for submission for "Clinical Psychology and Psychotherapy". The submission guidelines can be found in Appendix A.

Word Count: 6500

Abstract

Purpose

Insecure attachment styles and dissociation are theorised to play a role in the development of psychotic experiences. There is substantial evidence for the relevance of these processes individually but not when integrated together. Therefore, this systematic review aimed to review research that examined associations between attachment styles, dissociation and psychotic experiences in clinical and non-clinical samples, and how insecure attachment and dissociation, together, predict psychotic symptoms.

Methods

Five databases were searched (PubMED, Web of Science, PsycINFO, CINAHL and ETHOS) for published and unpublished research examining attachment style and dissociation in relation to clinical and non-clinical psychotic symptoms. Two independent reviewers extracted the data and quality assessed the studies.

Results

We identified 239 potential articles and reviewed 10 (in which 1256 participants participated). Inconsistent associations were found between fearful attachment, dissociation, and auditory hallucinations. There were more consistent associations between fearful attachment, dissociation, and paranoia, though limited in number. There was some evidence for the mediating role of dissociation in the

association between (a) fearful attachment and auditory hallucinations (b) early adversity and positive and negative psychotic symptoms.

Conclusions

This review suggests dissociation has a stronger mediating role than fearful attachment in the relationship between trauma and psychotic symptoms. Dissociation consistently mediated the effect of childhood adversity and fearful attachment on AHs. Reliance on self-report and correlational methods limit the results. Future research should use experimental and longitudinal methods to improve understanding of the causal links between attachment, dissociation, and psychotic symptoms.

Practitioner Points

- Clinicians should routinely assess dissociation when working with people with psychosis.
- Clinicians should consider dissociation in individual formulations if relevant to the development and maintenance of psychotic symptoms.
- Clinicians should be familiar with methods of managing dissociation when working with people with psychosis and incorporate these into their treatment plans.

The Role of Attachment and Dissociation in Psychotic Experiences: A Systematic Review

Conceptualising Psychotic Experiences

Psychosis refers to a severe mental health problem, where auditory hallucinations (AHs) and persecutory delusions/paranoia are present without insight (Arciniegas, 2015). AHs have been defined as hearing a voice in the absence of the appropriate sensory stimulus (Thakur et al., 2021). Paranoia is an unfounded or exaggerated belief, often persecutory or conspiratorial in nature, with themes of interpersonal threat, which range in degree from suspiciousness to persecutory delusions (Freeman & Garety, 2014). Individuals may also experience restricted emotional expression, poverty of speech, decreased motivation for goals or social interactions as well as reduced ability to experience pleasure (Kirkpatrick et al., 2006). These symptoms are referred to as negative symptoms. AHs occur in 75% of schizophrenia cases where they are most prevalent, and persecutory delusions occur in 70% of first episode of psychosis cases (Choong et al., 2007). Approximately 15-25% of people with psychosis experience negative symptoms (Buchanen, 2006). However, these experiences are not found solely in psychotic disorders; both AHs and persecutory delusions occur in a range of other disorders and are common among the general population, while negative symptoms are also present in other disorders (Freeman et al., 2005; Leede-Smith et al., 2013; Strauss, et al, 2018).

Increasingly, it has become recognised that the symptoms outlined above may occur along a continuum in the general population, ranging from non-clinical to clinical levels (Cooke, 2017). Psychotic experiences occur less frequently and with lower severity in non-clinical individuals than those with clinical presentations

(Verdoux et al., 2002) and are commonly referred to as 'psychosis proneness', 'psychotic experiences', 'schizotypy' or 'at-risk mental states' in non-clinical populations. Continuum models of psychosis recognise that psychotic-type experiences are observable and measurable in the general population as well as clinical populations with psychosis and other disorders (van Os et al., 2009). Therefore, mechanisms relevant to clinical populations can be investigated in non-clinical populations using analogue studies. These mechanisms may be appropriate targets for treatment and inform symptom specific approaches, which have been shown to be more effective than global treatment approaches such as Cognitive Behavioural Therapy for Psychosis (Lincoln & Peters, 2018). The BPS recommends taking an approach where symptoms are seen as "experiences" and individuals are supported to understand and cope with them through individualised assessment and formulation. Inclusion of such mechanisms can better inform psychological formulations (Cooke, 2017).

Several factors have been identified in the development of psychotic experiences across the psychosis continuum. AHs are thought to develop due to failure to recognise thoughts and mental events as self-generated (source monitoring deficits; Waters et al., 2012a), as well as deficits in executive and inhibitory control and negative emotional states (Waters et al., 2012b). Meanwhile, a worry thinking style, negative thoughts about self, interpersonal sensitivity, anomalous internal experience, insomnia, and faulty reasoning have been implicated in the development of paranoia (Freeman et al., 2014). Negative symptoms may be associated with depression experienced due to AHs or paranoia, or depression may be a mechanism by which psychosis arises (Hardy, 2017). Recently, two further factors have been

identified in the development of paranoia, AHs and negative symptoms: insecure attachment styles and dissociation.

Attachment

Attachment theory (Bowlby, 1977) suggests early interactions between infants and primary caregivers (termed 'attachment figures') lead to the development of *internal working models*. These models represent the self and others and influence thoughts, feelings, and actions in later relationships (Bowlby, 1977). Three patterns of attachment have been observed in children using the Strange Situation: secure, insecure-avoidant, and insecure-anxious (Ainsworth et al., 1978). These patterns are sometimes referred to as *organized* patterns of attachment. A secure attachment style develops when a caregiver is available both emotionally and physically to a child. Secure attachment in adulthood has been linked with a positive view of the self, improved distress tolerance and valuing close relationships (Mikulincer & Shaver, 2012). Anxious attachment (sometimes referred to as preoccupied attachment in adults) is characterised by high levels of anxiety and ambivalence towards attachment figures and loved ones in later life. Avoidant attachment (sometimes referred to as dismissive attachment in adults) is characterised by low levels of anxiety, and avoidance of an attachment figure who may be dismissing or rejecting of a child's attempts to engage with them (Mikulincer & Shaver, 2010)[1].

[1] Several different terms are used to describe different forms of insecure attachment style. In this review the terms anxious, avoidant and disorganised are used to represent the three types of insecure attachment.

Insecure attachment styles develop due to disturbances in early relationships and have strong associations with poor mental health in adulthood (Mikulincer & Shaver, 2012). This has been demonstrated for psychotic symptomology, with research showing positive associations between insecure attachment styles and paranoia, voice severity and voice related distress (Korver-Nieberg et al., 2014; Lavin et al., 2019; Berry et al., 2012).

Sometimes an infant will not fall into any of these categories and will score highly in both insecure patterns – this pattern of attachment is recognised as *disorganized* attachment (Main & Solomon, 1990). Disorganized attachment is thought to develop due to a child's relationship with a caregiver who appears frightening, confused or erratic, possibly due to their own unresolved traumas (Main & Hesse, 1990).

In adults, one way these attachment styles are represented by the combination of positive and negative beliefs about the self and others and are broken down into four styles, secure, dismissive, preoccupied, and fearful (Bartholomew & Horowitz, 1991). Fearful attachment has been argued to be analogous to disorganized attachment and is often used to study disorganized attachment in adults (Alexander, 1992). Fearful attachment is characterised by the desire for close relationships but also simultaneously the fear and avoidance of them (Bartholomew & Horowitz, 1991). Fearful attachment combines both a negative image of self in preoccupied attachment and a negative image of others typical of dismissive attachments. However, Paetzold et al. (2015) propose that disorganized attachment is a distinct concept from attachment anxiety and avoidance and coexists alongside them and therefore may not be captured by fearful attachment, which is often

conceptualised by high degree of both attachment anxiety and avoidance. The Dynamic Maturation Model of Attachment Theory (DMM: Crittenden, 2006) has developed the understanding of disorganized attachment further, differentiating coping strategies instead of labelling them all as disorganized; however, this model has not yet been applied to the development of psychotic symptoms unlike the model (Cognitive Attachment Model of Voice Hearing, Berry et al, 2017) discussed later in this introduction.

Links Between Dissociation and Attachment in the Development of Psychotic Symptoms

Dissociation is defined as a lack of normal integration of thoughts, feelings, and experiences into the stream of consciousness and memory (Bernstein, 1986). Dissociative experiences range from gaps in memory (amnesia), out of body experiences and distortions of a person's sense of body (depersonalisation), distortions of visual perception (derealization) to fragmentation of the sense of self (identity disturbance) (Bremner et al., 1998). Dissociation is most associated with trauma, with some researchers suggesting it is a defence mechanism aimed at reducing the emotional and physical pain of trauma, while others have suggested that it is direct consequence of trauma (Dorahy & van der Hart, 2007; Ogawa et al., 1997). Trauma and dissociation are positively correlated in both non-clinical and clinical populations (Dalenberg, et al., 2012). Robust associations have also been found between dissociation and hallucinations and paranoia in previous systematic reviews and meta-analyses (Longden et al., 2020; Pilton et al., 2015). Associations between negative symptoms and dissociations have been found to be small and some cases not significant in systematic reviews (Longden et al., 2020).

Disorganized attachment has been theorised to be an early dissociative process (Liotti, 2009). The attachment system is meant to draw a child towards their caregiver, however when their caregiver is perceived as frightening, a child's fight or flight system will be activated alongside the attachment system, urging them to back away from their caregiver. Therefore, disorganized attachment is one way in which dissociation may become an adaptive way of coping with early relational trauma, allowing a child to maintain their relationship with their caregiver despite the two contradictory messages they are receiving (Liotti, 1992). Longitudinal research shows early disorganized attachment is likely to predispose individuals to dissociate in later life (Carlson, 1998; Ogawa, et al, 1997; Hesse & van IJzendoorn, 1998).

The link between attachment and dissociation has been extended by Berry et al. (2017) in their Cognitive Attachment Model of Voice Hearing (CAV; see Appendix B). This model incorporates cognitive, attachment and dissociative processes to conceptualize the development and maintenance of distressing voices. In the CAV, voices are conceptualised as dissociated, trauma-related memories. Source monitoring problems lead to these being experienced as external rather than as internal memories. An assumption of the CAV is that an individual's predisposition to experience dissociative states of self is determined by the development of a disorganized attachment style due to early childhood adversity. Insecure attachment styles then influence how individuals cope with, relate to, and appraise the voices they hear, leading to high levels of distress and paranoia (Humphrey et al., 2022). Negative symptoms may represent an avoidant attachment coping style as people withdraw to cope with positive symptoms (Hardy, 2017). To date there has been no synthesis of research examining the role of both attachment style and dissociation in psychotic experiences. Thus far, systematic reviews have

looked at attachment and dissociation separately in relation to psychotic experiences (Lavin, et al., 2019; Longden et al., 2020; Pilton et al., 2015).

Aim of the Current Review

Early disrupted attachment and dissociation due to traumatic experiences are likely to contribute to the development of psychotic experiences. It has been theorised that disorganized attachment specifically increases proneness to dissociate as a method of coping with relational trauma which, in turn, leads to the development of psychotic experiences. However, most reviews have focused on research which has looked at the associations between only two of these concepts i.e., attachment and psychotic symptoms or dissociation and psychotic experiences. The aim of this systematic review is to examine evidence for the combined and relative impact of attachment and dissociation in the development and maintenance of psychotic experiences.

Methodology

Search Procedure

The present study followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA; Page et al., 2020) to identify published and unpublished quantitative empirical studies researching attachment style and dissociation in people with psychotic symptoms. To ensure a comprehensive review of the literature, we searched five databases including PubMED, Web of Science, Psych Info, CINAHL and British Library EThOS (for unpublished dissertations) from their inception to 01.12.2021. We utilised three search strings; dissociat* OR "multiple personalit*" OR depersonalisation OR depersonalization OR derealisation or derealization OR absorption AND attachment OR "attachment theory" OR "internal working models" OR "felt security" AND psychos?s OR psychotic OR schizophreni* OR schizotypy OR paranoi* OR delusion* OR hallucinat* OR voices. The references and citations of previous relevant reviews and eligible articles were also hand-searched.

Inclusion and Exclusion Criteria

Inclusion criteria were: (1) studies which used quantitative methodology, (2) studies which used a standardised measure of attachment, (3) studies which used a standardised measure of dissociation, (4) studies which used a standardised measure of psychosis type experiences/psychotic symptoms (e.g., AHs/paranoia)/or recruited a sample with psychosis/psychotic symptoms and (5) published in the English language.

Exclusion criteria were: (1) studies which used only qualitative methodology (given our focus on the quantitative association between attachment and dissociation); (2) studies not published in the English language, and (3) books, book reviews, book chapters, conference extracts, case reports or other systematic reviews.

Screening and Data Extraction

Figure 1 shows the flow of studies through the different phases of the systematic searches. We established eligibility at two stages: (1) title and abstract and (2) full text article searches. Data was extracted by the author and an independent researcher(ST).

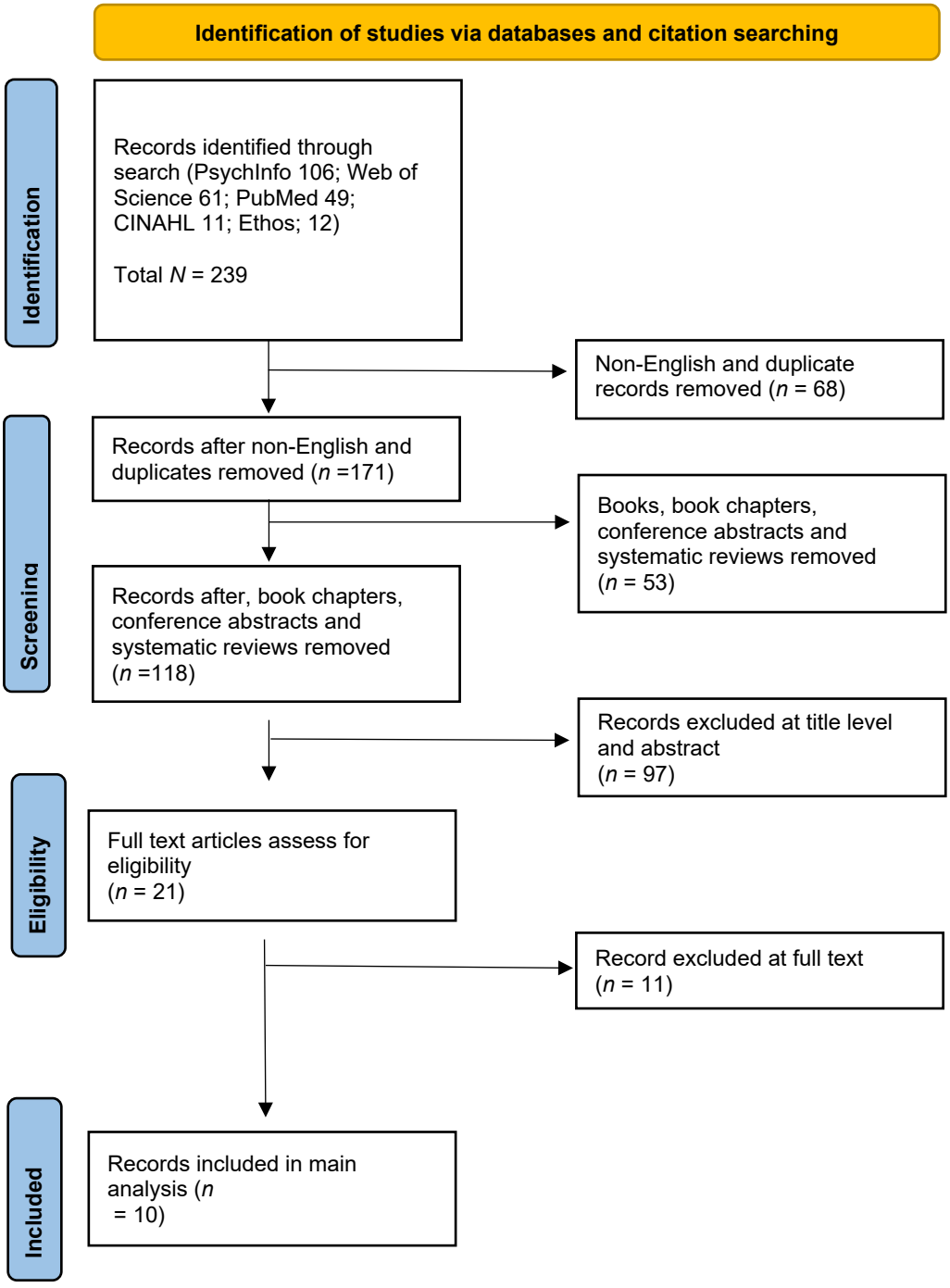
Quality Assessment

Eligible cross-sectional and experimental studies were assessed using the Joanna Briggs Institute (JBI) Checklist for Analytical Cross-Sectional Studies (JBI-CACSS) and the JBI Checklist for Quasi Experimental Research (JBI-CQER) (Moola et al., 2017). The JBI-CACSS is the preferred tool for the quality assessment of cross-sectional research (Ma et al., 2020). The JBI-CACSS asks eight questions concerning: (1) inclusion criteria, (2) study subjects and setting, (3) exposure of interest, (4) measurement of the condition, (5) confounding factors, (6) management of confounders, (7) validity and reliability of measurement, and (8) appropriate data analysis. The JBI-CQER ask nine questions concerning: (1) clarity of variables, (2) similarity of participants, (3) additional treatments, (4) presence of control group, (5) outcome variable measure pre and post, (6) follow up, (7) outcome measure fairly between groups (8) reliability of measures, (9) statistical analysis. Items on both are rated yes/no/unclear/not applicable. No overall rating is given. Following Mel et al.

(2018), studies were rated as: (1) low risk of bias, if 75% JBI criteria scored "yes"; (2) moderate risk of bias, if 50-74% JBI criteria scored "yes"; or (3) high risk of bias, if less than 49% JBI criteria scored "yes". The author and an independent researcher completed an independent quality assessment; any disagreements were resolved through discussion and with another member of the research team (KNT or MS).

Figure 1

Paper Selection Flow Chart



Results

Ten studies were found to meet inclusion criteria. Details of all studies can be found in Table 1. All were cross-sectional in design and conducted in the United Kingdom (*n* = 9) or Spain (*n* = 1; Mertens et al., 2021).

Demographic Characteristics

A total of 1256 participants participated across all 10 studies; of which approximately half identified as female (52%). Four studies accounted for 707 of the 1256 participants. Seven studies recruited clinical samples (*n* = 913; 72.7%) and the predominant diagnosis among these participants was schizophrenia (*n* =337; 30%). The ages of the sample ranged from 20 to 41.3 years. Mean ages for individual studies can be found in Table 1. Two studies did not report the average age of their participants. Nine studies recruited samples based in the United Kingdom while one recruited a sample from Spain. Seven studies reported participants' ethnicity; of these, approximately half identified as white (55%).

Measures

Attachment

Four measures of attachment were used across the 10 studies. The majority (*n* = 7) used the Relationship Questionnaire (RQ; Bartholomew & Horowitz, 1991) and two studies used the Relationship Style Questionnaire (RSQ; Griffin & Bartholomew, 1994). These measures yield broadly comparable but slightly different subscales. The RQ is a 4-item self-report measure assessing attachment across four dimensions; secure, fearful-avoidance (fearful attachment), dismissive-avoidance

(avoidant attachment) and preoccupied (anxious attachment). These represent the four different combinations of positive and negative working models of the self and others conceptualized as representing attachment in adulthood (Bartholomew & Horowitz, 1991) The RSQ is a 30-item measure assessing an individual's subjectively reported attachment style in close relationships along four dimensions; secure, fearful, dismissing, and preoccupied. The secure scale indicates positive views of the self and other, the fearful scale indicates negative perceptions of self and others, the preoccupied scale defines negative views of the self and positive views of the others while the dismissing scale relates to high levels of self-confidence and negative views of others. The Psychosis Attachment Measure Revised (PAM-R: Pollard et al., 2020) was used by two studies. The PAM-R is a 23-item measure assessing attachment styles in psychosis and has three subscales, avoidant, anxious and disorganized. Pollard et al (2020) also used the Adult Disorganized Attachment (ADA: Paetzold et al., 2015), a 9-item measure of disorganized attachment.

Dissociation

One measure of dissociation was used across all 10 studies, the Dissociative Experiences Scale – Revised (DES – II; Carlson & Putnam, 1993). The DES – II consists of 28 items and yields three subscales: depersonalisation/derealization, amnesia and absorption. The three subscales can be combined to yield a total dissociation score. Degnan, (2020) also used the Personality Structure Questionnaire (PSQ; Pollock et al., 2001) which is a measure of personality integration which can be impacted by dissociation. The PSQ is an 8-item self-report measure which asks respondents to rate two contrasting statements on which most applies to themselves.

Psychotic Experiences

Five different measures of psychotic experiences were used across the 10 studies. Four studies used the Positive and Negative Syndrome (PANSS; Kay et al., 1987) and four studies used the Community Assessment of Psychotic Experience (CAPE; Konings et al., 2002). The PANSS is a 30-item semi-structured clinical interview that assesses the presence and severity of general psychopathology as well as the positive and negative symptoms of schizophrenia (Sitko, 2015; Austin, 2011). The CAPE is a 42-item self-report questionnaire measuring frequency and distress of positive, negative, and depressive symptoms. One study used just the auditory hallucinations and paranoia specific items of the CAPE (Pearce et al., 2017). Two studies used the Launay Slade Hallucination Scale (LSHS; Bentall & Slade, 1985), a 12-item measure of auditory and visual hallucinations and vivid mental events. One study used the Revised Launay Slade Hallucination Scale: Auditory Subscale (LSHS-R [AH]; Morrison et al., 2000) which is a revised form of the LSHS used to distinguish auditory and visual hallucinations. Mertens et al. (2021) used two measures of paranoia, the 8-item self-report suspiciousness subscale of the Schizotypal Personality Assessment Questionnaire (SPQ; Raine, 1991) and the Structured Clinical Interview for DSM-IV Axis-II disorders (SCID-II; Gibbon et al., 1997). One study (Degnan, 2020) used the Self-evaluation of Negative Symptoms (SNS; Dollfus et al., 2015), a 20 item self-report measure of negative symptoms across 5 domains; social withdrawal, avolition, alogia, anhedonia and diminished emotional range. Degnan (2020) combined the scales to create two subscales for expressive and experiential symptoms.

Study Quality Assessment and Limitations

The results of the quality assessment are reported in Table 2, with overall scores also reported in Table 1. Two of the studies had a moderate risk of bias for correlational research due to lack of sufficient information regarding their sample (ethnicity, employment, education) and not controlling for confounders. The majority were considered to have a low risk of bias which suggests we can be confident in the validity of the results. The average ages of the samples were significantly lower for the non-clinical research compared to the clinical research.

All but one study (Mertens et al., 2021) relied solely on self-report measures to measure their exposure and outcome variables which may be subject to participant bias. There was heterogeneity between studies in terms of the inclusion and exclusion criteria and how individual studies defined their populations. Of the 10 studies, only five reported a power calculation and, of these, only four achieved a sample size of sufficient power (0.80). Many of the studies included were unpublished and therefore have not been peer reviewed. Therefore, interpretation of these studies results is tentative.

A narrative synthesis of the findings follows - this was chosen over a meta-analysis due to the heterogeneity of the studies included in this review, their methodological limitations and differing sample characteristics and size.

What is the Relationship Between Attachment and Dissociation and Psychotic Type Experiences?

Six of the ten studies investigated the relationship between attachment, dissociation, and AHs explicitly (Berry et al., 2018; Pearce et al., 2017; McGonagle,

2017; Sitko, 2015; Williams, 2017; Wong, 2016). One was in a non-clinical population of university students (Berry et al, 2018), while the others were in clinical populations with people with psychosis. Five also measured different forms of trauma. Four studies examined relationships between attachment, dissociation and paranoia explicitly (Pearce et al; 2017; McGonagle, 2012; Mertens et al, 2021 and Sitko, 2015) with only one within a non-clinical population (Mertens et al, 2021). Austin (2011), Pollard et al. (2020) and Degnan (2020) only refer to 'positive symptoms' and do not differentiate between hallucinations or paranoia. Degnan (2020) was the only study which measured negative symptoms.

Associations between Attachment Styles and Dissociation

In a non-clinical sample, Berry et al. (2018) found significant positive correlations between both anxious and avoidant attachment and dissociation. In another non-clinical sample, a small negative association was found between secure attachment and dissociation while small positive correlations between both preoccupied attachment and fearful attachment and dissociation (Mertens et al., 2021). This possibly suggests that more securely attached individual experience less dissociation while insecurely attached individuals may experience greater levels of dissociation; however, the moderate risk of bias in Mertens et al.'s (2021) study suggest the results should be interpreted with caution.

Out of six studies with clinical samples, three (Pearce et al., 2017; McGonagle, 2017 and Williams, 2017) found that fearful attachment was correlated with dissociation.. Two studies found, medium to large positive associations between disorganized attachment and dissociation (Degnan, 2020, Pollard et al, 2020). However, Sitko (2015) found no association between attachment and dissociation.

Austin (2011) did not examine the association between attachment and dissociation but found that secure attachment was the highest rated attachment style in a clinical sample.

In summary, insecure attachment styles seem to predict greater dissociation in non-clinical and clinical populations. Fearful/disorganized attachment seemed to be the main attachment style associated with dissociation in clinical populations.

Associations between Attachment Styles and Psychotic Experiences

In a non-clinical population, Anxious and avoidant attachment were positively correlated with greater voice predisposition (Berry et al., 2018). Small to medium positive association were found between preoccupied and fearful attachment and self-reported and interview-based measures of paranoia (Mertens et al., 2021). Secure attachment was found to have a small negative association with levels of paranoia on self report and interview measures within this non-clinical sample. (Mertens et al, 2021).

In all the studies of clinical populations, only one study found fearful attachment positively correlated with AHs (Pearce et al., 2017). Pearce et al (2017) found preoccupied and dismissive attachment were not associated with AHs, while McGonagle (2017) found that preoccupied attachment was positively correlated with AHs. Both these studies also found that fearful attachment correlated positively with paranoia. Sitko (2015) found both anxious and avoidant styles correlated positively with paranoia but neither correlated with AHs. Out of two studies that assessed disorganized attachment in a clinical population (Degnan, 2020, Pollard et al, 2020) both found disorganized attachment was positively correlated with positive symptoms of psychosis. Degnan (2020) found disorganized and avoidant attachment

were positively correlated with total negative symptoms and both experiential and expressive negative symptoms.

In summary, insecure attachment styles may predict high degrees of psychotic experiences in non-clinical and clinical populations. Fearful attachment seems to more consistently be associated with paranoia then AHs.

Associations between Dissociation and Psychotic Experiences

In a non-clinical sample, greater levels of dissociation were positive correlated with higher levels of voice predisposition by Berry et al. (2018). Wong (2016) completed the only experimental study included in this review and found that only depersonalisation (a facet of dissociation) was related to voice hearing in their non-clinical sample. Dissociation was also found to have a small positive correlation with self-reported and interview-based paranoia in Mertens et al (2021) non-clinical sample.

In clinical samples, dissociation correlated positively with hallucinations in three studies (Pearce et al., 2017; McGonagle, 2017 and Williams, 2017). Pearce et al. (2017) and McGonagle (2017) also found dissociation correlated with paranoia. In contrast in a clinical population, Sitko (2015) found dissociation did not correlate with AHs but did predict paranoia. Degnan (2020) and Pollard et al. (2020) found dissociation was positively correlated with the positive symptoms of psychosis. However, Austin (2011) found dissociation had no correlation with positive symptoms. Degnan (2020) found dissociation also correlated positively with total negative symptoms and experiential negative symptoms but not expressive negative symptoms.

In summary, there seems to be more consistent associations between dissociation and psychotic experiences in non-clinical and clinical populations with two exceptions among the studies.

Regression and mediation models including attachment, dissociation and psychotic experiences

When Berry et al. (2018) included attachment, dissociation and voice predisposition in a multiple regression (controlling for age and negative affect) , only attachment avoidance and dissociation predicted voice hearing predisposition in a non-clinical population. These results suggests that individuals with higher degrees of attachment avoidance and/or higher levels of dissociation are more prone to hallucinations.

In a non-clinical population, Mertens et al. (2021) found the effect of emotional abuse on self-reported and interview based paranoid traits was mediated by both preoccupied attachment and dissociation. Fearful attachment and dissociation were found to mediate the relationship between emotional abuse and self-reported paranoid traits but not interview based traits. Mertens et al. (2021) hypothesised insecure attachment styles would precede dissociation in mediating the effect of emotional abuse on paranoid traits. However, no serial mediation effect was found as fearful attachment did not predict dissociation in their model and fearful attachment and dissociation mediated paranoid traits separately to each other. This finding was partially replicated with one study (Pearce et al., 2017) finding both fearful attachment and dissociation mediated the effect of childhood trauma on paranoia as parallel mediators. This suggests trauma influences the development of paranoia through increased dissociation and attachment insecurity. Interestingly,

Sitko (2015) ran a moderation analysis and found the effect of attachment anxiety on paranoia was moderated by dissociation. As dissociation increased, the effect of attachment anxiety on paranoia decreased. However, the effect of attachment avoidance on paranoia was not moderated by dissociation. This suggest that anxious attachment triggers increased dissociation over attachment avoidance.

Three studies (Williams, 2017; McGonagle, 2017; and Pearce et al. 2018) found evidence for the mediating role of dissociation in the association between fearful attachment and AHs. McGonagle (2017) found the effect of childhood interpersonal trauma on AHs was mediated by fearful attachment and dissociation in a serial mediation model, but fearful attachment had no mediating effect by itself. Similarly, Williams (2017) found an indirect effect of fearful attachment on AHs mediated by dissociation however, this effect became non-significant when age, gender, ethnicity, and depression were added as covariates (though remained significant when depression was removed as a covariate). Pearce et al. (2018) found that the effect of childhood trauma on AHs was mediated only by dissociation. In Pearce et al.'s (2018) study, fearful attachment did not mediate the relationship between trauma and AHs.

Finally, in a clinical sample, Degnan (2020) found disorganized attachment and dissociation fully mediated the effect of childhood trauma on total negative symptoms and experiential negative symptoms. Only disorganized attachment mediated the effect of childhood trauma on expressive symptoms. Together, disorganized attachment and dissociation accounted for 40% of the variance childhood trauma predicted in negative symptoms.

In summary, research suggests trauma's effect on psychotic symptoms is mediated by both fearful/disorganized attachment and dissociation. There is some evidence that fearful attachment effect on AHs is mediated by dissociation.

Table 1

Data Extracted from Studies (n = 10) Found Through Searches

Study authors, date, and country	Study design	Sample characteristics	Measures	Analysis	Key findings	Risk of bias rating
Austin, 2011. United Kingdom	Cross Sectional	Male offenders in secure hospital settings with psychosis diagnoses (*N* = 56; mean age = 40, Male = 56)	Positive and Negative Syndrome Scale; Beck Depression Inventory, Childhood Trauma questionnaire, Dissociative Experiences Scale-Revised, Relationship Questionnaire, Impact of Events Scale-Revised	Correlational analysis and inferential analysis - kruskal-wallis	Positive symptoms: Dissociation was not associated with trauma, overall positive symptom score, emotional/sexual abuse or hallucinatory behaviour and delusions. No between group differences were found levels of dissociation between participants with trauma and those without, even though on average participants with trauma reported more dissociation. Secure attachment was the most endorsed attachment style.	Low
Sitko, 2015. United Kingdom	Cross Sectional	Participants with schizophrenia spectrum diagnoses (*N* = 80; mean age = 41.5, Male = 60, Female = 20)	Positive and Negative Syndrome Scale; Dissociative Experience Scale-Revised; Relationship Questionnaire	Correlational analysis, hierarchical regression analysis, moderation	AHs: Attachment styles did not predict auditory hallucinations. Paranoia: Both anxious (β = .23, *SE* = .04, *p* = .03) and avoidant attachment (β = .36, *SE* = .04, *p* = .001) predicted paranoia. Dissociation moderated the anxious attachment-paranoia relationship accounting for 37% of the variance (F (5,70) = 7.46, $p < .001$).	Moderate
Wong, 2016. United Kingdom	Experimental	General population sample (*N*= 130, median age =20, Male = 42, Female = 88	Voice Detection Task; Stress Manipulation Task; Launay-Slade Hallucination Scale Revised; Childhood Trauma; The Relationship Scales Questionnaire; The Dissociative Experiences Schedule – Revised; Positive and Negative Affect Schedule	ANCOVA and Linear regression	No significant affect was found of the group allocation on rating of false alarms post stress manipulation. False alarms at baseline and depersonalization were only significant predictors of false alarms post stress manipulation. No association was found between hallucination proneness, attachment styles and childhood sexual abuse.	Low
Pearce, et al., 2017.	Cross-Sectional	Participants who self-reported as having sought medical	Brief Betrayal Trauma Survey; Dissociative Experiences Scale-Revised;	Correlation analysis & mediation	AHs: Dissociation significant mediated the childhood trauma – voice hearing association (b = 0.09, 95% CI = 0.03, 0.17).	Low

Study authors, date, and country	Study design	Sample characteristics	Measures	Analysis	Key findings	Risk of bias rating
United Kingdom		support for distressing psychotic experience (*N* =112; mean age = 40.2, Male =81, Female = 30)	Community Assessment of Psychotic Experiences (paranoia and voices subscales); Relationship Questionnaire		Paranoia: dissociation (b = 17, 95% CI = 0.07, 0.30]) and fearful attachment (b = 0.05, 95% CI = 0.01, 0.12) mediated the childhood trauma – paranoia association.	
McGonagle, 2017. United Kingdom	Cross-Sectional	Online sample of over 18s with a self-reported diagnosis of psychosis. (*N* = 230, mean age = 36.95, Male = 46, Female = 184)	Brief Betrayal Trauma Survey; Dissociative Experiences Scale-Revised; Personality Structure Questionnaire; The Creative Experiences Scale; Community Experience of Psychotic Experiences	Multiple regression analysis and serial mediation analysis	AHs: Fearful attachment and dissociation mediated the trauma-AHs with a significant indirect effect (b = 0.01, 95% CI = 0.002, 0.03). The mediators accounted for 25.4% of the total effect, P_M = .254.	Low
William, 2017. United Kingdom	Cross-Sectional	Participants with schizophrenia spectrum diagnosis. (*N* = 50, mean age = 41.36, Male = 34, Female = 16)	Dissociative Experience Scale-Revised; Revised Launay-Slade Hallucination Subscale; Relationship questionnaire; Calgary Depression Scale for Schizophrenia	Mediation analysis	AH: Dissociation mediated the fearful attachment-AH relationship (Indirect effect, b = 0.37 95% CI = 0.07, 0.68), (Direct effect, b =-0.19, 95% CI = -0.49, 0.12). When age, gender, ethnicity, and depression included, indirect direct effect became insignificant. The effects did remain significant, however, when only age, gender and ethnicity were included as covariates (b = 0.38, 95% CI= 0.06 to 0.71).	Low
Berry, et al., 2018. United Kingdom	Cross-Sectional	General population sample (*N* = 123; mean age = 22, Male = 36, Female = 87).	Launay-Slade Hallucination Scale; Childhood Trauma Questionnaire, Dissociative Experiences Scale- Revised; Positive and Negative Affect Schedule; Relationship Styles Questionnaire	Correlational analysis & multiple regression	AHs: Avoidant attachment and dissociation predicted AHs (F (6,106) = 15.20, $p < 0.001$) with an adjusted R^2 of 0.432. Only dissociation and attachment avoidance were significant predictors of AHs.	Low

Study authors, date, and country	Study design	Sample characteristics	Measures	Analysis	Key findings	Risk of bias rating
Degnan, A. 2020. United Kingdom.	Cross Sectional	Online sample of over 18s with a self-reported diagnosis of psychosis/ had received treatment for experiences related to psychosis (N = 242; mean age = 33.17, Male = 154, Female = 74	Brief Betrayal Trauma Survey; Psychosis Attachment Measure – Revised; Dissociative Experiences Scale – Revised; Personality Structure Questionnaire; Self-Evaluation of Negative Symptoms; Community Assessment of Psychic Experiences	Mediation analysis	Disorganized attachment and Dissociation together mediated the childhood trauma-negative symptom association, explaining 40% of the variance. Disorganized attachment mediated trauma effect on total negative symptoms (β = 0.06, *SE* = 0.03, 95% CI = 0.02 to 0.13), experiential symptoms (0.05, *SE* = 0.02, 95% CI = 0.02 to 0.12) and expressive symptoms (β = 0.06, *SE* =0.02, 95% CI = 0.02 to 0.12). Dissociation mediated trauma effect on negative symptoms (β = 0.04, *SE* =0.02, 95% CI = 0.01 to 0.10) and experiential symptoms (β = 0.04, *SE* =0.02, 95% CI = 0.01 to 0.10).	Low
Pollard, et al., 2020. United Kingdom	Cross-Sectional	Online sample of over 18s with a self-reported diagnosis of psychosis (*N* = 144, mean age = not reported, Male = 47, Female = 94)	Brief Betrayal Trauma Survey; Psychosis Attachment Measure – Revised; Dissociative Experiences Scale – Revised; Adult Disorganized Attachment; Relationship Questionnaire; Community Assessment of Psychic Experiences	Correlational analysis	The disorganized attachment subscale correlated positively with the positive symptoms of psychosis frequency (r_2 = 0.52, p = 0.01) and distress (r_2 = 0.40, p = 0.01), dissociation (r_2 = 0.50, p = 0.01), fearful attachment (r_2 = 0.57, p = 0.01) and other measures of disorganized attachment (r_2=0.60, p=0.01)	Low
Mertens, et al., 2021. Spain	Cross-Sectional	General population sample (*N* = 89, mean age = 24.8, Male = 34, Female = 55).	Interview for Traumatic Events in Childhood; Relationship Questionnaire; Dissociative Experiences Scale-Revised; Schizotypal Personality Questionnaire; Structured Clinical Interview for DSM-4 Axis 2 Disorders	Correlational analysis & parallel & serial mediation models	Preoccupied attachment (PA) and dissociation (D) mediated the effect of emotional abuse on self-reported paranoid traits (PA: *b* = 0.01, *SE* = 0.01, 95% CI =0.01, 0.04; D: *b* = 0.04, *SE* = 0.02, 95% CI =0.01, 0.09) and interview based paranoid traits (PA: *b* = 0.04, *SE* = 0.02, 95% CI =0.01, 0.1; D: *b* = 0.04, *SE* = 0.03, 95% CI =0.01, 0.13). Fearful attachment (FA) and dissociation (D) mediated the effect of emotional abuse on self-reported paranoid traits (FA: *b* = 0.02, *SE* = 0.01, 95% CI =0.003, 0.05; D: *b* = 0.04, *SE* = 0.02, 95% CI =0.01, 0.09) but only dissociation (*b* = 0.05, *SE* = 0.03, 95% CI =0.004, 0.14) mediated the effect of emotional abuse on interview-based measures of paranoia.	Moderate

Note. P_M = proportion mediated, *b* = unstandardized regression coefficients, β = standardized regression coefficients, *SE* =standardized error, *95% CI* = 95% confidence level, r_2 = R-squared

Table 2.

Quality Assessment of Cross-Sectional Studies

Study	Were the criteria for inclusion in the sample clearly defined?	Were the study subjects and the setting described in detail?	Was the exposure (IV) measured in a valid and reliable way?	Were objective, standard criteria used for measurement of the condition?	Were confounding factors identified?	Were strategies to deal with confounding factors stated?	Were the outcomes (DV) measured in a valid and reliable way?	Was an appropriate statistical analysis used?	Risk of bias rating
Austin, 2011	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Low
Pearce, et al., 2017	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Low
Sitko, et al., 2015	Yes	No	No	Yes	Yes	Yes	No	Yes	Moderate
McGonagle, 2017	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Low
William, 2017	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Low

Study	Were the criteria for inclusion in the sample clearly defined?	Were the study subjects and the setting described in detail?	Was the exposure (IV) measured in a valid and reliable way?	Were objective, standard criteria used for measurement of the condition?	Were confounding factors identified?	Were strategies to deal with confounding factors stated?	Were the outcomes (DV) measured in a valid and reliable way?	Was an appropriate statistical analysis used?	Risk of bias rating
Berry, et al., 2018	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Low
Degnan, 2020	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Low
Pollard, et al., 2020	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Low
Mertens, et al., 2021	Yes	Yes	No	Yes	No	No	No	Yes	Moderate

Table 3.

Quality Assessment of Experimental Studies

Study	Is it clear in the study what is the 'cause' and what is the 'effect'	Were the participants included in any comparisons similar?	Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or intervention of interest?	Was there a control group?	Were there multiple measurements of the outcome both pre and post the intervention/ exposure?	Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analysed?	Were the outcomes of participants included in any comparisons measured in the same way?	Were outcomes measured in a reliable way?	Was appropriate statistical analysis used?	Risk of bias rating
Wong, 2016	Yes	Yes	Yes	Yes	No	NA	Yes	Yes	Yes	Low

Discussion

This systematic review sought to synthesise the research examining both attachment and dissociation in relation to clinical and/or non-clinical psychotic type experiences. This review found fearful attachment, used as a proxy for disorganized attachment, was the main attachment style associated with dissociation. However, the association between fearful attachment and AHs was less consistent. In contrast, there was a consistent association between dissociation and both AHs and paranoia. Dissociation was consistently found to mediate between both early adversity and insecure attachment and each of AHs and paranoia. Early childhood adversity effect on negative symptoms was also found to be mediated by dissociation and disorganized attachment. This review suggests that dissociation may play a role in the association between trauma, insecure attachment styles and positive and negative psychotic type experiences.

The CAV model (Berry, et al,2017) theorises disorganized attachment is the primary driver of dissociation. In line with this, fearful attachment (representing disorganized attachment in adults) was associated with dissociation. Several studies found that fearful attachment was not directly associated with AHs. This may be because the relationship between fearful attachment and AHs is accounted for by other factors, such as dissociation. In mediation models, dissociation was found to mediate fearful attachment effect on AHs and fearful attachment had no association or direct effect on AHs (McGonagle, 2017, William, 2017). These findings support the theory that disorganized attachment predisposes individuals to dissociation which then leads to voice hearing. Inconsistent associations between fearful attachment and

AHs may reflect that fearful attachment does not fully capture disorganized attachment formed in early childhood. Interestingly measures of disorganized attachment consistently positively correlate with positive symptoms (Degnan, 2020; Pollard et al, 2020). These findings along with others using fearful attachment as a proxy supports the theoretical link between attachment, dissociation, and AHs, and extends it to paranoia and negative symptoms of psychosis.

The CAV model (Berry et al, 2017) specifies that early disorganized attachment predisposed individuals towards dissociation. In all but two studies reviewed, fearful attachment was conceptualized as analogous to disorganized attachment. However fearful attachment is an amalgamation of avoidant and anxious coping styles so it may not reflect actual attachment disorganisation (Paetzold et al., 2015). Pollard et al. (2020) have recently revised the Psychosis Attachment Measure (PAM-R) to measure disorganized attachment alongside anxious and avoidant attachment in adults. The PAM-R disorganized subscale was positively correlated with fearful attachment on the RQ and disorganized attachment on the ADA. Pollard et al. (2020) felt that the disorganized subscale of the PAM-R captures something beyond previous measures of attachment. Future research is encouraged to use a specific measure of disorganized attachment over fearful attachment.

In one study, Childhood adversity's effect on voice hearing was only mediated by dissociation and not fearful attachment as was expected, (Pearce et al, 2017). This plus the finding in all the research in this review that fearful attachment effect on AHs is mediated by dissociation, suggests that dissociation has a key role in development of voices. Therefore, it may be more important for research to

consider the link between dissociation and AHs. Disorganized attachment may be responsible for predisposing individuals to dissociation, evidenced by the serial mediation effect found by McGonagle (2017), however, dissociation may occur without a disrupted attachment due to traumatic experiences and this may lead to AHs as evidenced by high rates of AHs among people with PTSD (Shinn et al, 2020). Future research should consider *how* dissociation predicts psychotic symptoms and the mechanisms involved (e.g., source monitoring errors).

Dissociations consistent association with paranoia and differing roles in mediating trauma's affect and moderating anxious attachments effect. is unique to this review (Pearce et al., 2017; Sitko 2015). Previously, Bloomfield et al. (2021) systematic review of research examining mediators between developmental trauma and psychotic symptoms did not identify any studies that investigated dissociation and paranoia. Our findings support Longden et al.'s (2020) review which found a robust association between dissociation and paranoia .Future research is needed to confirm the nature of the role of dissociation in the development of paranoia and potential mechanisms involved. Dissociation is hypothesised to serve as a defence mechanism in the face of traumatic experiences but also possible serves a defence against e negative interpretations of the self (Ogawa et al, 1997). The misinterpretation of anomalous experiences is thought to contribute to the development of persecutory delusions (Bentall & Taylor, 2006) and it is possible the same occurs with dissociative experiences and this requires further research.

This review also extends the previous association between disorganized attachment and dissociation and AHS and paranoia to experiences labelled as the

negative symptoms of psychosis. Furthermore, it suggests trauma's effect predicts higher levels of disorganized attachment and dissociation which, in turn, predicts higher levels of negative symptoms (Degnan, 2020). This finding requires further research. Degnan recognises the poor fit of their model which suggests that other variables may be involved, such as affect regulation and negatives beliefs about the self and others and the associations between these and disorganized attachment and dissociation, which require further investigation.

Review Strengths and Weaknesses

This is the first systematic review to consider the associations between attachment, dissociation and psychotic symptoms in non-clinical and clinical populations. A strength of this review is the inclusion of studies investigating both non-clinical and clinical populations that experience AHs and paranoia. This reflects the continuum model of psychosis (van Os & Reininghaus, 2016). The studies examining non-clinical populations found associations between attachment, dissociation and psychotic symptoms which were replicated in some clinical studies supporting the use of analog research to investigate psychotic phenomenon.

The main weakness of the current review is the lack of a meta-analysis. However only a limited number of studies were found and they are all fairly heterogenous in the aspect of the associations they were considering making analysis very difficult.

Limitations of Research

These reviews findings need to be interpreted with some caution because of the limited number of studies available and the methodological limitations of these studies. Six studies included in this review are unpublished and, therefore, have not been peer reviewed and should be interpreted with caution.

Furthermore, as nearly all studies are cross-sectional in nature, causality cannot be inferred. As causal inference is not possible, it may be that dissociation during traumatic experiences lead to disorganized/fearful attachment. Experimental and longitudinal studies examining causal links are needed to firmly establish these associations. All studies in this review use measures of attachment that follow Bartholomew and Horowitz's (1991) conceptualization of adult attachment (the RQ and RSQ) and do not take account of alternative conceptualizations. This may mean this leads to bias interpretation of the findings which favours one method of conceptualising attachment over another. The RQ and RSQ measure attachment across a continuum rather than assigning people to categories allowing greater individual variability and have been found to have adequate test-retest and interrater reliability, convergent validity with other measures of attachment, and discriminant and predictive validity (Ravitz et al, 2010).

All but two studies (Wong, 2017; Mertens, et al., 2021) relied solely on self-report measures. Individuals completing self-report measures may experience social desirability bias and, therefore, their answers may not be reflective of their actual experience (Grimm, 2010). Avoidant individuals may underreport symptoms, as they may experience difficulties recognising affect and identifying with certain questions (Gumley, et al, 2014; Strand, et al, 2015).

There is limited available information about ethnicity from the studies reviewed, which limits generalisability of the findings. Two of the studies were limited due to their small sample size that did not meet required power (Austin, 2011; Williams 2017), which may account for some of the inconsistency in associations found between insecure attachment, and AHs. Many studies did not report the required power so we cannot infer whether their sample sizes were substantial enough to give confidence in their results. It was also noted that the average age of samples differed between non-clinical and clinical populations with non-clinical populations being significantly younger on average. This may raise the question of whether results from the non-clinical studies can be generalised to clinical populations

Future research should try to recruit more representative samples of the general population and clinical populations. This may require clinicians to use measures of attachment and dissociation when assessing and treating clients regularly and routinely with psychosis so they can be used when evaluating outcomes and in future research. Due to the methodological problems with the research reviewed, that is, the variable sample size, lack of possible statistical power and unpublished nature of many studies, only tentative conclusions can be made by this systematic review.

Clinical Implications

Many people with psychosis experience dissociation but it is not routinely assessed in clinical practice. Our findings suggest clinicians should regularly ask

about dissociation associated with their psychotic experiences and may be related to previous trauma. They should be familiar with different forms of dissociation, such as amnesia and depersonalisation, and make use of assessment tools such as the DES-II or Clinician Administered Disordered States Scale (CADSS; Bremner et al, 1998). Clients may report gaps in memory or out of body experiences as adults and children and these might be reframed for them through psychoeducation as dissociative experiences. This may facilitate greater understanding of symptoms for both clinicians and clients. Newman-Taylor and Sambrook (2013) have suggested the use of grounding skills early in therapy to manage dissociation. Clinicians may also extend the formulation process to promote integration as information is recontextualised. For example, that a voice is not malevolent spirit but a dissociated memory of a traumatic experience, or that disconnection from moments of intense distress leads to misunderstandings and promotes paranoid thinking.

Sitko's (2015) finding that dissociation moderates the effect of anxious attachment on paranoia is relevant to therapeutic work. Attending therapy may activate clients threat systems, making them prone to dissociate, inhibiting what they may learn from therapy, perhaps by forgetting the content of sessions. Therefore, it is important that therapists help clients to use strategies to retain information from therapeutic work.

Though limited in number of studies, the effect of fearful attachment on AHs was found to be mediated by dissociation which may suggest that interventions that seek to foster a secure attachment would reduce dissociation, and in turn, reduce AHs and paranoia. The therapeutic relationship may be used to model such a secure

relationship (Mikulincer et al., 2013). Another route to treatment for AHs and paranoia may be the use of trauma-focused approaches (van den Berg et al., 2020). Treatment using imaginal exposure has led to an improvement in AHs and delusions; however, dissociation was not measured independently of trauma symptoms and was not assessed as a possible mediator (Keen et al., 2017). The researchers suggest this is because clients were taught to reformulate distressing experiences as understandable reactions to trauma which supports the routine assessment of dissociation and integration into formulations.

Evidence suggests dissociation may have a role in mediating attachment and trauma associations with psychotic experiences. However, all these studies use trait measures, therefore this means this finding might not be applicable to state dissociation. Recent research has begun to consider whether state dissociation may be a useful target for therapy (Farrelly et al., 2016; Varese et al., 2021). Evidence is still developing into whether treating dissociation leads to increased positive affect with studies unable to tell if changes in symptoms were due to targeting dissociation (Varese et al., 2021)

Conclusion

This systematic review has found some evidence for the association between fearful attachment (as a proxy for disorganized attachment), dissociation and psychotic symptoms (e.g., AHs and paranoia) across both non-clinical and clinical groups. The effect of fearful attachment on AHs was found to be mediated by dissociation supporting the theory that disorganized attachment predicts dissociation

leading to AHs. Fearful attachment had no effect on AHs directly, suggesting that dissociation may be the primary mediating variable between trauma and psychotic experiences. This may be because fearful attachment does not fully capture disorganized attachment, as disorganized attachment when measured was correlated positively with psychotic symptoms. However, findings from this systematic review should be considered tentative due to the limited number of studies and methodological problems with them. Further research is needed using specific measures of disorganized attachment and more robust methods to clarify and support the reviews finding. Clinicians should routinely assess for dissociation when working with clients with psychosis and incorporate it into their formulations. Future research using experimental methods, representative samples and direct measures of disorganized attachment is required to determine how dissociation leads to psychotic symptoms and whether treating dissociation directly would lead to an improvement in psychotic symptomology.

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Empirical Paper: Does Dissociation Mediate the Effect of Attachment Imagery on Auditory Hallucinations?

Joseph. F. Puckett

Department of Psychology, University of Southampton

Doctorate of Clinical Psychology

Katherine Newman-Taylor & Monica Sood

The following paper has been prepared for submission for "Clinical Psychology and Psychotherapy". The submission guidelines can be found in Appendix A.

Word Count: 5447

Abstract

Objective

Auditory hallucinations (such as hearing voices) are common in clinical and non-clinical populations. Many who hear voices also report early adversity and have an insecure attachment style. Current cognitive models suggest that dissociation may mediate the relationship between disorganized attachment style and auditory hallucinations. However, the existing research is limited due to reliance on cross-sectional and correlational designs. This study examined the impact of secure and disorganized attachment imagery priming on hallucinatory experiences, and whether dissociation mediates this association.

Design

We utilised an experimental design and recruited an analogue sample who were highly predisposed to auditory hallucinations.

Method

Participants were randomly assigned to secure or disorganized imagery priming conditions and completed self-report measures of auditory hallucinations and dissociation before and after, to test whether attachment imagery has an impact on auditory hallucinations and whether dissociation mediates this impact.

Results

Attachment imagery did not have an impact on auditory hallucinations. Both secure and disorganized imagery increased dissociation. Secure attachment imagery reduced paranoia, but dissociation did not mediate this effect.

Conclusions

Secure attachment imagery reduces paranoia but not auditory hallucinations, and the impact of imagery on paranoia is not mediated by dissociation. This suggests that secure attachment imagery may be useful in reducing *paranoia* in people who are highly predisposed for auditory hallucinations. Future research is required to extend this finding to clinical populations and consider whether attachment imagery may reduce voice related distress.

Key Practitioner Message

- Secure attachment imagery may be useful in reducing paranoia for people who hear voices.
- Using imagery with people with psychosis may increase dissociative experiences and, should be used carefully in clinical practice. However, this does not mean imagery is ineffective or worsens symptoms of psychosis.
- Clinicians should be familiar with how to manage dissociation, such as using grounding techniques when using imagery with people with psychosis.

Does Dissociation Mediate the Effect of Attachment Imagery on Auditory Hallucinations?

Psychosis and Auditory Hallucinations

Hearing the voice of someone or something that is not physically present is an experience that can cause severe distress. Psychosis is commonly identified by the presence of such hallucinations, alongside delusions or both hallucinations without insight and delusions (DSM-V, 2013). Psychosis is exceedingly distressing and functionally impairing. Therefore, it is a priority for treatment both psychiatrically and psychologically. Current guidance in the United Kingdom (NICE, 2014) advises Cognitive Behavioural Therapy for Psychosis (CBTp) as the primary approach; however, CBTp has been criticised concerning its effectiveness in symptom reduction and distress (Hazell, et al, 2018). This has led to the development of symptom specific approaches, where one symptom of psychosis (e.g., delusions or hearing voices) may be targeted at a time. Symptom specific approaches are typically more effective than generic CBTp (Lincoln & Peters, 2018).

Hallucinations describe sensory perceptions that occur without corresponding external/somatic stimuli (Arciniegas, 2015). Auditory hallucinations (AHs) typically involve hearing voices discussing one's actions or as a running commentary. Johns et al. (2002) found only 25% of people who reported AHs met criteria for a psychotic disorder. Based on this, Johns and van Os (2001) argue AHs lie on a continuum from normal to clinically psychotic experiences. Psychological processes maintaining AHs and associated distress extend across this continuum, and

so research focused on these processes in analogue groups is likely to be relevant to clinical groups with AHs (see Gibbs, 1996). These processes may be appropriate targets for treatment and inform symptom specific approaches. Studies have used non-clinical samples to investigate psychotic phenomena and found that insecure attachment styles, dissociation, AHs, and paranoia are correlated, with dissociation mediating the relationship between insecure attachment and psychotic symptoms (Berry et al., 2018; Mertens, et al, 2021).

The Role of Attachment and Dissociation in Auditory Hallucinations

Attachment theory (Bowlby, 1977) assumes that through interactions with early caregivers, we develop 'internal working models' which guide appraisals of self and others, emotion regulation, and how we behave in relationships. People are commonly conceptualised along continuums of attachment which fall into two broad styles, secure and insecure. Secure attachment typically follows safe and responsive caregiving and is characterised by positive self/other beliefs, effective emotion regulation skills and an ability to form reciprocal interpersonal relationships. Three insecure attachment styles have been identified: avoidant, anxious and disorganized (Ainsworth et al, 1978, Main & Hesse, 1990).

Anxious and avoidant attachment styles have been associated with paranoia while disorganized attachment is primarily associated with auditory hallucinations in clinical populations (Bucci et al, 2017). Disorganized attachment (Main 1991) is formed when a child is exposed to frequent interactions with a "helpless frightened, hostile and frightening or confused" caregiver (Liotti & Gumley, 2007, p. 118). The

infant is torn between the urge to flee and the urge to approach and, therefore, experiences "fright without solution" – an early relational trauma (Main & Hesse, 1990, p. 163; Liotti, & Gumley, 2007). Sexual and physical abuse is associated with disorganized attachment and more hallucinations among people with psychosis (Bucci et al., 2017).

Disorganized attachment has been identified as an antecedent of dissociation in response to trauma (Carlson, 1998; Byun et al. 2016; Liotti, 2004; Ogawa et al., 1997). Dissociation describes a lack of integration of normal thoughts, feelings, and experiences into the stream of consciousness and memory (Bernstein & Putnam, 1986). Holmes et al. (2005) suggests two distinct types of dissociation: detachment and compartmentalisation. Detachment comprises 'depersonalization' and 'derealization'. Depersonalization involves experiencing the mind or body as detached from oneself, leading to perceptions of the world as vague, dreamlike, or less real. Derealization involves feeling detached from surroundings, leading to people and objects seeming less real. Dissociative amnesia is where individuals cannot remember information about themselves or events in their life and is a form of compartmentalisation. This means that a process that is normally within your control is now out of it, i.e., the recall of information (Holmes et al., 2005).

Research supports the hypothesis that insecure/disorganized attachment develops due to maltreatment in childhood (Baer & Martinez, 2006). Early disorganized attachment correlates with higher rates of dissociation in non-clinical young adults (Byun et al., 2016; Ogawa et al., 1997). A systematic review and meta-analysis demonstrated robust positive associations between dissociation and AHs,

similar in size across clinical and non-clinical studies (Longden et al., 2020). This review found that derealisation, absorption, and amnesia were positively associated with AHs to a similar extent. Given the links between early interpersonal trauma, dissociation, and voice hearing, it has been found that dissociation mediates the association between childhood trauma and voice-hearing proneness (Varese et al., 2012).

Limited research has examined the association between attachment and voice hearing, and possible mediating processes (McGonagle, 2018). Dissociation is a potential mediator in this relationship, as higher dissociation levels predict more AHs (Varese et al., 2011). When an individual experiences high levels of dissociation they may become prone to making source monitoring errors and identifying a disowned or dissociated component of the self as a "voice" (Berry et al., 2017; Longden et al., 2012). The limited research examining the attachment-dissociation–AH association has largely used fearful attachment as a proxy for disorganized attachment. Fearful attachment, a combination of attachment anxiety and avoidance, overlaps conceptually with disorganized attachment in infancy (Lavin et al, 2019). However, it may be that fearful attachment captures fear of others and sensitivity to abandonment, which are features of anxious attachment and not attachment disorganisation (Shaver & Mikulancer, 2002). The available research suggests the impact of trauma on AHs and paranoia is mediated by fearful attachment and dissociation (Pearce et al., 2018). Current cognitive theory suggests that early relational trauma causes children to form a disorganized attachment which predisposes them to dissociation and, in turn, voice hearing (Berry et al., 2017).

In summary, the research shows: (a) childhood adversity increases the likelihood that individuals will develop an insecure attachment style, (b) insecure attachment styles (particularly disorganized) are associated with dissociation, and (c) dissociation and attachment disorganization predict predisposition to voice hearing in non-clinical and clinical populations. Importantly, this research is limited by a reliance on fearful attachment as a proxy for disorganized attachment, and the use of correlational designs that preclude causal inferences

Attachment-Imagery Priming: An Experimental Approach to Examine the Causal Impact of Attachment

Attachment-imagery priming has been used to investigate the cognitive processes related to secure and insecure internal working models (Bartz & Lydon, 2004). While individuals have a global attachment style (i.e. trait attachment), people also have relationship-specific attachment styles (formed with different people in their lives) that can be activated through priming (Rowe et al, 2020). Attachment primes activate a sense of security or insecurity felt in these relationships by making these mental representations more salient and accessible. People do not base their attachment style on just their own personal experience but also on their vicarious experiences, learn from observing other relationships (Baldwin et al, 1996). This means that individuals have the ability to draw on these experiences (both personal and vicarious), enabling the priming of alternative styles of attachment (Baldwin et al, 1996). Security priming activates the experience of feeling safe and secure and is associated with a range of positive outcomes. For example, security priming

consistently increases positive affect and decreases negative affect compared to insecure primes (Rowe et al., 2020). It also increases emotional wellbeing and reduces hostile attitudes in general population samples (Rowe et al, 2020). Guided imagery is an especially effective conduit for priming compared to other methods (Gillath & Karantzas, 2019).

In non-clinical samples high in paranoia, security priming reduces state paranoia, anxiety and negative affect compared to insecure primes (Bullock et al, 2016; Newman-Taylor et al, 2017). An initial study of attachment priming in individuals experiencing psychosis showed security priming increased positive affect and reduced paranoia (Pitfield et al., 2020). Research examining the potential mechanisms demonstrates that secure attachment imagery reduces state paranoia and anxiety compared to insecure attachment imagery, with cognitive fusion and negative self/other beliefs mediating these effects (Sood et al., 2021; Sood & Newman-Taylor, 2020). These studies only examined the effects of anxious and avoidant attachment imagery priming on paranoia. No research to date has primed disorganized attachment imagery and examined the impact on AHs, and mediators of this impact.

Aims and Hypotheses

Existing research examining relationships between attachment, dissociation and AHs rely largely on correlational designs. Attachment priming offers a novel experimental approach to investigating the causal impact of attachment and possible mediating mechanisms.

This study aimed to investigate the impact of attachment priming on dissociation and Auditory Hallucinatory Experiences (AHES) in an analogue sample predisposed to AHs. Given robust associations between fearful attachment (used as a proxy for disorganized attachment), dissociation, and AHs, we examined the impact of secure versus disorganized attachment imagery. Paranoia and AH predisposition often co-occur; thus, we measured paranoia (examined as a covariate and secondary outcome of interest).

We predicted that secure attachment imagery would decrease dissociation and AHEs; whereas disorganized attachment imagery would increase dissociation and AHEs. This would provide experimental evidence for the hypothesised relationship between disorganized attachment, dissociation, and AHs. If secure attachment imagery decreases dissociation and AHEs, this would have clinical implications for working with people who hear voices.

Hypotheses

1. Secure attachment imagery, compared to disorganized attachment imagery, will decrease dissociation, AHs, and paranoia.
2. Dissociation will mediate the impact of attachment imagery on AHs and paranoia; relative to secure imagery, disorganized imagery will increase dissociation and, in turn, increase AHs and paranoia, while secure imagery will decrease dissociation and reduce AHs.

Methodology

Design

We used an experimental design. The independent variable was the manipulation of imagery (secure or disorganized). The dependent variables were state AHs and paranoia. The hypothesised mediator was state dissociation. The study lasted ~25 minutes and took place online on Qualtrics, a research website. The study was preregistered on the Open Science Framework; https://osf.io/xaquz/?view_only=352b5010d94841269cfaa944f4d06d76.

An *a priori* G*Power analysis (see Appendices G) indicated that, to detect a medium effect size (0.25) at $p = 0.05$ with 80% power, 128 participants are required. A medium effect size was chosen based on previous research (Sood & Newman-Taylor, 2020). Ethical approval was obtained from the University of Southampton (ERGO ID: 62578.A1; see appendices for evidence, and priming scripts and measures).

Participants

An international, analogue sample of adults (≥18 years), who were highly predisposed to AHs were recruited online using Prolific[2]. Participants were screened

[2] Prolific is an online website used to recruit participants. It has previously been shown to yield valid and reliable data (Sood et al., 2021). Participants are paid a small amount in exchange for their data.

using the Launay Slade Hallucination Scale – Revised (LSHS; Bentall & Slade, 1985) and asked if they were currently receiving professional support for any mental health problem(s). If they scored above 19 (the mean of the standardisation sample on the LSHS) and were not receiving professional mental health support, they were invited to participate. A total of 517 were screened; 212 were invited to Part 2, of whom 149 completed the study. Participants who did not complete the study (n = 18) and reported they did not hold the imagery manipulation in mind for any length of time (n = 2) were excluded. Another participant was excluded as they were under 18 years of age. The final sample comprised 128 participants (males = 78, females = 47, non-binary = 2, prefer not to say = 1), aged 18–51 (M = 24.52, SD = 6.9).

Most participants were in full or part-time employment (43.5%) or students (37.2%). Most resided in Poland (18.8%) and Portugal (18.8%); see Table 1 for a summary of employment, residence, and ethnicity.

Table 1

Summary of Employment, Residence, and Ethnicity

Demographic Characteristic	N	Percentage (%)
Employment		
Full time or part time employment	56	43.5
Students	48	37.2
Unemployed	15	12.4
Looking after the home or caring for family	1	0.8
Unable to work due to health or disability	2	1.6
Other situation	3	2.3
Prefer not to answer	3	2.3

Demographic Characteristic	N	Percentage (%)
Residence		
Poland	24	18.8
Portugal	24	18.8
South Africa	11	8.6
United Kingdom of Great Britain and Northern Ireland	10	7.8
United States of America	10	7.8
Italy	9	7
Mexico	7	5.5
Chile	6	4.7
Greece	6	4.7
Hungary	4	3.1
Spain	4	3.1
Canada	2	1.6
Australia, Belgium, Czech Republic, Denmark, France, Germany, Ireland, Israel, Kazakhstan, Latvia, Norway	11 (1 from each respective country)	8.8
Ethnicity		
African	3	2.3
Asian/East Asian	2	1.6
Black African	1	0.7
Black American	1	0.7
Other Black Ethnicity	1	0.7
Eastern European/Slavic	8	6.2
Latin/Latin American/Hispanic	14	11
Southern European/Mediterranean	9	7
White Caucasian European	65	50.8
Non-specific European	4	3.1
Mixed	5	3.9
Other	7	5.5

Demographic Characteristic	N	Percentage (%)
Not Registered	8	6.2

Trait measures

Launay Slade Hallucination Scales – Revised (LSHS)

A 12-item measure of trait hallucinatory type experience (Bentall & Slade, 1985). Participants rate their agreement with each statement, on 5-point scales from "1 = strongly disagree" to "5 = strongly agree". Higher scores indicate greater hallucinatory predisposition. The scale has good internal consistency (α = 0.87) which was also good in the current sample (α = 0.81).

Revised Psychosis Attachment Measure (PAM-R)

A 26-item measure of trait attachment style comprising three subscales: anxious, avoidant, and disorganized attachment (Pollard et al., 2020). Participants rate how representative each item is of them on a 4-point scale from "0 = not at all" to "3 = very much". The anxious, avoidant, and disorganized subscales have acceptable to good internal consistency (α = .87, α = .79 and α = .89, respectively). Internal consistency in the present sample was questionable to good (anxious: α = 0.82, avoidant: α = 0.67 and disorganized: α = 0.87).

Dissociative Experiences Scale (DES-II)

A 28-item measure of trait dissociative experiences (Carlson & Putnam, 1993). Participants estimate the percentage of time they have specific dissociative experiences. The scale yields an overall dissociation score and subscale scores for

amnesic dissociation, absorption and imaginative involvement, and depersonalization and derealization. Higher scores indicate greater dissociative experiences. The scale has excellent internal consistency (α = 0.95), which was also excellent in the current sample (α = 0.93).

State Measures

Clinician Administered Dissociative Symptom Scale – 6-item version (CADSS)

A measure of state dissociative experiences (Rodrigues et al., 2021) based on the 23-item CADSS (Bremner, 1998). The CADSS is normally administered by a clinician but has been used as a self-report measure for research (Lemons & Lynn, 2016). The 6-item version assesses depersonalization, derealization, amnesia (and a total dissociation score). Participants indicate how they are feeling "at this time" and items are scored from "0 = no presence of dissociation" to "4 = extreme presence of dissociation". Higher scores indicate more severe dissociative symptoms. Internal consistency for the long form is excellent (α = .94). Internal consistency for the 6-item form is not reported by Rodrigues, et al (2021), though was acceptable in the present sample (α = 0.78).

Continuum of Auditory Hallucinations – State Assessment (CAHSA)

A 9-item measure of state AHEs (Schlier et al., 2017). This scale produces a total score and four subscales: vivid imagination, perceptual sensitivity, intrusive thoughts, and auditory hallucinations. We asked respondents to indicate "current" applicability of items (rather than over the last day) on a scale from "1 = not at all"

to “7 = very much”. Internal consistency has not been previously reported but was good in the current sample (α = 0.80).

Brief Paranoia Checklist

A 5-item measure of state paranoia (Schleir et al., 2016). Participants indicate how much each item applies to them “at the moment” from “1 = not at all” to “5 = very much”. The scale has good internal consistency (α = 0.88) which was also good in the current sample (α = 0.83).

Experimental manipulation

Imagery manipulation scripts

Imagery manipulation scripts were used to prime secure or disorganized attachment. The scripts are based on traditional attachment primes (Bartz & Lydon, 2004) and adapted (in audio form) for people predisposed to AHs (following Sood et al., 2021). Participants were asked to remember a time when they were with another person and felt safe, secure, and trusting (secure attachment imagery) or when they were with another person who they experienced as inconsistent, unreliable, and frightening (disorganized attachment imagery). Once an image is identified, participants are asked to close their eyes and recreate the situation as vividly as possible, focusing on all their senses.

Manipulation checks

Participants completed three imagery manipulation checks. Firstly, they rated the extent to which they felt safe and secure (felt security; Luke et al., 2012).

Participants rate the applicability of six items on a 6-point scale from 1 (“not at all”) to 6 (“very much”) (cf. Sood et at, 2021). Averaged responses yield a felt security score. Internal consistency is excellent ($\alpha = 0.97$) (Sood, et al, 2021), and was excellent in the current sample ($\alpha = 0.96$). Participants rated vividness of the image on a 10-point scale from 1 (“not at all”) to 10 (“very much”) and reported the percentage of time the image was held in mind (0–100%).

Procedure

Participants accessed the study through Prolific. After providing informed consent, participants completed the AHs screen (LSHS) and current mental health screen to determine eligibility (i.e., those who scored $\geq$19 and were not currently receiving mental health support were eligible). Participants were thanked, paid, and, if eligible, informed they would be contacted regarding the next part of the study within four days.

Eligible participants completed Part 2 on Prolific, and were asked to do so on a computer, alone, in a quiet space. They completed demographic and trait measures of attachment and dissociation, and a brief unrelated filler before completing state measures of dissociation, hallucinatory experience, and paranoia. Participants were randomly allocated to secure or disorganized attachment imagery conditions where they listened to the relevant 3-minute audio recording. Subsequently, participants repeated the state measures (while holding the image in mind) and completed the imagery manipulation checks (felt security, image vividness, and percentage of time

the image was held in mind). Finally, participants completed an optional mood repair task before being thanked and debriefed.

Data analysis

The data were analysed using SPSS 26 (IBM, 2019). Inspection of histograms, Q-Q plots and normality tests indicated that most variables were normally distributed, though trait AHs predisposition and dissociation were positively skewed. Since the sample was predisposed to AHs, we expected this positive skew. Inspection of boxplots revealed nine outliers across all state variables (most in the dissociation measures), which were Winsorized and replaced with the 5th and 95th percentiles (Field, 2013).

Pre-manipulation between-group differences on demographic and trait measures were investigated using paired sample *t*-tests. Chi-square was used for gender.

One-way Analyses of Variance (ANOVA) were conducted to assess between-group differences on the imagery manipulation checks. Mixed-model ANOVAs, with one between-participants factor (attachment imagery: [secure vs. disorganized]) and one within-participants factor (Time: pre- vs. post-imagery [Time 1 vs. Time 2]) were used to test whether secure attachment imagery reduced state AHs, dissociation, and paranoia, compared to disorganized attachment imagery.

We used PROCESS v.3 (Hayes, 2017) for SPSS to examine whether attachment imagery impacts AHEs and paranoia via dissociation. We covaried Time

1 scores while modelling Time 2 scores (Hayes, 2018). We also covaried paranoia in the AHs model, and vice versa to account for any shared variance between the variables.

Results

Pre-manipulation differences between groups

See Table 2 for descriptive statistics. There were no between-group differences in age, (t (126) = 0.76, p = 0.94), gender (X^2 (3, 128) = 1.102, p = 0.78), trait AHs predisposition, (t (126) = - 0.09, p = 0.93), anxious attachment (t (126) = 0.01, p = 0.99), avoidant attachment, (t (126) = 0.40, p = 0.69), disorganized attachment (t (126) = - 0.72, p = 0.47), and trait dissociation (t (126) = - 0.41, p = 0.68). This indicated that the groups were similar on demographic and trait measures prior to the imagery manipulation.

Table *2*.

Descriptive Statistics for Demographic and Trait Measures in the Secure and Disorganized Imagery Conditions

Variable	Secure (N = 66)	Disorganized (N = 62)
	M (SD)	*M(SD)*
Age	24.56 (6.64)	24.47 (7.22)
Trait auditory hallucination predisposition	25.14 (5.89)	25.22 (5.16)
Anxious attachment	1.50 (0.64)	1.50 (0.73)
Avoidant attachment	1.68 (0.58)	1.64 (0.51)
Disorganized attachment	1.23 (0.70)	1.31 (0.63)
Trait dissociation	26.03 (15.43)	27.11 (14.43)

Table 3 presents means and standard deviations for state AHEs, dissociation, and paranoia for the secure and disorganized conditions, pre- (Time 1) and post- (Time 2) imagery manipulation.

Table 3.

Mean and Standard Deviations for State Measures at Time 1 and Time 2 in the Secure and Disorganized Imagery Conditions

Variable	Secure (N = 66)		Disorganized (N = 62)	
	Time 1	Time 2	Time 1	Time 2
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
Total state auditory hallucination experiences	4.06 (1.17)	4.00 (1.25)	4.00 (1.09)	3.97 (1.20)
Vivid imagination	4.65 (1.46)	4.81 (1.53)	4.84 (1.47)	4.81 (1.62)
Perceptual sensitivity	4.14 (1.71)	3.96 (1.89)	4.09 (1.70)	4.19 (1.85)
Intrusive thoughts	4.57 (1.52)	4.42 (1.62)	4.58 (1.42)	4.39 (1.68)
Auditory hallucinations	2.90 (1.57)	2.78 (1.72)	2.51 (1.38)	2.47 (1.27)
State dissociation	3.32 (3.65)	4.99 (4.28)	3.08 (3.06)	5.41 (3.79)
State derealisation	1.18 (1.61)	1.91 (1.70)	1.08 (1.51)	2.10 (1.67)
State depersonalisation	0.91 (1.47)	1.44 (1.68)	0.92 (1.26)	1.78 (1.65)
State amnesia	1.27 (1.36)	1.68 (1.68)	1.10 (1.40)	1.58 (1.57)
State paranoia	9.43 (4.69)	8.34 (3.91)	10.39 (4.48)	10.53 (4.97)

Imagery Manipulation Checks

No differences were found between the secure and disorganized condition in the percentage of time the image was held in mind (t (126) = 1.24, p = 0.22) and vividness of the image (t (126) = 1.34, p = 0.18). Felt security was successfully

manipulated (t (112.51) = 6.97, p = 0.01), with the secure group (M = 4.88, SD = 1.10) reporting higher security than the disorganized group (M = 3.27, SD = 1.47).

Main analysis

ANOVA

See Table 4 for 2 (condition: secure imagery vs disorganized imagery) x 2 (time: pre- vs post-imagery) mixed-model ANOVA results for all state measures and subscales. Reported in text are investigations into key hypotheses (see Figure 1). A Bonferroni p value of 0.0083 (0.05/6) was set as the confidence level for post hoc t-tests. The study was appropriately powered to conduct the planed analysis on state AHs, dissociation and paranoia (see appendices for G*power calculation). Applying a Bonferroni correction to these ANOVAs may increase the chances of Type II error; therefore, it is only applied to post hoc analyses. Further exploratory analyses were conducted on subscales of the state AHS and dissociation (see Table 4).

State Auditory Hallucinations

The ANOVA indicated no main effect of condition (F (1,126) = 1.88, p = 0.17) or time (F (1,126) = 1.00, p = 0.32), and no condition×time interaction (F (1,126) = 0.26, p = 0.61).

State Dissociation

The ANOVA indicated no main effect of condition (F (1,126) = 0.02, p = 0.88) or condition×time interaction (F (1,126) = 1.93, p = 0.17), but there was an effect of time (F (1,126) = 71.53, p < 0.001, η_p^2 = 0.39).

Dissociation increased from Time 1 to Time 2 in both the secure (t (65) = - 5.30, p = 0.001, d = 0.43) and disorganized (t (61) = - 7.41, p = 0.001, d = 0.75) conditions.

State Paranoia

The ANOVA indicated no main effect of condition (F (1,126) = 3.25, p =0.07) or time (F (1,126) = 3.33, p = 0.07). There was a condition×time interaction (F (1,126) = 20.40, p = 0.02). Simple effects tests indicated the two conditions did not differ in paranoia at Time 1 (F (1(126) = 1.39, p = 0.24) and differed at Time 2 (F (1(126) = 7.71, p = 0.006). Paranoia decreased from Time 1 to Time 2 in the secure condition (t (65) = 2.95, p = 0.004, d = 1.38) but did not change in the disorganized condition (t (61) = -0.48, p = 0.64).

Table 4

Mixed-Model ANOVA Results for all State Measures.

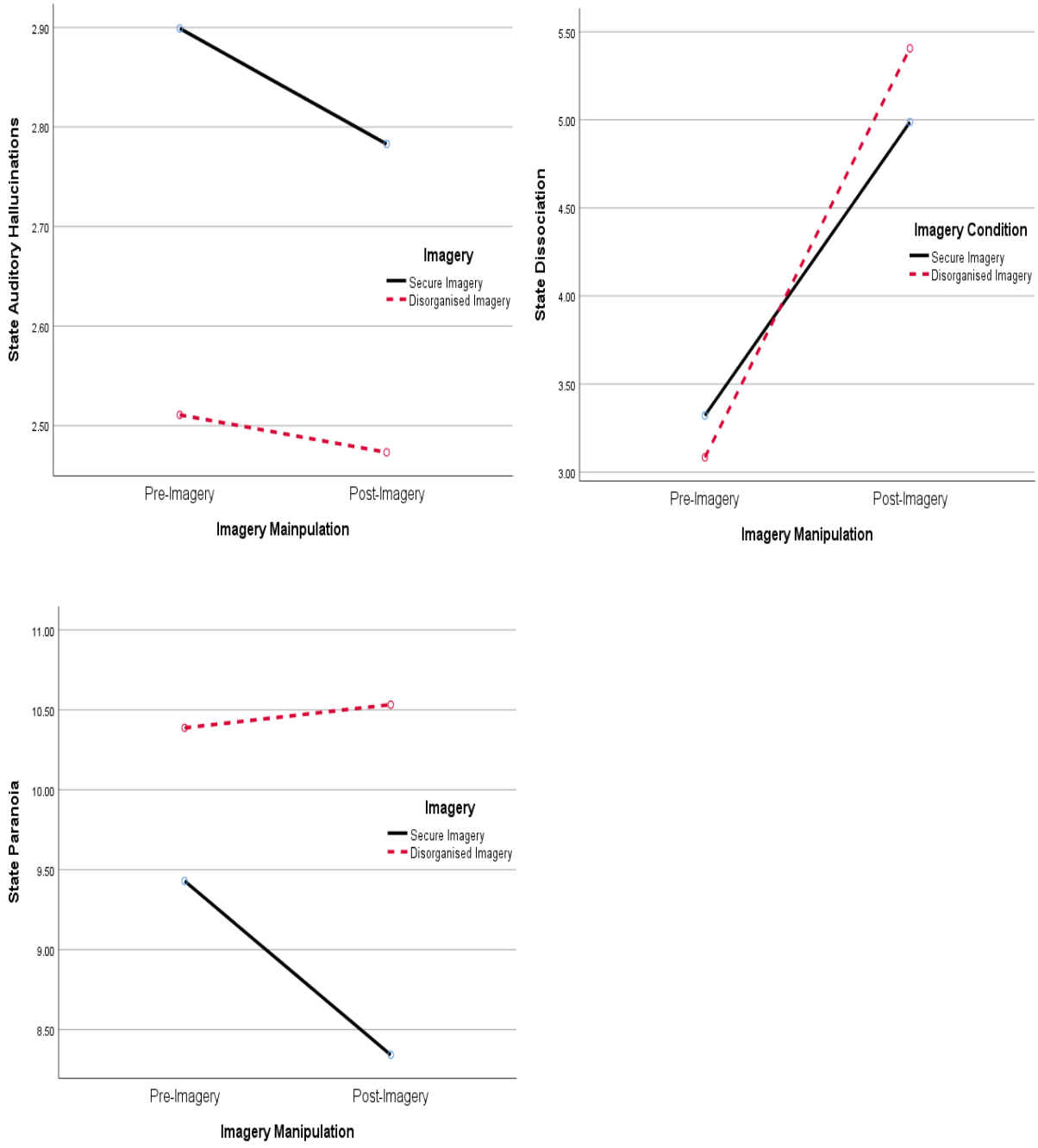
Variable	Effect of time		Effect of imagery		Interaction between imagery and time	
	F (df)	p value	F (df)	p value	F (df)	p value
Total state auditory hallucination experiences	2.43 (1,126)	0.12	0.05 (1,126)	0.82	0.11 (1,126)	0.73
Vivid imagination	1.14 (1,126)	0.29	0.12 (1,126)	0.73	2.06 (1,126)	0.15
Perceptual sensitivity	0.24 (1,126)	0.62	0.08 (1,126)	0.77	3.33 (1,126)	0.07
Intrusive thought	4.22 (1,126)	0.07	0.00 (1,126)	0.96	0.07 (1,126)	0.84
Auditory hallucinations	1.00 (1,126)	0.32	1.88 (1,126)	0.17	0.26 (1,126)	0.61

Variable	Effect of time		Effect of imagery		Interaction between imagery and time	
	F (*df*)	*p* value	*F* (*df*)	*p* value	*F* (*df*)	*p* value
Total state dissociation	71.53 (1,126)	0.001*	0.02 (1,126)	0.88	1.93 (1,126)	0.17
State derealisation	49.75 (1,126)	0.001*	0.02 (1,126)	0.87	1.37 (1,126)	0.24
State depersonalisation	43.02 (1,126)	0.001*	0.47 (1,126)	0.50	2.44 (1,126)	0.12
State amnesia	15.94 (1,126)	0.001*	0.33 (1,126)	0.57	0.11 (1,126)	0.74
State paranoia	1.33 (1,126)	0.07	3.25 (1,126)	0.07	20.40 (1,126)	0.02*

Note. * Significant at $p < .05$

Figure 1

Change in State AHs, Dissociation and Paranoia Pre- and Post-Imagery in the Secure and Disorganized Attachment Conditions



Mediation

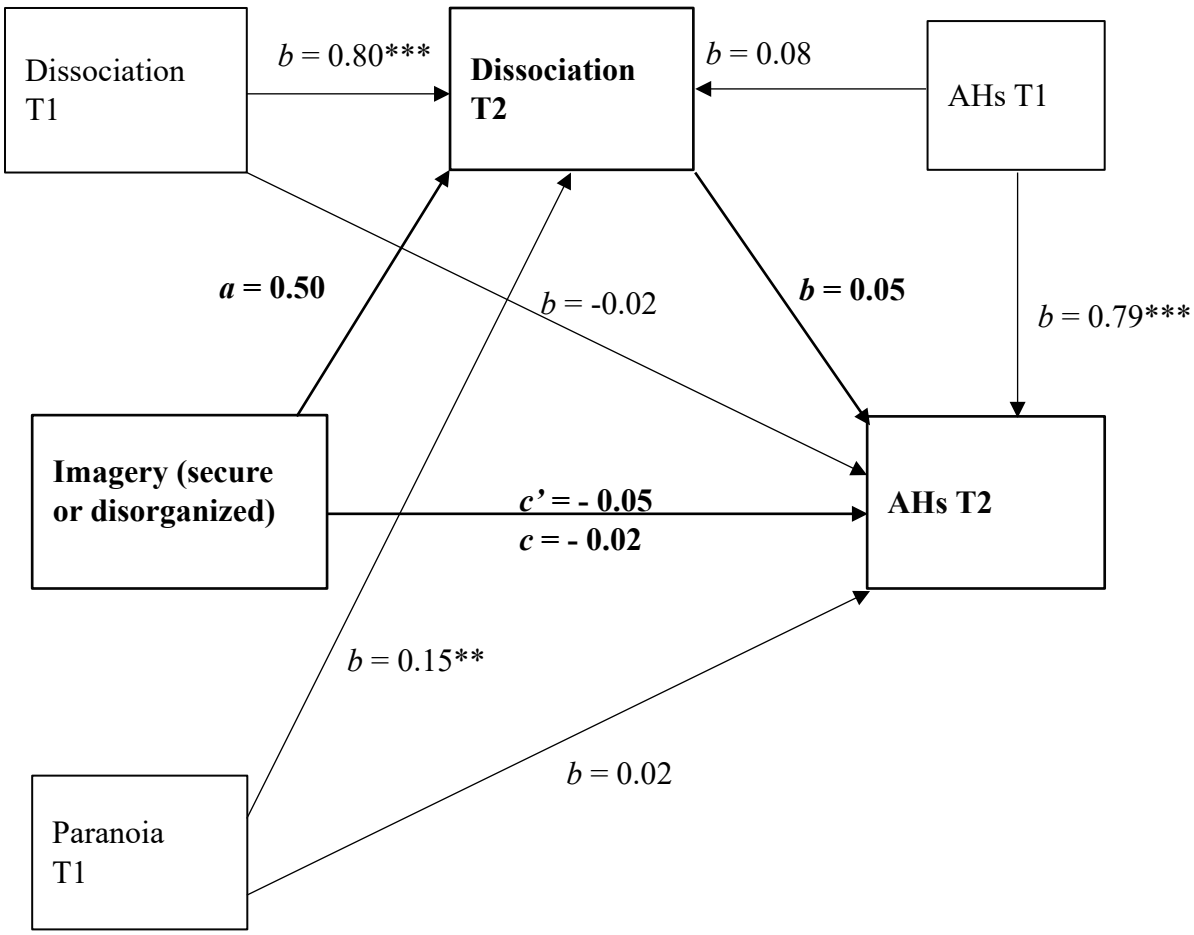
Both secure and disorganized attachment imagery increased state dissociation, which was correlated with state AHs and state paranoia pre- and post-imagery (see correlation matrix in supplementary material, Appendix G), meaning that the criteria for mediation were met (Hayes, 2017)

First, we tested whether dissociation mediated the effect of attachment imagery on AHs. Attachment imagery and dissociation did not predict AHs (see Figure 2); there was no direct effect (*b* = -.05, SE =0.15, 95% CE=-0.35, 0.24) or indirect effect (*b* = 0.03, SE = 0.04, 95% CE = -0.01, 0.16) of attachment imagery on auditory hallucinations via dissociation. The total effect of secure/disorganized imagery on AHs was negative and non-significant (*b* = -0.02, SE =0.15, 95% CE = -0.32, 0.27), suggesting that attachment imagery has no effect on auditory hallucinations.

Secondly, we tested whether dissociation mediated the effect of attachment imagery on paranoia. Attachment imagery and dissociation did not predict paranoia (see figure 3). There was a direct effect of attachment imagery on paranoia, (*b* = 1.25, SE = 0.46, 95% CE = 0.33, 2.17); however, there was no indirect effect via dissociation (*b* = 0.01, SE = 0.07, 95% CE = -0.15, 0.17). The total effect of secure/disorganized imagery on paranoia was positive and significant (*b* = 1.26, SE =0.46, 95% CE = 0.35, 2.17), suggesting that attachment imagery had an effect on paranoia.

Figure 2

Mediation of the Effect of Attachment Imagery on AHs via Dissociation

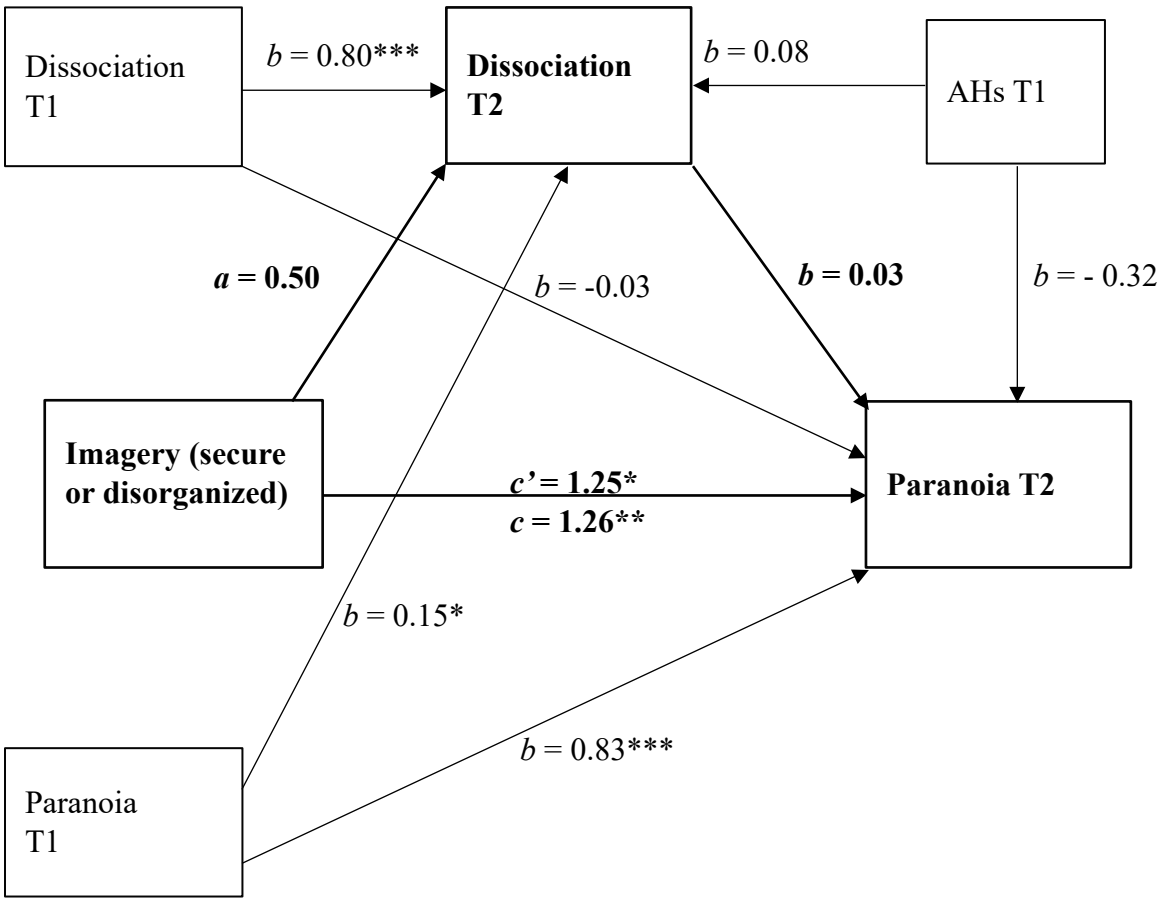


Note. T1 = Time 1, pre-imagery; T2 = Time 2, post-imagery. AHs = auditory hallucinations. Path *c'* denotes the direct effect, and path *c* denotes the total effect. Estimated path coefficients are unstandardized.

** $p < .01$. *** $p < .001$.

Figure 3

Mediation of the Effect of Attachment Imagery on Paranoia via dissociation



Note. T1 = Time 1, pre-imagery; T2 = Time 2, post-imagery. AHs = auditory hallucinations. Path *c'* denotes the direct effect, and path *c* denotes the total effect. Estimated path coefficients are unstandardized.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Follow Up Exploratory Analysis

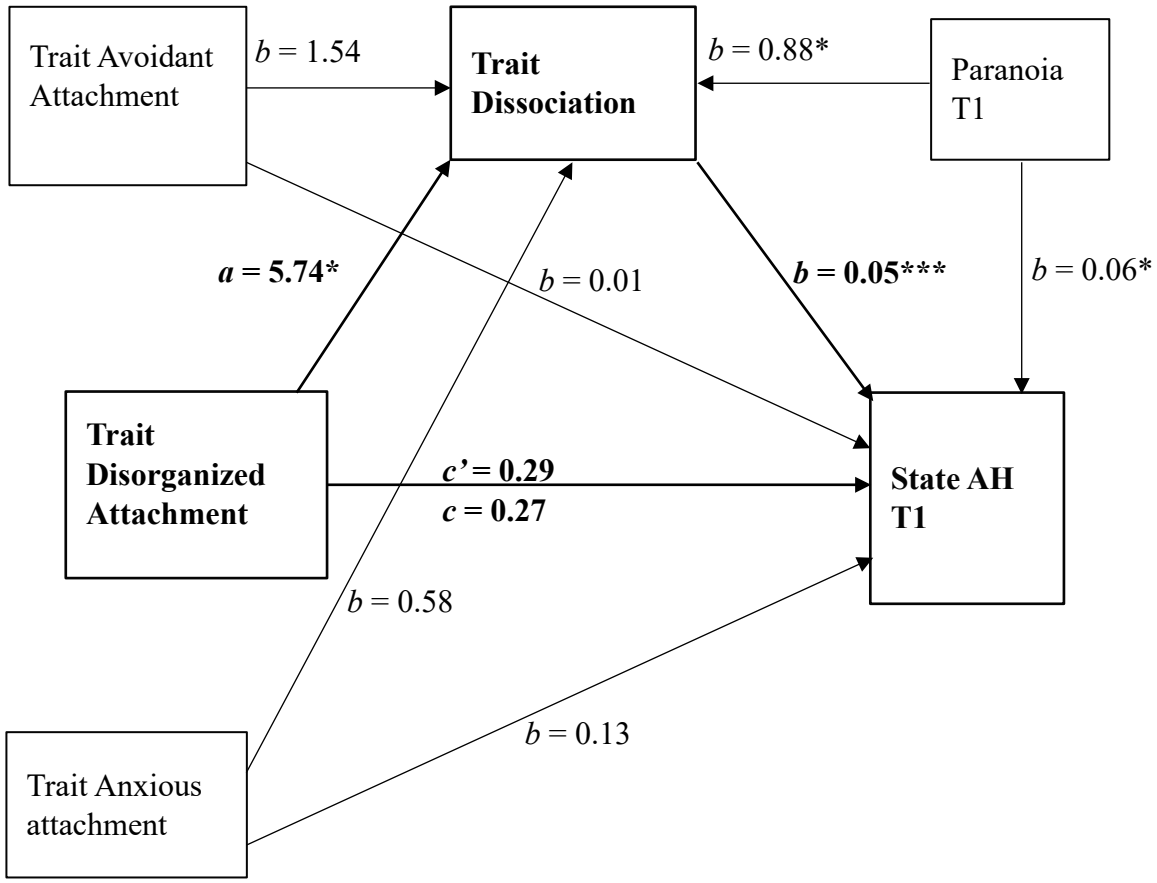
We ran exploratory analyses to try and understand why the results we found did not meet with our hypotheses.

A correlations matrix between all variables can be found in Table 4. Based on the theoretical links suggest by Berry et al. (2017) we used PROCESS to run exploratory mediation analyses investigating whether trait dissociation mediates the association between trait disorganized attachment and state AHs with trait avoidant and anxious attachment styles as covariates in the models (see Figure S1).

Dissociation mediated the effect between trait disorganized attachment and state AHs before the imagery manipulation took place. Trait disorganized attachment predicted trait dissociation *(b* = 5.74, SE = 2.74., 95% CE = 0.31, 11.17) while trait dissociation predicted state AHs, (*b* = 0.05, SE =0.01, 95% CE = 0.03, 0.06). There was no direct effect of trait disorganized attachment on state AHs, (*b* = - 0.14, SE = 0.27, 95% CE = -0.66, 0.39), however an indirect effect was significant, (*b* = 0.27, SE =0.14, 95% CE = 0.01, 0.37) suggesting that all the effect of disorganized attachment on state AHs is mediated by dissociation. We found the total effect of trait disorganized attachment on state AHs was insignificant, *b* = 0.27, SE =0.29, 95% CE = -0.44, 0.70).

Figure 4

Mediation model of trait disorganized attachment effect on state AHs at Time 1 mediated by trait dissociation with other attachment styles and paranoia at **Time 1**



Note. T1 = Time 1, pre-imagery; T2 = Time 2, post-imagery. AHs = auditory hallucinations. Path *c'* denotes the direct effect, and path *c* denotes the total effect. Estimated path coefficients are unstandardized.

*p<.05 ** $p < .01$. *** $p < .001$

Table 5

Correlation Matrix of Trait and State Variables.

Scale	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Trait Measures																												
(1) Auditory Hallucination Predisposition	-																											
(2) Anxious attachment	-.02	-																										
(3) Avoidant attachment	.06	-.01	-																									
(4) Disorganized attachment	.13	.65**	.33**	-																								
(5) Dissociation	.09	.42**	.19*	.42**	-																							
(6) Amnesia	.06	.26**	.12	.35**	.86**	-																						
(7) Absorption Imagination	.13	.23**	.17*	.36**	.90**	.63**	-																					
(8) Depersonalisation Derealisation	.02	.31**	.18*	.38**	.86**	.73**	.68**	-																				
Time 1 State Measures																												
(9) Vivid Imagination	-.02	.36**	.03	.23**	.39**	.28**	.40**	.29**	-																			
(10) Perceptual Sensitivity	-.07	.27**	.13	.34**	.30**	.21**	.28**	.24**	.23**	-																		
(11) Intrusive Thought	-.03	.33**	.14	.28**	.45**	.32**	.46**	.38**	.46**	.46**	-																	
(12) Auditory Hallucinations	-.03	.22*	.11	.27**	.53**	.52**	.46**	.49**	.28**	.40**	.54**	-																

(13)	Auditory Hallucinatory Continuum	-.05	.40**	.14	.38**	.56**	.44**	.53**	.47**	.65**	.73**	.83**	.74**	-															
(14)	Dissociation	-.01	.27**	.10	.41**	.63**	.63**	.47**	.64**	.21*	.31**	.34**	.46**	.45**	-														
(15)	Derealisation	-.05	.24**	.04	.33**	.49**	.50**	.34**	.55**	.18*	.29**	.26**	.41**	.39**	.85**	-													
(16)	Depersonalisation	.04	.13	.07	.31**	.47	.46**	.32**	.54**	.12	.23**	.20*	.28**	.28**	.83**	.62**	-												
(17)	Amnesia	-.00	.25**	.16	.37**	.59**	.56**	.50**	.45**	.23**	.23**	.36**	.45**	.43**	.73**	.40**	.40**	-											
(18)	Paranoia	-.08	.41**	.19*	.51**	.42**	.45**	.32**	.378**	.31**	.27**	.38**	.37**	.45**	.46**	.38**	.35**	.41**	-										
Time 2 State Measures																													
(19)	Vivid Imagination	.01	.35**	.11	.24**	.29**	.17*	.33**	.24**	.88**	.26**	.52**	.25**	.63**	.18*	.14	.11	.20*	.26**	-									
(20)	Perceptual Sensitivity	-.10	.34**	.09	.34**	.27**	.19**	.26**	.24**	.24**	.88**	.52**	.44**	.72**	.27**	.28**	.17	.22*	.32**	.27**	-								
(21)	Intrusive Thought	-.11	.28**	.21*	.29**	.43**	.30**	.46**	.39**	.45**	.34**	.78**	.49**	.69**	.35**	.27**	.20*	.38**	.35**	.51**	.44**	-							
(22)	Auditory Hallucinations	-.13	.21*	.11	.32**	.45**	.43**	.35**	.47	.17*	.38**	.45**	.83**	.62**	.46**	.39**	.31**	.43**	.39**	.165	.43**	.53**	-						
(23)	Auditory Hallucinatory Continuum	-.11	.40**	.18*	.40**	.49**	.36**	.47**	.45**	.58**	.65**	.77**	.67**	.90**	.42**	.36**	.27**	.41**	.45**	.65**	.75**	.83**	.71**	-					
(24)	Dissociation	-.08	.16	.22*	.36**	.58**	.62**	.42**	.57**	.18*	.22*	.25**	.39**	.35**	.75**	.60**	.63**	.58**	.49**	.12	.21*	.36**	.45**	.38**	-				
(25)	Derealisation	-.09	.14	.22*	.27**	.46**	.52**	.31**	.47**	.13	.17	.24**	.33**	.29**	.63**	.63**	.48**	.41**	.45**	.09	.18*	.30**	.35**	.31**	.83**	-			
(26)	Depersonalisation	-.07	.11	.17	.32**	.49**	.54**	.33**	.51**	.16	.16	.18*	.35**	.29**	.69**	.54**	.70**	.43**	.44**	.11	.16	.26**	.39**	.31**	.87**	.64**	-		
(27)	Amnesia	-.04	.14	.17	.34**	.57**	.55**	.46**	.50**	.19*	.27**	.25**	.38**	.37**	.62**	.43**	.44**	.66**	.40**	.14	.23**	.35**	.42**	.38**	.79**	.46**	.55**	-	
(28)	Paranoia	-.03	.42**	.14	.46**	.35**	.40**	.26**	.35**	.25**	.19*	.30**	.19*	.31**	.33**	.30**	.27**	.19*	.82**	.20*	.22*	.29**	.22**	.32**	.38**	.35**	.33**	.30**	-

*p<0.05. **p<0.01

Discussion

We examined the impact of secure and disorganized attachment imagery on dissociation and AHEs in a non-clinical sample, highly predisposed to AHs. Based on previous evidence for the association between insecure attachment and AHs and dissociation (Berry et al., 2018) we tested whether secure attachment imagery decreased AHEs and compared to disorganised attachment imagery, and whether dissociation mediated this effect.

Contrary to our hypotheses, attachment imagery did not impact AHEs. Both secure and disorganized attachment imagery increased dissociation. Secure attachment imagery reduced paranoia, but dissociation did not mediate this effect.

These unexpected results suggest attachment imagery priming does not affect AHs but does affect dissociation and paranoia. Secure imagery participants felt more secure than participants in the disorganized condition, suggesting the security prime was effective. Neither group differed in vividness of image or percentage of time the images were held in mind, and both were comparable on demographic and trait variables. This suggests the observed changes in dissociation and paranoia may be attributed to the imagery task.

Our hypothesis concerning the impact of attachment priming on AHs was not supported. This is inconsistent with previous correlational research (McGonagle, 2017; Williams, 2017) showing that fearful attachment is related to AHs via dissociation. A possible reason for this inconsistency is that previous studies focused on trait dissociation in clinical populations (McGonagle2017; Williams, 2017) while

ours focused on state dissociation in a non-clinical group. Our findings may suggest a conceptual difference between non-pathological and pathological dissociation and trait and state variables.

Dissociation increased over time in both conditions, rather than just in the disorganized condition, as predicted. This aligns with research showing that script-driven imagery may trigger a dissociative physiological response in people with a diagnosis of borderline personality disorder (Bichescu-Burian et al., 2017) and that imagery rescripting can trigger dissociation (Paulik et al., 2020). It may be that imagery, regardless of attachment condition increases dissociation. Stopa (2013) suggests a commonality between imagery and dissociation, with imagery being a core feature of daydreaming, which is linked to traits like vivid imagination. Vivid imagination has been linked to trait dissociation (Vannuci & Mazzoni, 2006).

Paranoia reduced in the secure imagery condition as predicted; however, no effect was found in the disorganized condition. This is consistent with previous research demonstrating the impact of secure attachment priming on paranoia (Sood et al., 2021; Sood & Newman-Taylor, 2020), this time replicated in a population high in auditory hallucination predisposition. This shows that the effect of secure imagery on paranoia is robust, even in groups not selected for level of paranoia.

State dissociation did not mediate the effect of attachment imagery on AHs or paranoia as we predicted. This suggests that state AHs may occur independently of dissociation levels and are not influenced by attachment imagery. This corresponds with research in populations of voice hearers who were highly dissociative where,

following imagery rescripting, trauma intrusions and voice related distress reduced even for participants who dissociated during the imagery rescripting (Paulik et al., 2020).

The lack of direct effect between attachment imagery and AHs or mediation by dissociation is interesting given the association found between trait disorganized attachment, dissociation, and AHs in this study (see exploratory analysis) and others. A recent systematic review shows a robust association between trait dissociation and AHs (Longden et al., 2020) and the finding that treatment of dissociation in voice hearers led to an improvement in voice severity (Varese et al., 2021). However, this effect could not be attributed to techniques to reduce dissociation over other voice specific cognitive appraisal techniques (Varese et al., 2021).

Our exploratory analysis found the effect of trait disorganized attachment on state AHs was mediated by trait dissociation, supporting the theoretical link between disorganized attachment, dissociation and AHs variables (Berry et al., 2017). Paranoia was a significant covariate in this model. This would suggest the sample in this study had high levels of paranoia alongside high levels of AHs. Security priming is thought to reduce paranoia by allowing people to step back from their paranoid thoughts (Sood et al., 2020). The same process is implicated in the amount of distress individuals experience due to their AHs (Moran et al., 2021). This might suggest that secure attachment imagery influences the relationship an individual has with their AHs and therefore reduce paranoia but has no effect on frequency of AHs as these are dissociated parts of the self and not maintained by dissociation but form due to dissociation. This finding is limited due to the exploratory analysis only using

data from a single time point. The relationship suggested is based on theory and a true causal relationship cannot be inferred.

Limitations

The secure condition scored higher on felt security than the disorganized condition, meaning that the secure prime induced felt security effectively. However, we cannot be confident of priming disorganized attachment since we are the first to use this prime and the manipulation checks focus on secure rather than specific types of attachment priming. Furthermore, participants may not have had an experience of disorganized attachment in a relationship to draw on during the imagery task. Future studies could include a neutral priming condition to validate the disorganized prime through comparison on the felt security measure (Carnelley et al., 2015).

A further limitation is the sensitivity of the CAHSA and CADSS-6. Both demonstrate reliability but may lack sensitivity to capture changes over short time frames or suffer from practice effects which may explain the increase in dissociation across conditions. This may mean that the change in dissociation observed across participants may not reflect an actual change in dissociation and, therefore, the finding that dissociation increases after imagery requires replication. Furthermore, the CADSS-6 has not been fully validated as a short form measure of dissociation, however there was limited alternatives. Therefore, we cannot be confident it was the imagery task that increased dissociation and not just the act of paying attention to a task and, so, future research may wish to test imagery tasks against alternative tasks and measure and compare dissociation across both.

Research and clinical implications

Areas for future research

Longitudinal research with repeated imagery primes would help demonstrate the long-term effectiveness of attachment imagery in reducing paranoia in people predisposed to AHs. This would overcome the limitation of one-shot priming studies which may not be sufficient to effect change in AHs. Research indicates that repeated priming has a cumulative effect (Rowe, 2020). Therefore, repeated priming may have more of an effect on AHs and future research may wish to explore this possibility. Future studies may also combine attachment priming with a signal detection task which may have better sensitivity then the measures used in this study (Brookwell et al., 2013; Wong, 2016). Also, we suggest that future studies include measures of AHs/AHEs and voice - related distress alongside measures of paranoia. Attachment imagery may be more effective in reducing distress/impact of AHs rather than AHs occurrence.

Clinical implications

This study aimed to determine whether attachment imagery would be beneficial in the treatment of AHs. Though there are no clear implications for the treatment of AHs, this study contributes to evidence demonstrating the benefits of secure attachment imagery in reducing paranoia. The results suggest that, in the short term, secure attachment imagery is more beneficial for paranoia than AHs., Attachment imagery reduced paranoia in those predisposed to AHs, suggesting potential clinical value of attachment imagery in the treatment of paranoia in voice

hearers. This supports the idea that targeting the relationship between the hearer and the voice may be more effective than targeting the actual occurrence of the voice (Hayward et al., 2017).

Secondly, we found an increase in dissociative experience following secure and disorganized attachment imagery. Imagery is a common tool used in the treatment of mental health problems, such as trauma and psychosis. Therefore, clinicians should be aware of that dissociation may occur when using imagery, especially for people predisposed to AHs. These findings suggest that secure/disorganized attachment imagery tasks will not worsen AHs via increasing dissociation; however, clinicians using imagery techniques with clients should be familiar with ways of managing dissociation (e.g., grounding tasks) when using imagery (Paulik et al., 2020).

Conclusion

We sought to investigate the impact of secure and disorganized attachment imagery on AHEs, and whether dissociation mediates this association. We found that attachment imagery did not impact AHEs, though both secure and disorganized imagery increased dissociative experience. Higher levels of state dissociation did not predict AHEs in this study. Our findings suggests that imagery interventions may increase dissociation, which clinicians should be aware of and have the skills to manage. Attachment imagery influenced paranoia; with secure imagery reducing paranoia in our analogue sample. This suggests that secure imagery could be a

helpful intervention to manage paranoia in individuals who are highly predisposed to voice-hearing.

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List of Appendices

Appendix A

Submission guidelines

The following paper has been prepared for submission for "Clinical Psychology and Psychotherapy. Please find the guidelines below.

1. SUBMISSION

Authors should kindly note that submission implies that the content has not been published or submitted for publication elsewhere except as a brief abstract in the proceedings of a meeting or symposium.

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2. Been involved in drafting the manuscript or revising it critically for important intellectual content;
3. Given final approval of the version to be published. Each author should have participated sufficiently in the work to take public responsibility for appropriate portions of the content; and
4. Agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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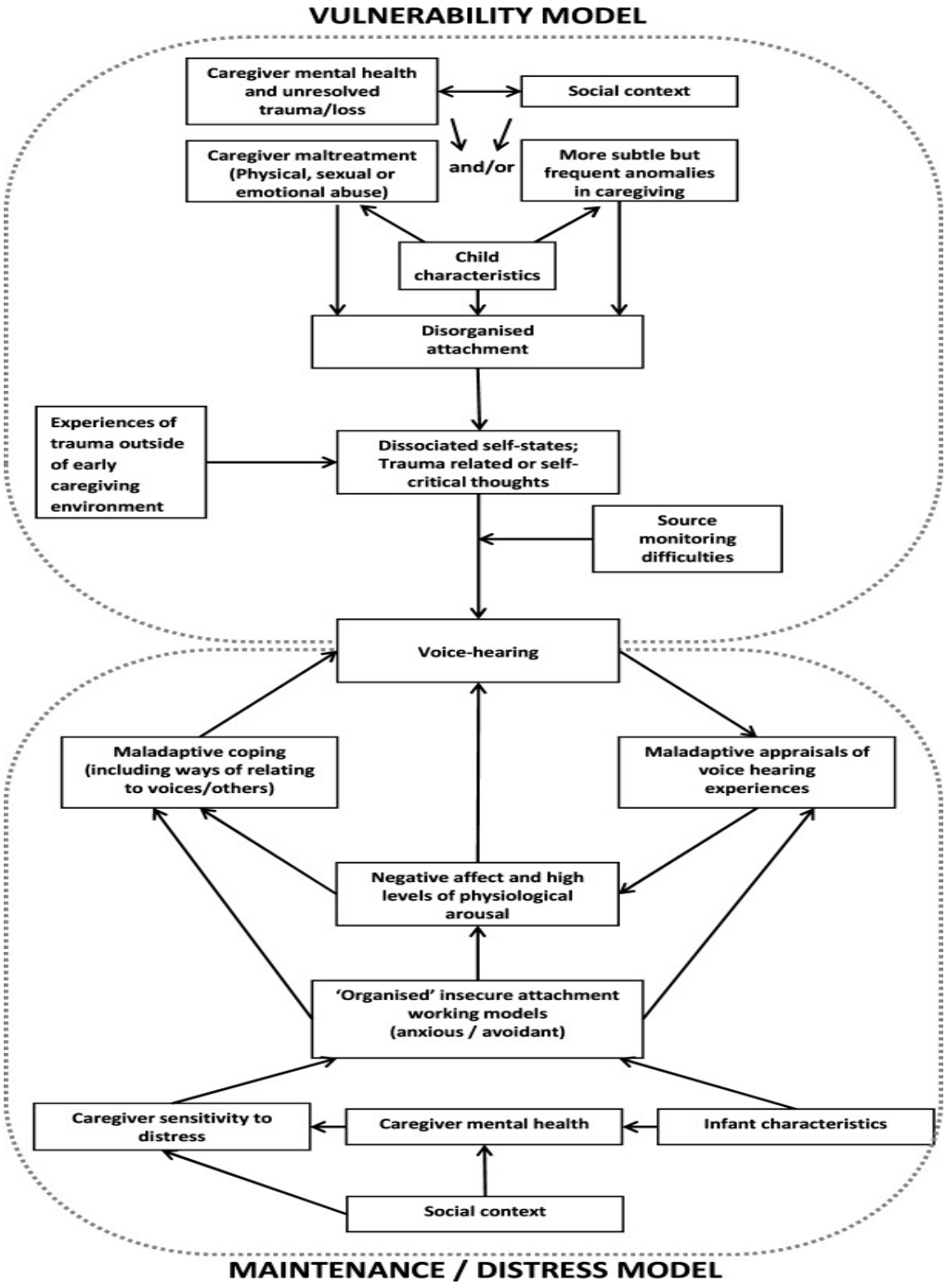
Appendix B

Cognitive Attachment Model of Voices

Figure S1

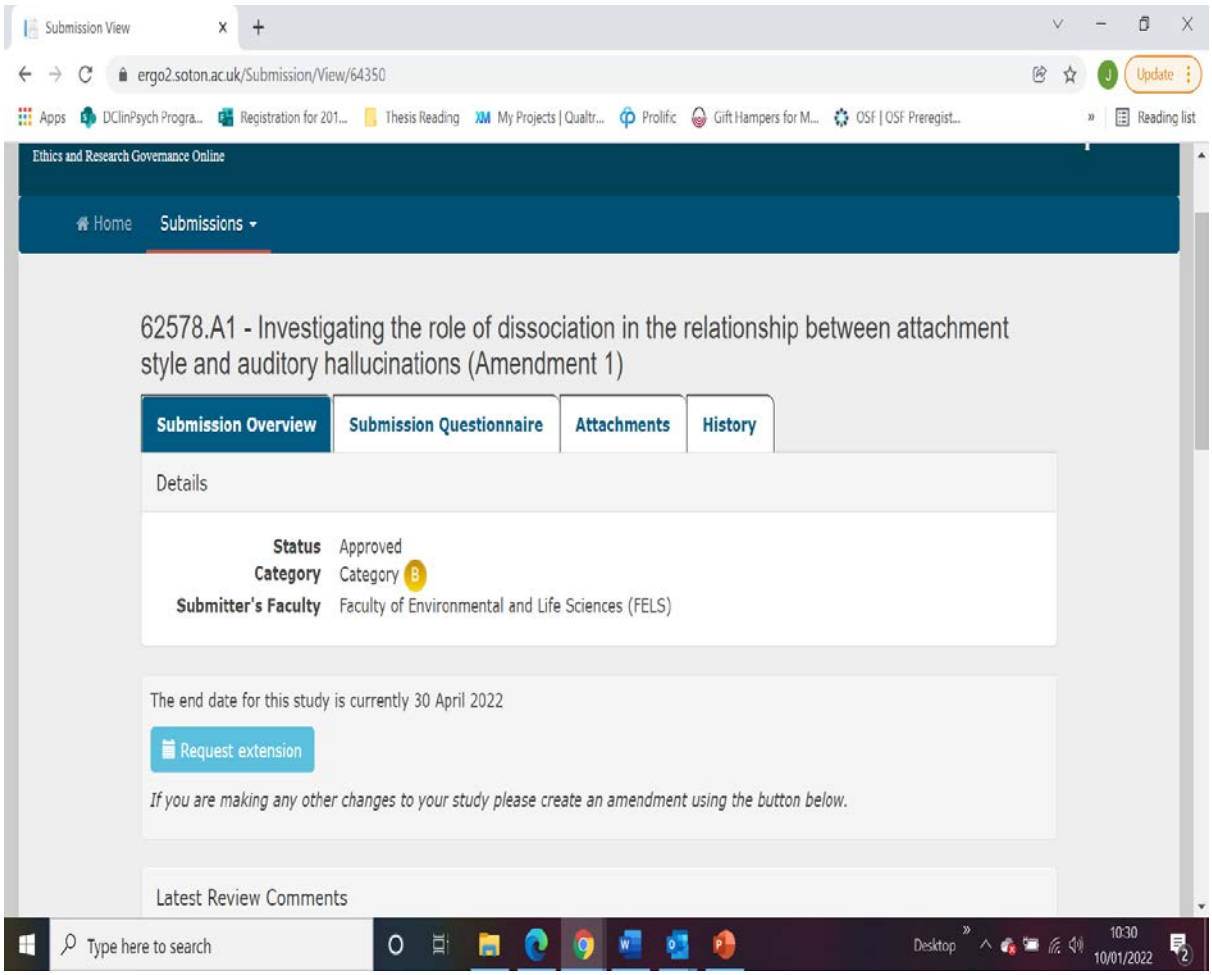
Cognitive Attachment Model of Voice Hearing



Appendix C

Ethical Approval

Ethical approval was received from the University of Southampton Ethics Committee.



Appendix D

Participant Information Sheet

Study Title: An online study examining the impact of imagery on perception

Researcher: Joe Puckett

ERGO number: 62578

Please read this information carefully before deciding to take part in this research. It is up to you to decide whether or not to take part. If you are happy to participate you will be asked to sign a consent form.

What is the research about?

I am a doctoral clinical psychology student conducting this research as part of my doctoral qualification at the University of Southampton. This study aims to explore the impact mental imagery on perception.

Why have I been asked to participate?

You have been chosen because you are aged 18 and above. This study uses a self-selected sample (i.e., your participation is voluntary).

What will happen to me if I take part?

Having signed up to this study, you will take part in a brief online screening questionnaire (approximately 5 minutes) to determine whether you fit the criteria to participate in the following parts of the study. If you are selected for the study, you will then be asked to provide some basic demographic information and answer questions about your mood (approximately 5 minutes). Following this, you will be asked to listen to an audio tape (5 minutes). Having listened to the tape, you will be asked complete a questionnaire about your mood whilst holding a specific image in mind (approximately 5 minutes). Finally, you will have the option to complete a brief mood repair to reduce distress (if any). Having completed the study, you will be debriefed. The whole study should take no longer than 25 minutes to complete. This study asks you to provide your email address at two different time points – this information is obtained solely for the purpose of matching your data and to email you (up to two times) to remind you to complete the study.

Are there any benefits in my taking part?

Are there any risks involved?

There are no major risks in this study; however, as this study involves imagery, it is possible that you may experience transient discomfort. If you feel unable to continue your participation, please be ensured that you are free to withdraw at any time. If you do feel discomfort at any point during the study, I advise you to contact your GP for support. Alternatively, you may visit the following website: http://www.samaritans.org/how-we-can-help-you/contact-us. You can also find mental health information on the NHS choices website: http://www.nhs.uk/pages/home.aspx.

Will my participation be confidential?

Your participation will be completely confidential in compliance with the Data Protection Act and University policy. All the information you provide will be kept confidential and anonymous at all times – this will be ensured by a password-protected computer. Your data will only be seen be seen by myself and my supervisors.

What should I do if I want to take part?

If you wish to take part. Please tick the consent below and follow the links.

What happens if I change my mind?

You have the right to withdraw at any time during the study without penalty.

What will happen to the results of the research?

The research data will be stored for a minimum of 10 years as per University of Southampton policy. I plan to write up the results of the study and submit them to an academic journal. If you would like a copy of the results, please contact the researcher (details below). Please ensure that all data will treated anonymously and as such, no identifiable information will be published in the results.

Where can I get more information?

If you have any further questions regarding this study, please contact me at jfp1n19@soton.ac.uk

What happens if something goes wrong?

If you have any concerns or complaints, please contact the Chair of the Ethics Committee, Psychology, University of Southampton, Southampton, SO17 1BJ. Phone: +44 (0)23 8059 3856, email: fshs-rso@soton.ac.uk

Thank you for reading this information and considering to take part in this research.

***(Following this information, participants will be prompted to check a box to indicate consent)**

Appendix E

Prolific Advert

Experiment: Online questionnaires and brief visualisation tasks (up to **£3.97**)

Researcher: Joe Puckett

Description: This study will explore the relationship between imagery and perception and has 2 parts. You will first complete screening questionnaires to assess whether you meet criteria for Part 2 of the study. The screening questionnaires will take approximately 5 minutes and you will receive **84p** on completion of this screening.

*****Please only participate if you are able and willing to complete Part 2 of this study***.**

If you are eligible for Part 2, you will be asked to complete some brief visualisation tasks and questionnaires. These will be sent to via prolific within 4 days of you completing Part 1. Please check Prolific within this time to see whether you have received Part 2.
The entire study will be online and take approx. 30 minutes to complete. You will

receive a further **£3.13** upon completion of Part 2.

Appendix F

Debriefing Statement

Title of Project: An online study examining the impact of imagery on perception

Debriefing Statement:

The aim of this research was to examine whether there is a relationship between mental imagery and auditory hallucinations, and whether dissociation mediates this relationship.

Fleeting auditory hallucinations are common in the general population. We are testing whether imagining secure relationships will decrease auditory hallucinations and whether imagining disorganised relationships will increase auditory hallucinations. Dissociation describes the ways in which our minds can struggle to manage information when under stress. You may feel disconnected from your thoughts, feelings, memories, and surroundings. It can affect your sense of identity and your perception of time. We tested whether this influences the impact of imagery on paranoia and anxiety.

Your data will help us fill in some of the major gaps in the current literature by allowing us to determine whether mental imagery and paranoia are related, and potential psychological mechanisms by which this occurs.

Once again, results of this study will not include your name or any other identifying characteristics. This research did not use deception.

If you would like a copy of this summary and/or the findings of this study (once they are available), please contact the researcher (details are below).

If you have any further questions please contact me, Joe Puckett, at jfp1n19@soton.ac.uk

Thank you for your participation in this research.

If you have questions about your rights as a participant in this research, or if you feel that you have been placed at risk, you may contact the Chair of the Ethics Committee, Psychology, University of Southampton, Southampton, SO17 1BJ. Phone: +44 (0)23 8059 3856, email fshs-rso@soton.ac.uk

If you are experiencing distress after this completing this survey, I advise you to contact your GP for support. Alternatively, you may visit the following website: http://www.samaritans.org/how-we-can-help-you/contact-us. You can also find mental health information on the NHS choices website: http://www.nhs.uk/pages/home.aspx. University of Southampton students and staff may visit the university's enabling services website (http://www.southampton.ac.uk/edusupport/mental_health_and_wellbeing/index.page) to get more information about where to receive support. Please note that the university counselling services are only available to staff and students recruited at the university.

If you are an international student at the University of Southampton, you may visit http://www.southampton.ac.uk/uni-life/international/support.page for support.

Appendix G

Attachment Imagery Scripts

Secure Attachment-Based Imagery Script

Thank you for taking part in this study. Please only proceed if you are able to spend the next few minutes alone, in a quiet place, focusing on this task. I will be asking you to remember a time when you were with another person, and imagine this memory as clearly as possible.

Take a few moments to sit comfortably in the chair. Notice how your body feels right now … the floor solid beneath your feet … the pressure of the chair supporting you. Close your eyes if you are happy to do this, or allow your gaze to drop to a point in front of you if this feels more comfortable.

I'd like you to think of a time when you were with another person, perhaps a family member or a friend. Think of a time when you felt close to the other person. You felt confident in their affection for you, and knew that they wanted to stay with you. In this relationship you felt safe and secure with the other person.

As best you can, focus on this memory, on how safe and secure you felt, and how you trusted the other person with you.

When we feel safe and secure with other people, and confident we can trust them, we often feel good about ourselves and may have an image or a sense of ourselves in mind. As best you can, picture yourself in this situation. Picture the image of yourself as clearly as possible in your mind's eye.

Notice what you're doing.

Notice who you're with.

Notice what you can see and hear.

As best you can, continue to picture this memory as clearly as possible – and the image of yourself, safe and secure.

Notice how clear and vivid this image is.

Focusing on this image, notice any sensations in your body.

Focusing on this image, notice any feelings that arise.

Focusing on this image, notice the sense of being safe and secure with the other person who you can trust.

As we come to the end of this exercise, as best you can, continue to hold this memory in mind – and the sense of yourself, safe and secure.

Disorganized Attachment-Based Imagery Script

Thank you for taking part in this study. Please only proceed if you are able to spend the next few minutes alone, in a quiet place, focusing on this task. I will be asking you to remember a time when you were with another person, and imagine this memory as clearly as possible.

Take a few moments to sit comfortably in the chair. Notice how your body feels right now … the floor solid beneath your feet … the pressure of the chair supporting you. Close your eyes if you are happy to do this, or allow your gaze to drop to a point in front of you if this feels more comfortable.

I'd like you to think of a time when you were with another person, perhaps a family member or a friend. Think of a time when you felt that you wanted to be close to them but had the urge to pull away. You want to become close with this person but you feel yourself freezing and you are confused by the feelings inside you.

As best you can, focus on this memory, on how you are frightened and find this persons actions unpredictable and confusing.

When we feel that we freezing up with a person even when we want to be close to them and that they are unpredictable, we may lose sense of who we are. As best you can, picture yourself in this situation. Picture the image of yourself as clearly as possible in your mind's eye.

Notice what you're doing.

Notice who you're with.

Notice what you can see and hear.

As best you can, continue to picture this memory as clearly as possible – and the image of yourself, freezing up even as you try to get close to someone, confused by the feelings inside of you, feeling the urge to pull away.

Notice how clear and vivid this image is.

Focusing on this image, notice any sensations in your body.

Focusing on this image, notice any feelings that arise.

Focusing on this image, wanting to be close but feeling frightened of being close to the person and being worried that you don't know what they might do.

As we come to the end of this exercise, as best you can, continue to hold this memory in mind – and the sense of yourself, frightened, freezing up and confused.

Appendix H

Measures

Launay–Slade Hallucination Scale – Revised (LSHS-R; Bentall & Slade, 1985) – trait hallucinatory-type experience

Rate on a scale of 1 to 5 how much you agree or disagree with the following statements

1 – strongly disagree

2 – mildly disagree

3 – neutral

4 – mildly agree

5 – strongly agree

1. No matter how hard I try to concentrate, unrelated thoughts always creep into my mind
2. In my daydreams I can hear the sound of a tune almost as clearly as if I were actually listening to it
3. Sometimes my thoughts seem as real as actual events in my life
4. Sometimes a passing thought will seem so real that it frightens me
5. The sounds I hear in my daydreams are generally clear and distinct

6. The people in my daydreams seem so true to life that sometimes I think they are
7. I often hear a voice speaking my thoughts aloud
8. In the past, I have had the experience of hearing a person's voice and then found that no-one was there
9. On occasions, I have seen a person's face in front of me when no-one was in fact there
10. I have heard the voice of the Devil
11. In the past, I have heard the voice of God speaking to me
12. I have been troubled by hearing voices in my head

Paranoia Scale (Fenigstein and Vanable 1992) Please rate how applicable each belief is to you by selecting a number between 1 (not at all applicable to me) and 5 (extremely applicable to me).

1 Someone has it in for me

2 I sometimes feel as if I'm being followed

3 I believe that I have often been punished without cause

4 Some people have tried to steal my ideas and take credit for them

5 My parents and family find more fault with me than they should

6 No one really cares much what happens to you

7 I am sure I get a raw deal from life

8 Most people will use somewhat unfair means to gain profit or advantage, rather than lose it

9 I often wonder what hidden reason another person may have for doing something nice for you

10 It is safer to trust no one

11 I have often felt that strangers were looking at me critically

12 Most people make friends because friends are likely to be useful to them

13 Someone has been trying to influence my mind

14 I am sure I have been talked about behind my back

15 Most people inwardly dislike putting themselves out to help other people

16 I tend to be on my guard with people who are somewhat more friendly than expected

17 People have said insulting and unkind things about me

18 People often disappoint me

19 I am bothered by people outside, in cars, in stores, etc., watching me

20 I have often found people jealous of my good ideas just because they had not thought of them first

DISSOCIATIVE EXPERIENCES SCALE II

This questionnaire consists of 28 questions about experiences you have had in your daily life. We are interested in how often you have had these experiences. It is important, however, that your answers show how often these experiences happen to you when you are not under the infl uence of alcohol or drugs. To answer the questions, please determine to what degree the experience described in the question applies to you and circle the appropriate number to show what percentage of the time you have had the experience.

Example: 0% 10 20 30 40 50 60 70 80 90 100%

1. Some people have the experience of driving a car and suddenly realizing that they don't remember what has happened during all or part of the trip. Circle a number to show what percentage of the time this happens to you.
   0% 10 20 30 40 50 60 70 80 90 100%
2. Some people fi nd that sometimes they are listening to someone talk and they suddenly realize that they did not hear part or all of what was just said. Circle a number to show what percentage of the time this happens to you.
   0% 10 20 30 40 50 60 70 80 90 100%
3. Some people have the experience of fi nding themselves in a place and having no idea how they got there. Circle a number to show what percentage of the time this happens to you.
   0% 10 20 30 40 50 60 70 80 90 100%
4. Some people have the experience of fi nding themselves dressed in clothes that they don't remember putting on. Circle a number to show what percentage of the time this happens to you.
   0% 10 20 30 40 50 60 70 80 90 100%
5. Some people have the experience of fi nding new things among their belongings that they do not remember buying. Circle a number to show what percentage of the time this happens to you.
   0% 10 20 30 40 50 60 70 80 90 100%
6. Some people sometimes fi nd that they are approached by people that they do not know who call them by another name or insist that they have met them before. Circle a number to show what percentage of the time this happens to you.
   0% 10 20 30 40 50 60 70 80 90 100%
7. Some people sometimes have the experience of feeling as though they are standing next to themselves or watching themselves do something, and they actually see themselves as though they were looking at another person. Circle a number what percentage of the time this happens to you.

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

8. Some people are told that they sometimes do not recognize friends or family members. Circle a number to show what percentage of the time this happens to you.
   0% 10 20 30 40 50 60 70 80 90 100%
9. Some people fi nd that they have no memory for some important events in their lives (for example, a wedding or graduation). Circle a number to show what percentage of the important events in your life you have no memory for.
   0% 10 20 30 40 50 60 70 80 90 100%
10. Some people have the experience of being accused of lying when they do not think that they have lied. Circle a number to show what percentage of the time this happens to you.
    0% 10 20 30 40 50 60 70 80 90 100%
11. Some people have the experience of looking in a mirror and not recognizing themselves. Circle a number to show what percentage of the time this happens to you.
    0% 10 20 30 40 50 60 70 80 90 100%
12. Some people sometimes have the experience of feeling that other people, objects, and the world around them are not real. Circle a number to show what percentage of the time this happens to you.
    0% 10 20 30 40 50 60 70 80 90 100%
13. Some people sometimes have the experience of feeling that their body does not seem to belong to them. Circle a number to show what percentage of the time this happens to you.
    0% 10 20 30 40 50 60 70 80 90 100%
14. Some people have the experience of sometimes remembering a past event so vividly that they feel as if they were reliving that event. Circle a number to show what percentage of the time this happens to you.
    0% 10 20 30 40 50 60 70 80 90 100%
15. Some people have the experience of not being sure whether things that they remember happening really did happen or whether they just dreamed them. Circle a number to show what percentage of the time this happens to you.
    0% 10 20 30 40 50 60 70 80 90 100%
16. Some people have the experience of being in a familiar place but fi nding it strange and unfamiliar. Circle a number to show what percentage of the time this happens to you.
    0% 10 20 30 40 50 60 70 80 90 100%
17. Some people fi nd that when they are watching television or a movie they become so absorbed in the story that they are unaware of other events

happening around them. Circle a number to show what percentage of the time this happens to you.
0% 10 20 30 40 50 60 70 80 90 100%

18. Some people sometimes fi nd that they become so involved in a fantasy or daydream that it feels as though it were really happening to them. Circle a number to show what percentage of the time this happens to you.
0% 10 20 30 40 50 60 70 80 90 100%
19. Some people fi nd that they sometimes are able to ignore pain. Circle a number to show what percentage of the time this happens to you.
0% 10 20 30 40 50 60 70 80 90 100%
20. Some people fi nd that they sometimes sit staring off into space, thinking of nothing, and are not aware of the passage of time. Circle a number to show what percentage of the time this happens to you.
0% 10 20 30 40 50 60 70 80 90 100%
21. Some people sometimes fi nd that when they are alone they talk out loud to themselves. Circle a number to show what percentage of the time this happens to you.
0% 10 20 30 40 50 60 70 80 90 100%
22. Some people fi nd that in one situation they may act so diff erently compared to another situation that they feel almost as if they were two diff erent people. Circle a number to show what percentage of the time this happens to you.
0% 10 20 30 40 50 60 70 80 90 100%
23. Some people sometimes fi nd that in certain situations they are able to do things with amazing ease and spontaneity that would usually be diffi cult for them (for example, sports, work, social interactions, etc.). Circle a number to show what percentage of the time this happens to you.
0% 10 20 30 40 50 60 70 80 90 100%
24. Some people sometimes fi nd that they cannot remember whether they have done something or have just thought about doing that thing (for example, not knowing whether they have just mailed a letter or have just thought about mailing it). Circle a number to show what percentage of the time this happens to you.
0% 10 20 30 40 50 60 70 80 90 100%
25. Some people sometimes fi nd evidence that they have done things that they do not remember doing. Circle a number to show what percentage of the time this happens to you.
0% 10 20 30 40 50 60 70 80 90 100%
26. Some people sometimes fi nd writings, drawings, or notes among their belongings that they must have done but cannot remember doing. Mark the line to show what percentage of the time this happens to you.

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

27. Some people sometimes fi nd that they hear voices inside their head which tell them to do things or comment on things that they are doing. Circle a number to show what percentage of the time this happens to you.
    0% 10 20 30 40 50 60 70 80 90 100%
28. Some people sometimes feel as if they are looking at the world through a fog so that people and objects appear far away or unclear. Circle a number to show what percentage of the time this happens to you.
    0% 10 20 30 40 50 60 70 80 90 100%

PAM-R (Pollard et al., 2020)

We all differ in how we relate to other people. This questionnaire lists different thoughts, feelings and ways of behaving in relationships with others.

Thinking generally about how you relate to other key people in your life, **please use a tick to show how much each statement is like you**. Key people could include family members, friends, partner or mental health workers. There are no right or wrong answers.

	Not at all	**A little**	**Quite a bit**	**Very much**
1. I prefer not to let other people know my 'true' thoughts and feelings.				
2. I find close relationships overwhelming				
3. I find it easy to depend on other people for support with problems or difficult situations.				
4. I feel frightened in close relationships				
5. I tend to get upset, anxious or angry if other people are not there when I need them.				
6. I usually discuss my problems and concerns with other people.				
7. When I'm stressed I want to contact close others but I am frightened of their response				
8. I worry that key people in my life won't be around in the future.				
9. I find people I am in close relationships with to be unpredictable in their actions and behaviours				

10. I ask other people to reassure me that they care about me.				
11. I often get hurt in close relationships				
12. If other people disapprove of something I do, I get very upset.				
13. I find it difficult to accept help from other people when I have problems or difficulties.				
14. When I try to get close to someone sometimes I shut down and find it difficult to think or move				
15. It helps to turn to other people when I'm stressed.				
16. I worry that if other people get to know me better, they won't like me.				
17. Sometimes I am confused by my feelings towards others				
18. I worry a lot about my relationships with other people.				
19. I want close relationships, but being close makes me feel frightened				
20. I often freeze when I try to get close to someone				
21. I try to cope with stressful situations on my own.				
22. I worry that if I displease other people, they won't want to know me anymore.				

23. I want to be close to others but I often find myself pulling away when I am				
24. I worry about having to cope with problems and difficult situations on my own.				
25. I feel uncomfortable when other people want to get to know me better.				
26. When I form close relationships I lose sense of who I am				

Continuum of Auditory Hallucinations. Development and Validation of a State Inventory -Amended (Schlier, B., Hennig, T., & Lincoln, T. M. 2017).

Instruction and items

CAHSA

I have the following feelings and experiences:

1. **My fantasies are vivid and intense.**

Not at all						Very much
1	2	3	4	5	6	7

2. **I ddaydream a lot.**

Not at all						Very much
1	2	3	4	5	6	7

3. My hearing is so sensitive that even everyday noise becomes irritating.

Not at all						Very much
1	2	3	4	5	6	7

4. I feel easily distracted by distant sounds.

Not at all						Very much

1	2	3	4	5	6	7

5. My thoughts are so strong and vivid that I can almost hear them.

Not at all 1	2	3	4	5	6	Very much 7

6. Ideas and thoughts hit me so fast that I cannot express them all.

Not at all 1	2	3	4	5	6	Very much 7

7. I hear one or more voices in my head speaking my thoughts aloud, talking to each other or saying other things.

Not at all 1	2	3	4	5	6	Very much 7

8. Meaningless noise that I hear can sound like someone was saying my name or as if people were talking.

Not at all 1	2	3	4	5	6	Very much 7

9. I hear something other people cannot hear.

	Not at all						Very much
	1	2	3	4	5	6	7

6 item Clinician Administered Dissociative State Scales (CADSS-6; Rodrigues, N. B., McIntyre, R. S., Lipsitz, O., Lee, Y., Cha, D. S., Shekotikhina, M. & Rosenblat, J. D. (2020)

When administered, clinician says at this time before each question

Do things seem to be moving in slow motion?

0 - Not at all

1 - Mild, things seem slightly slowed down, but not very noticeable.

2 - Moderate, things are moving about twice as slow as normally.

3 - Severe, things are moving so slowly that they are barely moving.

4 - Extreme, things are moving so slowly, I have the perception that everything has come to a stop, as if time is standing still.

Do things seem to be unreal to you, as if you are in a dream?

0 - Not at all

1 - Mild, things seem a little unreal, but I'm well aware of where I'm at.

2 - Moderate, things seem dreamlike, although I know I am awake.

3 - Severe, things seem very dreamlike, although I know that I am here, I have the feeling like I might be asleep.

4 - Extreme, I feel like nothing is real, like I should pinch myself to wake up, or ask someone if this is a dream.

Do you feel disconnected from your own body?

0 - Not at all

1 - Mild, I feel a little bit disconnected from myself, but I am basically all here.

2 - Moderate, I feel somewhat detached from my own body, but I am basically all together.

3 - Severe, I feel detached from my own body, but not far removed from my body, and I feel as if it is me there.

4 - Extreme, I feel like I am completely out of my body, as if I am looking at my own body from a long way off, as if there is another person there.

Does your sense of your own body feel changed: for instance, does your own body feel unusually large or unusually small?

0 - Not at all

1 - Mild, I have a vague feeling that something about my body has changed, but I can't say exactly what it is.

2 - Moderate, I feel like my body has increased or decreased in size slightly, or that it feels somewhat as if it is not my body.

3 - Severe, I feel as if my body has increased to twice its normal size, or decreased to twice its normal size, or I very much feel as if this is not my body.

4 - Extreme, I feel as if my body has swelled up to at least ten times its normal size, or as if it is ten times as small, or as if my arms have become like toothpicks.

Have you spaced out, or in some other way lost track of what was going on during this experience?

0 - Not at all

1 - Mild, I have had some episodes of losing track of what is going on, but I have followed everything for the most part.

2 - Moderate, I have lost at least a minute of time, or have completely lost track of what is going on now.

3 - Severe, I have lost several segments of time of one minute or more.

4 - Extreme, I have lost large segments of time of at least 15 min or more.

Do you have gaps in your memory?

0 - Not at all

1 - Mild, there are some recent things which I cannot remember.

2 - Moderate, there have been a few gaps in my memory which lasted a few minutes.

3 - Severe, there have been large gaps in my memory which lasted for more than a few minutes.

4 - Extreme, I cannot piece together what is happening from one moment to the next due to large gaps in my memory.

Paranoia Checklist

Please read the following statements and rate the extent to which they apply <u>at this moment</u>

1. I need to be on my guard against others

1 2 3 4 5

Not at all Very Strongly

2. There might be negative comments being circulated about me

1 2 3 4 5

Not at all Very Strongly

3. People deliberately try to irritate me

1 2 3 4 5

Not at all Very Strongly

4. I might be observed or followed

1 2 3 4 5

Not at all Very Strongly

5. People are try to make me upset

1 2 3 4 5

Not at all Very Strongly

6. People communicate about me in subtle ways

1 2 3 4 5

Not at all Very Strongly

7. Strangers and friends look at me critically

1 2 3 4 5

Not at all Very Strongly

8. People might be hostile towards me

1 2 3 4 5

Not at all Very Strongly

9. Bad things are being said about me behind my back

1 2 3 4 5

Not at all Very Strongly

10. Someone I know has bad intentions towards me

1 2 3 4 5

Not at all Very Strongly

11. I have a suspicion that someone has it in for me

1 2 3 4 5

Not at all Very Strongly

12. People would harm me if given an opportunity

1 2 3 4 5

Not at all Very Strongly

13. Some I don't know has bad intentions toward me

1 2 3 4 5

Not at all Very Strongly

14. There is a possibility of a conspiracy against me

1 2 3 4 5

Not at all Very Strongly

15. People are laughing at me

1 2 3 4 5

Not at all Very Strongly

16. I am under threat from others

1 2 3 4 5

Not at all Very Strongly

17. I can detect coded messages about me in the press/TV/radio

1 2 3 4 5

Not at all Very Strongly

18. My actions and thoughts might be controlled by others

1 2 3 4 5

Not at all Very Strongly

Appendix I

Participant Ethnicity Breakdown

Participants were asked to report how they identified their own ethnicity. This resulted in a cluster of unique responses. These responses where then coded along themes. In the table below can be found the complete reported details of participants ethnicities, as well as how they were coded.

Ethnicity self-identified by participants	Frequency	Code
African	2	African
Afro-asiatic	1	Mixed
Asian	1	Asian/East Asian
Black	1	Other Black Ethnicity
black american	1	Black American
Black South African	1	Black African
caucasian	5	White Caucasian European
Caucasian	6	White Caucasian European
Caucasin	1	White Caucasian European
caucasion	1	White Caucasian European
Causcasian/White/Polish	1	Eastern European/Slavic
Chinese	1	Other
Christian	1	NR
East Asian	1	Asian/East Asian
Easterneuropean	1	Eastern European/Slavic

Ecuadorian	1	Other
Egyptian	1	Other
european	2	Non-specific European
European	1	Non-specific European
European Caucasian	1	White/ Caucasian European
Good	1	NR
Greek	2	Southern European/Mediterranean
hispanic	2	Latin/Latin American/Hispanic
Hispanic	3	Latin/Latin American/Hispanc
Hispanic / Latino	1	Latin/Latin American/Hispanc
Hungarian	1	Eastern European/Slavic
I am an Africa from Mozambique	1	African
I wouldn't.	1	NR
Irish	1	White/ Caucasion European
Italian	3	Southern European/Mediteranean
kaukasian	1	NR
latin	1	Latin/Latin American/Hispanc
Latin	2	Latin/Latin American/Hispanc
LatinAmerican	1	Latin/Latin American/Hispanc

latino	2	Latin/Latin American/Hispanc
Latino	2	Latin/Latin American/Hispanc
Mexican	1	Other
Middle Eastern Jew	1	Other
Middle-European	1	Non-specific european
Mixed	3	Mixed
Mixed raised in a Black household and a White household separately	1	NR
pole	1	NR
Polish	1	Eastern European/Slavic
Polish/White	1	Eastern European/Slavic
portuguese	1	Southern European/Mediteranean
Portuguese	2	Southern European/Mediteranean
romance ethnic group	1	NR
Russian	1	Other
Slavic	2	Eastern European/Slavic
slavic, polish	1	Eastern European/Slavic
Slovenes	1	NR
South African	1	Other
South European	1	Southern European/Mediterranean

Spanish and Italian	1	Mixed
white	16	White/Caucasian European
White	19	White/ Caucasian European
White british	1	White/ Caucasian European
White British	6	White/ Caucasian European
White Caucasian	1	White/ Caucasian European
white causasian	1	White/ Caucasian European
White european	1	White/ Caucasian European
White European	1	White/ Caucasian European
White female	1	White/ Caucasian European
white italian	1	White/ Caucasian European
White/ Caucasian	1	White/ Caucasian European
Whitr	1	White/ Caucasian European
Total	128	

Appendix J

G*Power Calculation