Childhood Trauma and Hearing Voices: The Role of Dissociation and Cognitive Inhibition.

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Declaration and signature of candidate
I confirm that the thesis submitted is the outcome of work that I have undertaken during my programme of study, and except where explicitly stated, it is all my own work. I confirm that the decision to submit this thesis is my own. I confirm that except where explicitly stated, the work has not been submitted for another academic award. I confirm that the work has been conducted ethically and that I have maintained the anonymity of research participants at all times within the thesis. Signed:  Date: 2nd September 2024

Preface

Table illustrating breakdown of total word count:

Document Name	Word Count
Thesis Abstract	302
Paper One: Literature Review	7847
Paper Two: Empirical Paper	7187
Paper Three: Executive Summary	2485
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Contents

Thesis Abstract

Paper one is a comprehensive literature review that examines cognitive and affective factors contributing to delusional ideation across the psychosis-spectrum, including both psychotic and non-psychotic populations. Through a systematic search, twenty-two quantitative studies involving 5,000 participants were identified and analysed. The review synthesises evidence on cognitive biases, such as attributional style and cognitive flexibility, and their interaction with emotional regulation, particularly emotional distress, in shaping delusional beliefs. These findings highlight the need for therapeutic approaches that address both cognitive and emotional dimensions, with significant implications for clinical practice and future research. The review also identifies gaps in the existing literature, particularly the need for longitudinal studies to better understand the causal relationships between these factors.

Paper two presents an empirical study investigating the relationship between childhood trauma and hearing voices, focusing on the potential mediating roles of dissociation and cognitive inhibition. The study involved 33 participants who reported experiencing auditory hallucinations. Participants completed assessments of childhood trauma, dissociative experiences, hallucination-proneness, and a cognitive inhibition task. The results showed a significant correlation between childhood trauma and the severity of hallucinatory experiences; however, dissociation did not significantly mediate this relationship. Furthermore, no significant correlation was found between cognitive inhibition and hallucination severity. These findings suggest that while childhood trauma is linked to hearing voices, the pathways through which this occurs may involve other mechanisms, necessitating further research.

Paper three is an executive summary that provides an accessible version of the empirical study on childhood trauma and hearing voices. The summary is designed for individuals who experience auditory hallucinations, both with and without a formal diagnosis, and aims to help them understand how early trauma may contribute to their experiences. The summary includes practical recommendations based on the study's findings and is intended to be a resource for both clinical and non-clinical audiences.

Paper 1

Cognitive and affective factors associated with delusional ideation across the psychosis-spectrum, in psychotic and non-psychotic populations.

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Abstract

Cognitive and affective factors are implicated in the formation and maintenance of delusions. This paper reviews quantitative studies examining the association between cognitive and affective factors and delusional ideation across the psychosis-spectrum. A quality appraisal of studies is also undertaken. A database search was conducted for studies between January 2013 and March 2023. Studies were considered eligible if using cohort, case-control, cross-sectional, or longitudinal designs to quantitatively examine the association between cognitive and / or affective variables in adults comprising clinical and non-clinical samples, as well as those along the continuum of sub-clinical psychosis. A systematic search identified 22 eligible studies consisting of 5000 participants. Six studies used a case-control design, and 16 were cross-sectional. Cognitive biases included seeking/interpreting of information to support existing hypotheses, premature conclusion-making, attentional focus on threatening information, and attribution of significance to innocent stimuli. Affective factors consisted of self-criticism and negative affectivity facilitating a stress-delusion link, while high delusional stability was directly associated with anxiety, depression, worry, and meta-worry. Results add to the existing evidence base for cognitive and affective factors of delusional ideation across the psychosis-spectrum. Results suggest need for robust methodologies, additional replication and longitudinal studies, and evidence of psychotherapeutic treatment efficacy to strengthen conclusions.

Keywords: Cognitive factors, Affective factors, Delusional Ideation, Psychosis-spectrum

Introduction

Research in recent decades (Johns & van Os, 2001; van Os et al., 2009) supports a psychosis-spectrum underpinned by two research lenses. First, that psychosis-spectrum disorders are hypothesised to occur on a continuum across both clinical and non-clinical samples (Hinterbuchinger et al., 2023). Secondly, psychosocial factors (e.g., symptom intrusiveness and frequency) increasing the risk of psychotic phenomena are similarly implicated across the continuum (van Os et al., 2000; Johns & van Os, 2001; van Os et al., 2001; Kelleher & Cannon, 2010; Linscott & van Os, 2012; Taylor et al., 2013; McGrath et al., 2015). Anticevic and Halassa (2023) conceptualise psychosis-spectrum disorder (PSD) as a chronic, debilitating condition with a global economic burden of 0.02% to 1.65% Gross Domestic Product (Chaiyakunapruk et al., 2016). The lifetime risk for PSD is 1% worldwide (Rehm & Shield, 2019).

Delusions are a common feature of psychosis. Delusions are unusual, rigid beliefs held with conviction, despite disconfirmatory evidence (Jaspers, 1946). Delusions are evident in schizophrenia (Andreasen & Flaum, 1991), and are typically persecutory, somatic, or grandiose. They are often underpinned by an enduring sense of threat (Freeman et al., 2002), are highly distressing, and cause considerable social dysfunction. Within the literature, a distinction is typically made between delusion-like experiences (e.g., a ‘yes’ response to the question “*Do you have any special powers that most people lack?*” - Saha et al., 2012) and delusional ideation (e.g., an individual strongly believing they are God), with DLEs hypothesised to represent a ’milder’ form of DI. In population-based studies, DLE prevalence ranges from 5% (van Os et al., 2009) to 8.4% (Saha et al., 2011) using clinical interviews, compared with a range of 25.2% (Peters et al., 1999) to 29.8% (Peters et al., 2004) utilising self-report measures. Conversely, DI is typically associated with a full-blown psychosis (Johns & van Os, 2001; Myin-Germeys et al., 2003; Freeman, 2006; van Os et al., 2009; Kelleher & Cannon, 2010; Linscott & van Os, 2013; Prochwicz & Klosowska, 2017). A study by Sartorius et al. (1986) was done across 10 countries, with 1379 participants with schizophrenia symptomatology making first contact with services. Results showed persecutory delusions were second most common symptoms of psychosis, after delusions-of-reference, appearing in approximately 50% of cases. Freeman’s (2006) review of 15 papers indicates a higher degree of delusional ideation in the general

population compared with psychotic disorders, with DI occurring in non-psychotic individuals. Freeman and Garety (2006) outline between 1-3% of non-clinical populations experience DI comparable in severity to their clinical counterparts, whereas between 5-6% experience non-clinically comparable ideation. Furthermore, they report between 10-15% of non-clinical individuals experience regular DI, although this figure is a "*conservative estimate*" (p.406), as it will not account for marked differences in severity and content, nor would it include more fleeting, everyday ideation.

Delusional ideation is associated with more severe psychosis-spectrum disorders, one of which is Delusional Disorder (DD). DD was originally conceptualised by Kraeplin (1915) as an illness with highly constructed and developed delusions not considered unusual, and ultimately termed 'paranoia'. Winokur (1977) suggested DD was underpinned by evident delusions without hallucinations. Few studies have considered a causal difference between DD and other affective- and psychosis-spectrum disorders (Kendler, 1982; Marneros et al., 2012). The lack of DD studies may result from its low prevalence, alongside small sample sizes (Ibanez-Casas & Cervilla, 2012). Clinically, the lifetime risk of DD within the general population is between 0.05%-0.1% (Joseph & Saddiqui, 2019).

In recent decades, the cognitive element of delusions has garnered interest. Cognitive research of delusions considers processes contributing to biased appraisal as causal factors in the development, maintenance, and persistence of delusions (Garety & Freeman, 2013). Studies comparing healthy individuals with populations diagnosed with psychosis-spectrum disorders (e.g., schizophrenia and delusional disorder), reported non-significant deficits in visuo-spatial working memory (Hardoy et al., 2004; Grover et al., 2011), attention, verbal working-memory, and verbal learning (Leposavić et al., 2009; Ibanez-Casas & Cervilla, 2012; Ibanez-Casas et al., 2013). However, the limitation of small samples in these studies could preclude significant differences. A more recent study (Muñoz-Negro et al., 2015) reported that participants diagnosed with DD showed less cognitive and negative psychosis symptoms, compared with participants diagnosed with schizophrenia and schizoaffective disorder. This finding is consistent with existing research (Hardoy et al., 2004; Tuulio-Henriksson et al., 2011; Ibanez-Casas & Cervilla, 2012), whereby cognitive deficits in DD samples compared with schizophrenia samples have been reported.

A range of psychological models have looked to explain delusional formation and maintenance. Delusions may stem from dopamine-related salience attribution to certain thoughts and perceptions (Howes & Kapur, 2009; Heinz & Schlagenhauf, 2010), termed the 'aberrant salience hypothesis' (Gray, 1998; Kapur, 2003). Kapur conceptualises aberrant salience as inappropriate significance placed on neutral stimuli/events (e.g., a news article about cybercrime interpreted as someone monitoring one's e-mails; Chun et al., 2019). The theory furthers suggests this misattribution precedes DI formation. However, the persistence of delusions, despite disconfirmatory evidence, is neglected; a persistence likely explained by how delusional beliefs influence the shaping and perception of sensory evidence. Corlett et al. (2009) suggests this demonstrates increased predictive signalling, where the brain constantly attempts to predict upcoming states, refining these predictions through error signals (Ficco et al., 2021). Error signals are defined in the literature as the difference between expectation and outcome, which directly influences learning through allocation of attention to environmental stimuli (Corlett et al., 2007). Ultimately, this may explain delusion formation and maintenance. More recently, a relationship between self-disturbances (i.e., feelings that experiences and actions are controlled by others), and aberrant salience has been hypothesised (Nelson et al., 2014a; Nelson et al., 2014b), using self-referential models (i.e., judgements about the self and others) to test self-relevance (i.e., whether information is directly associated with the self; Kelley et al., 2002). Self-referential processing impairments are thought relevant to social dysfunction, and poor illness awareness of psychosis-spectrum disorders like schizophrenia (Zhao et al., 2021). It is hypothesised that delusions stem from inference abnormalities, (i.e., the shaping of beliefs through experiences; Hemsley & Garety, 1986). Impaired inferencing may lead to development of DI, although decades of investigation using the 'beads' task have not evidenced causality. The 'beads' task is a probabilistic reasoning task consisting of two jars with different proportions of coloured beads. One jar contains a greater ratio of one colour (e.g., 85:15 white: black), whilst the other jar contains the opposite (15:85 white: black). Participants are required to ask the researcher what colour a bead is, drawn from one-of-two jars, to decide which jar they came from. The number of beads drawn before participants decide (i.e., 'draws-to-decision') differentiates those with schizophrenia to those without (Dudley et al., 2016). The beads task suggests delusional populations jump-to-

conclusions (JTC) when considering how much information is required before deciding which jar beads came from (Dudley et al., 2013).

JTC is one of several cognitive biases studied within psychosis research. For example, Belief Inflexibility Bias (BIB) is the metacognitive capacity for self-reflection on beliefs (Garety et al., 2005), specifically the ability to consider delusions as mistaken (Freeman et al., 2004). Bias Against Disconfirmatory Evidence (BADE) — omitting contradictory information in decision-making (Woodward et al., 2007), or avoiding evidence for conflicting beliefs (Broyd et al., 2017) — is thought fundamentally linked to BIB. Garety et al. (2005) reported that belief inflexibility mediated the link between JTC and delusional conviction. Another form of attribution bias considers meaning making regarding positive and negative events. External Attribution Bias (ETB) refers to personal attributions made regarding causes of negative events (e.g., not submitting an assignment because the dog ate it; Lincoln et al., 2009). Empirical evidence suggests delusional populations make external interpretations for negative events, and more internal interpretations for positive events (Kaney & Bentall, 1989). This pattern of results is referred to as a self-serving bias (SSB). Aakre et al. (2008) found that schizophrenia participants with persecutory delusions believed their 'uniqueness' caused external forces to create positive and negative life events alike. Attention-to-Threat Bias (ATB) —the biased processing of threatening stimuli compared with neutral stimuli (Bentall et al., 2001) — has been associated with many psychological disorders, including schizophrenia (Bendall et al., 2013; Wiffen et al., 2013). False pictorial memory may underpin DI, with Bhatt et al. (2010) finding that schizophrenia populations experiencing delusions recalled more false memories than non-delusional schizophrenia participants. Moreover, Moritz and Woodward (2006) suggest overconfidence in delusional beliefs may be crucial in the formation and maintenance of DI.

Affective processes (emotional and behavioural), like the tendency to worry, appear to maintain delusions (Cernis et al., 2014; Hartley et al., 2014; Sun et al., 2019). Increased levels of worry and meta-worry are correlated with delusional distress and preoccupation over time (Startup et al., 2007; Hartley et al., 2014). Within a non-clinical sample, worry predicted persistent paranoid ideation over 12-18 months (Sun et al., 2019). Research with individuals experiencing Persistent Delusional Disorder (PDD) highlight between 30-50% experience co-morbid depressive

symptomatology (de Portugal et al., 2011; Wustmann et al., 2012). Empirical evidence suggests anxiety is a causal factor for persecutory delusions (Lincoln et al., 2010; Westermann & Lincoln, 2010), whilst mediating the impact of stress on delusions (Lincoln et al., 2008).

Emotion regulation (ER) is known to have a therapeutic role in the treatment of various psychopathologies (Aldao et al., 2010). However, research suggests ER deficits in schizophrenia (Khoury & Lecomte, 2012), paranoia-prone, and other psychotic experience populations (Westermann & Lincoln, 2011). Cognitive reappraisal is the reframing of emotional situations and is associated with better psychological health (Troy et al., 2013), with adaptive reappraisal considered a protective factor against psychopathology (Aldao et al., 2010), downregulating emotions that may activate DI (Lincoln et al., 2009); an empirically supported difficulty within psychosis-spectrum populations (Kimhy et al., 2020). Consequently, maladaptive reappraisal may generate new delusions. Expressive suppression (ES) refers to inhibiting behavioural expression of negative emotions (Chavez-Baldini et al., 2020). Generally, ES is ineffective in regulating negative emotions, decreasing positive affect whilst increasing negative affect (Brans et al., 2013). Habitual ES is associated with poorer wellbeing (Haga et al., 2007) due to increased physiological arousal and increased cognitive costs (Richards & Gross, 2000). Research suggests individuals with schizophrenia can use ES relative to healthy controls (Henry et al., 2007). However, Richards and Gross (2000) suggest that ES maintains maladaptive emotions and physiological arousal, which may trigger DI (Thewissen et al., 2011).

Ibanez-Casas and Cervilla (2012) conducted the most recent systematic review examining factors of DI. Therefore, this paper updates the knowledge base by examining literature from 2013-2023. The aims of this paper are to 1) offer comprehensive narrative review of quantitative studies investigating the association between cognitive and affective factors and delusional ideation across the psychosis-spectrum; 2) appraise the methodological quality of studies included in the review; and 3) provide recommendations for future research regarding delusions across the psychosis-spectrum.

Method

Literature search procedure

Scoping searches were conducted using Google Scholar to identify gaps in the research literature. A database search was then conducted using EBSCOHost, APA PsycInfo, APA PsycArticles, PsycBooks, CINAHL Plus, and eBook Collection (EBSCOHost) for primary studies published between January 2013 and March 2023. The search procedure and subsequent screening process is presented in the PRISMA diagram (Fig. 1).

Search terms

Given this paper is an update of the existing knowledge base, the earlier paper by Ibanez-Casas and Cervilla (2013) was consulted to identify their search terms. However, this paper was a non-systematic review and did not include search terms. Therefore, the following search strings were identified for this review: *'cognitive causes' AND 'affective causes' AND 'delusional disorder'; 'cognitive causes' AND 'affective causes' AND 'delusional' OR 'delusional ideation' OR 'delusions' AND 'healthy' OR 'non-clinical'; 'cognitive factors' AND 'affective factors' AND 'delusional' OR 'delusional ideation' OR 'delusions' AND 'healthy' OR 'non-clinical'; 'cognitive factors' AND 'affective factors' AND 'delusional' OR 'delusional ideation' OR 'delusions'*. This paper employs a broad review of the literature examining the cognitive and affective factors associated with delusional ideation across the psychosis-spectrum. As such, specific factors (e.g., attribution bias) were not included in the search strategy, as the aim was to capture as many cognitive and affective factors.

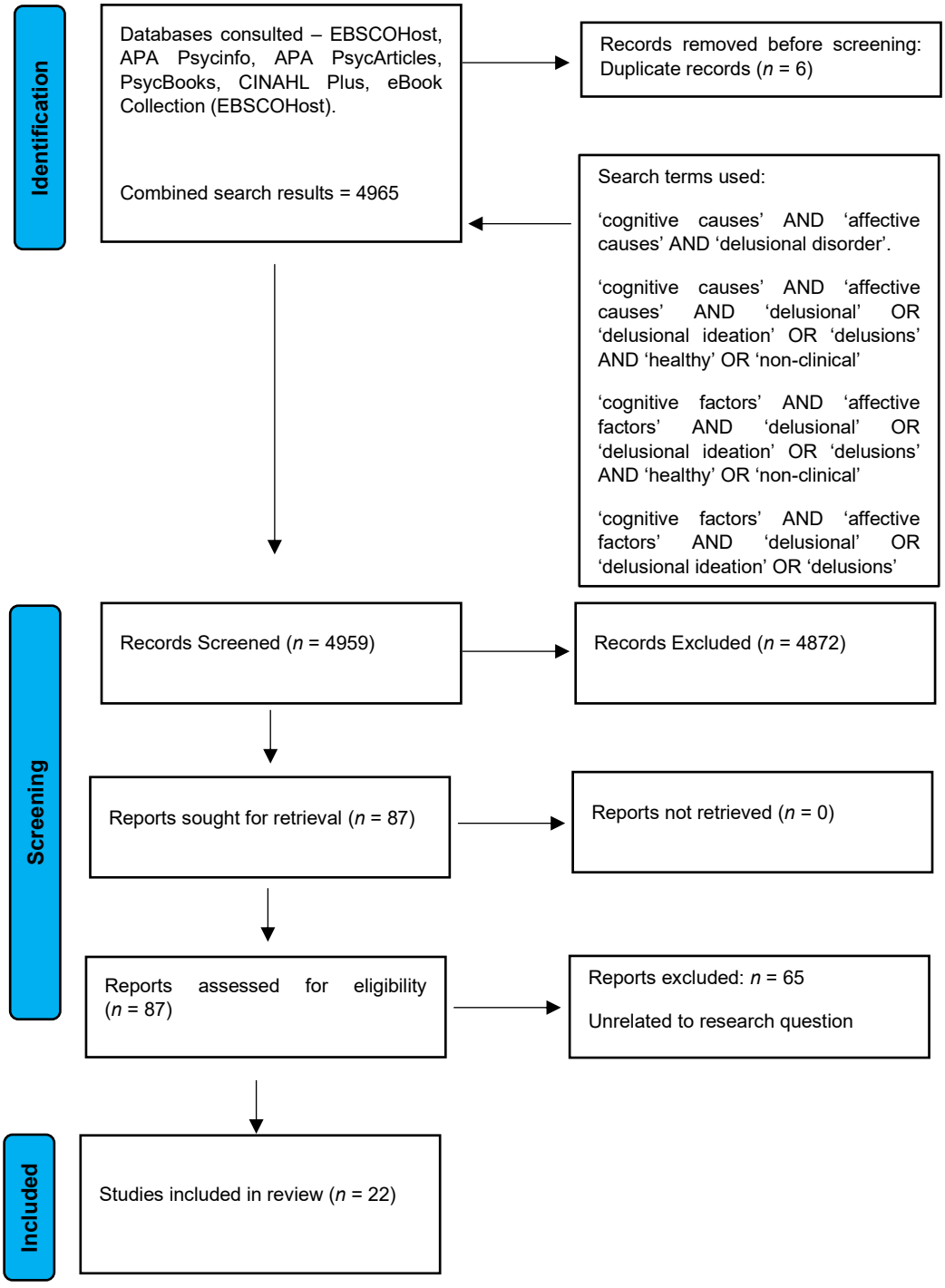

Fig. 1. PRISMA diagram describing the literature search and screening stages.

Inclusion and exclusion criteria

Study inclusion criteria were: (1) used cohort, case-control, cross-sectional, or longitudinal designs to examine the association between cognitive and affective factors and delusional ideation across the psychosis-spectrum; (2) For a study to be considered eligible, it must have used 'cognitive', 'cognitive factors', 'cognitive processes' and/or 'cognitive biases' in either the title, abstract, or study aims. Similarly,

studies examining affective factors must include ‘affective’, ‘affective factors’, ‘affective processes’, or stated a particular emotion (e.g., worry) in either the title, abstract, or study aims to be eligible; (3) used an adult sample (≥ 18 years old); (4) studies were peer-reviewed; (5) quantitative studies; (6) English language (translation services unavailable); (7) used clinical samples of participants who met validated diagnostic criteria (e.g., DSM-V) for psychosis-spectrum disorders, or studies employing samples along the continuum of sub-threshold psychosis symptoms (e.g., first-episode psychosis [FEP]), or non-clinical, healthy populations.

Exclusion criteria were: (1) studies examining the association between delusional ideation across the psychosis-spectrum continuum and other clinical variables (e.g., neuropsychological); (2) studies using qualitative methodology, single-case studies, and reviews; (3) non-peer-reviewed materials (e.g., book chapters, conference publications, dissertations/theses).

Critical Appraisal

The demographics and key findings of 22 primary studies were summarised in a table of characteristics (Table 1). The methodological quality of the studies was assessed using the National Institute of Health (NIH, 2009) quality assessment toolkits for case-control and observational-cohort cross-sectional studies (Appendix 1). The appraisal tools include items for evaluating various study design features (e.g., confounding variables). In this review, studies were assessed according to their design (case-control or cross-sectional). The NIH 12-item toolkit was used to evaluate case-control studies (n=6), while the 14-item version was used to evaluate longitudinal and cross-sectional studies (n=16). Ratings of ‘yes’, ‘no’, ‘cannot determine’, ‘not applicable’, and ‘not reported’ are made for each item evaluated. The NIH toolkits were not designed to provide global quality ratings. However, in accordance with other recently published healthcare-related systematic reviews (Connolly et al., 2017), each study was rated ‘poor’, ‘fair’, or ‘good’ to support overall appraisal of study quality. One item (assessors blinded) was omitted from the 14-item observational and cross-sectional tool, deemed irrelevant due to study design. Therefore, only 13/14 items were assessed for longitudinal and cross-sectional studies.

Table 1: *Demographics and Main Outcomes of Reviewed Studies*

Citation & Country	Study Design	Sample Size & Clinical Characteristics	Psychosis/Delusion Measure(s)	Main Measure(s) of Interest	Main Outcomes
Baker et al. (2019) **USA**	Case-control	*Clinical group: n*=26 (18 male) diagnosed with Schizophrenia, M_{age}=37. *Control group: n*=25 (15 male) HCG, M_{age}=36.	PDI PANSS PSYRATS Cardiff Anomalous Perceptions Scale	Modified Beads task	*Patients (clinical group) with > delusion severity demonstrated > information-seeking (i.e., increased draws-to-decision behaviour). This increase was specifically related to delusion severity, compared to severity of other psychotic symptomatology, working-memory capacity, and other clinical & socio-demographic characteristics. *Delusion-related increases in information-seeking present in non-medicated participants so unlikely due to medication. After adjusting for medication, all patients exhibited decreased information-seeking relative to HCG. *More delusional patients exhibited abnormal belief-updating, characterised by > reliance on incorporating information into forming beliefs earlier when making inferences – correlated with > information-seeking in patients. *Preliminary evidence that subjective valuing of information (instead of belief-updating) may explain group differences in information-seeking unrelated to delusions.
Balzan et al. (2013) **Australia**	Case-control	*Clinical group: n*=25 (15 male) diagnosed with Schizophrenia with history of delusions, M_{age}=40. *Non-clinical group: n*=25 (16 female) delusion-prone, M_{age}=44. *HCG: n*=25 (14 male) non-delusion-prone, M_{age}=42.	PANSS PDI-21 Mini-International Neuropsychiatric Interview	WAIS-Revised Digits Forward & Backward Positive/negative diagnostic test materials (*See 'Results' section or Samuels & McDonald, 2002*).	*Results across both positive and negative tests showed that delusion-prone and schizophrenia participants: • Prefer non-diagnostic/non-specific positive tests over diagnostic negative tests (biased searching) (S*ee 'Results' section for explanation*). • Rate confirming evidence more important than disconfirming evidence (biased interpretation). • Recalled confirming evidence easier than disconfirming evidence (biased recall). *Px with > DI failed to integrate disconfirmatory evidence to modify prior hypotheses.

Citation & Country	Study Design	Sample Size & Clinical Characteristics	Psychosis/Delusion Measure(s)	Main Measure(s) of Interest	Main Outcomes
Cafferkey et al. (2013) Northern Ireland	Cross-sectional	*n*=284 (198 female) undergraduate university HCG	PDI-21	Modified JTC Beads Task	*Participants who completed the 81:15 ratio beads task and exhibited > levels of DI did not demonstrate a JTC bias. However, participants who completed the more difficult 60:40 variant of the beads task, and who reported > levels of DI were more likely to demonstrate JTC bias. *JTC made a significant contribution to total variance explained for PDI Total, and each of the 3 subscales of the PDI. *HCG display 'JTC' tendency, which is associated with DI, representing the continuum.
Diaconescu et al. (2020) Switzerland	Cross-sectional	*High PD Clinical group: n*=70, *Low PD Clinical group: n*=81 Groups matched on age, education, and proportion of male and female, and experimental frames – adviser's possible intentions (dispositional) and rules of the task (situational) counterbalanced	PCL	Brief Cognitive Assessment Modified Advice-taking task (Probabilistic lottery guided by advice from a more informed human and a non-social cue - *See Behrens et al., 2008; Diaconescu et al. 2014, 2017)*	*Comparing different computational models, the hierarchical Bayesian model explained participants' responses better. Model parameters determining participants' belief-updates re: adviser's fidelity, and contribution of prior beliefs about fidelity to trial-wise decisions, showing significant Group x Frame interactions: • High PCL scorers held more rigid beliefs about adviser's fidelity across both experimental frames and relied less on advice in situational frames than low scorers.
Falcone et al. (2014) England	Case-control	*Clinical group: n*=108 (71 male) inpatient and CMHT First-Episode Psychosis participants, M_{age}=30. *Non-clinical group: n*=101 (54 female) age-matched HCG.	PANSS Psychosis Screening Questionnaire	JTC Beads Task WAIS-III	*Half FEP participants 'JTC' on at least 1 task, compared with 25% of control group. JTC was associated with clinical, but not non-clinical delusion severity, irrespective of clinical status. Delusion severity, but not working memory, was independently associated with JTC in the FEP group.
Falcone et al. (2015) England	Cross-sectional Longitudinal	N=34 (22 male) FEP participants, M_{age}=28 at baseline and M_{age}=29 at 12-month follow-up.	PANSS	JTC Beads Task	*JTC associated with baseline delusion severity. Baseline delusions persisted at follow-up for 8/20 participants (40%), who all 'JTC' (8/8, 100%), compared to half of those with no or changeable delusions (14/26, 54%).
Howe et al. (2018) Australia	Cross-sectional	N=98 (72 female) university students (mental health status not confirmed), split into 'low' (score ≤	PDI	Adapted JTC Beads Task BADE Task	*Adapted Beads task improved rates of comprehension not found in previous research. However, no evidence was found

Citation & Country	Study Design	Sample Size & Clinical Characteristics	Psychosis/Delusion Measure(s)	Main Measure(s) of Interest	Main Outcomes
		33, *n*=25) or 'high' (score ≥, *n*=26) delusion-prone using upper/lower PDI quartiles – scores outside parameters excluded, M_{age}=24.			that high-delusion-prone group demonstrated elevated over-adjustment or belief inflexibility in either task.
Klein & Pinkham (2018) USA	Case-control	*Clinical group: n*=46 (21 female) stable outpatient px diagnosed with SZ or Schizoaffective Disorder, M_{age}=36. *Control group: n*=46 (21 female) HCG, M_{age}=36.	SCID-P PANSS	MATRICS Consensus Cognitive Battery-Brief DACOBS Modified JTC Beads task	*Clinical group showed > JTC bias compared with HCG and in both groups, JTC bias > for emotionally salient task (positive and negative words displayed on a screen) in both groups. *Significant effect observed showing patients > difficulty in probabilistic reasoning. Effects diminished when controlling for probabilistic reasoning ability.
Kingston & Schuurmans-Stekhoven (2016) Australia	Cross-sectional	N=251 (200 female) undergraduate psychology student, M_{age}=36.	PDI-21	PANAS	*Self-criticism and NA mediated the relationship between life hassles and delusions. *Life hassles positively predict NA directly and indirectly (via self-criticism). *NA predicted delusional tendencies. *Life events had direct statistical effects on delusions in all models. *Neither PA nor self-reassurance mediated stress-delusional link.
Luk et al. (2018) Canada	Cross-sectional Retrospective	N=179 (120 male) with a diagnosis of SZ or schizoaffective disorders, split across 4 studies measuring component structure of BADE (Evidence Integration).	Signs & Symptoms of Psychotic Illness (SSPI)	BADE Task	*A component reflecting evidence integration emerged and was predicted by delusions.
Medlin & Warman (2014) USA	Cross-sectional	N=117, *n*=59 (33 male) from general community, *n*=58 from undergraduate student population. *n*=58 classified as 'high-SDI', M_{age}=22, *n*=58 classified as 'low-SDI', M_{age}=28.	PDI Modified Paranoia Checklist	State-trait Anxiety Inventory 60:40 (difficult) variant of JTC Beads task 85:15 (easy) variant of the JTC Beads task	*Ns differences found between participants with high vs low SDI in no-induction condition or following paranoia induction (use of 2-way mirror to heighten paranoia). *In stress-induction condition (speeded subtraction task), px with > levels of SDI significantly < likely to JTC on easy-reasoning task. Ns effects emerged on difficult task.
Mehl et al. (2018) Germany	Cross-sectional	N=70 (27 female) psychosis-spectrum patients (*n*=57 SZ, *n*=10 schizoaffective disorder, *n*=3 DD), randomly allocated to CBTp group	PANSS PDI PCL	IPSAQ JTC Beads Task	*Results show Sig effect in observer-rated general delusions (PANSS P1) with > decrease in CBTp condition than WL condition. NS differences found for post-

Citation & Country	Study Design	Sample Size & Clinical Characteristics	Psychosis/Delusion Measure(s)	Main Measure(s) of Interest	Main Outcomes
		(*n*=36, M_{age}=34) and Waiting-list group (*n*=34, M_{age}=32)			scores of self-rated general delusions, or self-rated PDs. Observer-rated PDs became Sig following missing data imputation. Changes in reasoning biases did not mediate intervention effects on delusions.
Menon et al. (2013) Canada	Cross-sectional	N=117 (77 females) HCG, M_{age}=31.	PDI	BADE Task JTC Beads Task	*Cognitive biases (specifically data-gathering bias and BADE) were independently associated with subclinical DI.
Pankow et al. (2015) Germany	Case-control	*Clinical group: N*=46 (44 males), n=24 diagnosed with subclinical DI, M_{age}=24, n=20 diagnosed with Schizophrenia, M_{age}=34. *Control group:* N=42 (27 males) HCG, M_{age}=28.	PANSS PDI	SCID-I Trail Making Test A&B Digit Span Test Behavioral Paradigm SAT (Aberrant Salience)	*Schizophrenia participants displayed > ASA compared to HCG and those with subclinical DI, the latter exhibited intermediate ASA.
Prochwicz & Klosowska (2017) Poland	Cross-sectional	N=138 (126 female) HCG, M_{age}=25.	PDI	ACS DACOBS	*Results support moderation model, specifically, > ability to focus attention associated with stronger effect of attention-to-threat-bias on frequency of DLEs. *Attention-to-threat-bias contributes to DLE frequency in individuals with high & moderate attentional focus capacity. In those scoring low on ACS^2, Attention-to-threat-bias does not influence DLE frequency.
Prochwicz et al. (2017) Poland	Cross-sectional	N=202 (172 female) university students and hospital staff HCG, M_{age}=36.	PDI	LSAS CBQp BDI	*The threatening events theme was found to fully mediate the linkage between fear of social situations and DLEs. The threatening events theme was also found to be a partial mediator in the association between social avoidance and DLEs, and between the overall level of social anxiety and DLEs.
Ross et al. (2016) USA	Cross-sectional	N=558 (357 male) HCG, M_{age}=30.	PDI	JTC Beads Task Cognitive Reflection Test 3-item	*Analytic Cognitive Style predicted data-gathering in non-clinical sample, but DI did not.

Citation & Country	Study Design	Sample Size & Clinical Characteristics	Psychosis/Delusion Measure(s)	Main Measure(s) of Interest	Main Outcomes
				Cognitive Reflection Test 4-item Heuristics and Biases battery 8-item syllogistic reasoning test	
Schmack et al. (2013) **Germany**	Cross-sectional	*Non-clinical group: n*=105 (53 female) participated in behavioural experiments. *Independent group: n*=20 (11 female) underwent fMRI.	PDI	Experiment 1 – Measuring influence of sensory predictions on perceptions to relate it to DI tendency. Experiment 2 – Test for relationship between DI tendency and effect of higher-level beliefs in perceptual inference.	*DI was associated with < perceptual stability, but a > BIB on perception.
So et al. (2023) **China**	Cross-sectional Longitudinal	*N*=356 (222 female), endorsing at least 1 DI on PDI-21, M_{age}=23. For each of the three dimensions (conviction, distress, and preoccupation), four-group linear models were identified–high stable, moderate stable, moderate decreasing, and low stable regarding trajectories over time in these areas.	PDI-21 CB-SCID-I/P	PSWQ GAD-7 PHQ-9 WAIS-IV JTC Beads task BADE task	*High stable group exhibited worse emotional and functional outcomes at 18 months than other 3 groups. Worry and meta-worry predicted group differences, and significantly differentiated moderate-decreasing groups from moderate-stable groups. *JTC bias milder in high/moderate-stable groups compared to low-stable group on conviction.
So et al. (2015). **China**	Case-control	*Clinical group:* N=70 (37 female) with FEP, *n*=31 diagnosed with SZ-spectrum-disorder, *n*=7 diagnosed with SZ, M_{age}=20.	PDI Community Assessment of Psychic Experiences	IPSAQ	*Self-serving-bias found in patients and non-clinical individuals with psychotic-like experiences, but not in healthy controls. *Personalising bias for negative events Ns different across 3 groups. Compared with

Citation & Country	Study Design	Sample Size & Clinical Characteristics	Psychosis/Delusion Measure(s)	Main Measure(s) of Interest	Main Outcomes
		Non-clinical group: N=654 (382 female), M_{age}=21, *n*=12 had psychotic-like experiences, *n*=642 HCG.			healthy controls, non-clinical individuals psychotic-like experiences had exaggerated self-serving-bias, but not more marked in personalising bias. *Self-serving-bias and personalising bias both associated with delusional dimensions. However, association between self-serving-bias and delusion-like-beliefs frequency strong amongst patients than non-clinical population.
Sulik et al. (2023) England	Cross-sectional	N=1002 (507 male) healthy participants, M_{age}=35.	PDI	JTC Beads Task (designed to reduce task miscomprehension) BADE Task Cognitive Reflection Test	* Results replicated classic relationships between cognitive biases and delusion-like beliefs. After 82 careless participants from the analyses (8.2% of the sample) removed, many relationships were severely diminished, and some eliminated outright. These results suggest that some (but not all) seemingly well-established relationships between cognitive biases and delusion-like beliefs might be artifacts of careless responding.
Westermann et al. (2014) Germany	Cross-sectional	N=79 healthy undergraduates (77 female), M_{age}=21.	PDI PCL	Emotion Regulation Questionnaire PANAS Analogue scales – Subjective ER success and state delusional ideation	* Reappraisal more effective than expressive suppression in regulating anxiety. However, delusion-prone individuals < successful applying reappraisal. * < success in reappraising threat = higher-state DI.

Note. ***N*** = Number of Participants, $\mathbf{M_{age}}$ = Mean Age, **>** = Higher/More Than/More/Greater, **<** = Fewer/Less Than/Less/Smaller, **ACS** = Attentional Control Scale, **ASA** = Aberrant Salience Attribution, **BADE** = Bias Against Disconfirmatory Evidence, **BIB** = Belief-Induced Bias, **CBQp** = Cognitive Biases Questionnaire for Psychosis, **CB-SCID-IP** = Chinese-Bilingual Structured Clinical Interview for Diagnostic and Statistical Manual of Mental Disorders, **CMHT** = Community Mental Health Team, **DACOBS** = Davos Assessment of the Cognitive Biases Scale, **DI** = Delusional Ideation(s), **DLE** = Delusion-like experience(s), **FEP** = First Episode Psychosis, **fMRI** = Functional Magnetic Resonance Imaging, **GAD-7** = General Anxiety Disorder 7-Item Scale, **HCG** = Healthy Control Group**, IPSAQ** = Internal, Personal and Situational Attributions Questionnaire, **JTC** = Jumping-To-Conclusions, **LSAS** = Liebowitz Social Anxiety Scale, **NA** = Negative Affect(ivity), **NS** = Non-significant/ Not significant, **PA** = Positive Affect(ivity), **PANAS** = Positive and Negative Affect Schedule, **PANSS** = Positive and Negative Syndrome Scale, **PCL** = Paranoia Checklist, **PD** = Persecutory Delusions, **PDI** = Peters et al. Delusion Inventory, **PDI-21** = Peters et al. Delusion Inventory 21-Item Scale, **PHQ-9** = Patient Health Questionnaire 9-Item Scale, **PSWQ** = Penn State Worry Questionnaire, **PSYRATS** = Psychotic Symptoms Rating Scale, **Px** = Patient(s), **SCID-I** = Structured Clinical Interview for DSM-IV Axis I Disorders, **SCID-P** = Structured Clinical Interview for DSM Disorders – Psychosis Module, **SDI** = Subclinical DI, **SZ** = Schizophrenia.

Results

Literature search

Database searching returned 4965 studies. A three-step process determined eligibility. Step one involved removing duplicates (n=6), and irrelevant studies after title screening (n=4872). Step 2 assessed the remaining abstracts for eligibility (n=87). Step 3 examined the full text of the remaining 87 articles, leading to exclusion of 65 papers deemed irrelevant. The final sample included 22 studies totalling 5000 participants. Across all studies, 44.30% of participants were male, with a mean age range of 20 to 44 years.

Six papers utilised a case-control design. Four studies used only healthy participants as their control group, whereas Balzan et al. (2013) recruited a delusion-prone group (n=25), while So et al. (2015) included non-clinical individuals with psychotic-like experiences (n=12) in their controls respectively. Conversely, sixteen studies were cross-sectional, with two using a longitudinal design (Falcone et al., 2015; So et al., 2023). One study (Diaconescu et al., 2020) grouped the sample into either ‘high’ (n=70) or ‘low’ (n=81) persecutory delusion groups based on PCL scores. Medlin and Warman (2014) classified participants into 58 ‘high’ and 58 ‘low’ subclinical delusional ideation (SDI) groups based on PDI scores, whilst So et al. (2023) recruited participants endorsing at least 1 DI on the PDI-21 (n=355). One study (Howe et al., 2018) did not verify participants’ mental health history. Luk et al. (2018) utilised a retrospective lens, looking at individuals diagnosed with schizophrenia or schizoaffective disorder (measured by the SSPI), across 4 studies examining component structure the BADE task (evidence integration).

Study Quality

The quality appraisal results are presented in Appendix 1. All 22 studies had a clear research question, defined populations, and used reliable, validated exposure measures. Exposure-prior-to-assessment was rated ‘absent’ in all studies, as exposure and outcome were measured concurrently. Only 36% (n=8) of papers reported a power analysis. Seventy-seven per-cent (n=17) included predetermined inclusion criteria, and 50% (n=11) controlled for confounding variables (e.g., Klein & Pinkham, 2018; So et al., 2023). All case-control studies defined ‘cases’ and ‘controls’, although none used concurrent controls. ‘Assessors blinded’ was not applicable to cross-sectional studies and was omitted from the total rating. Neither longitudinal

study had participation rates of 50% or above, although both had sufficient timeframes to observe effect(s). Twenty papers (91%) received an overall rating of 'fair', and two papers (9%) received a 'good' rating. Main sources of bias included lack of power analysis, poorly reported inclusion criteria, poor control of confounding variables, inadequate blinding of assessors, less than 50% participation rate, and a lack of concurrent controls (see Appendix 1).

Literature Review Findings

Cognitive Factors associated with Delusions and Delusion-like Experiences

Confirmation Bias

Three studies (Balzan et al., 2013; Menon et al., 2013; Luk et al., 2018) examined confirmation bias across clinical, non-clinical delusion-prone and psychologically 'healthy' samples. A confirmation bias represents the seeking/interpreting of information regarding existing beliefs or hypotheses (Nickerson, 1998). Balzan et al. (2013) introduced participants to three pictorial characters termed 'aliens' and their unique characteristics (e.g., height, diet, running speed). Participants undertook a memory recall task, requiring them to recall as many characteristics as possible. Afterwards, participants were told one of the three aliens would be hiding, and their task was to determine which alien this was by selecting the best questions. In the first phase, the optimal question was a positive diagnostic test (e.g., 'is the alien behind the curtain short?'), while remaining questions would be positive non-diagnostic tests (e.g., 'is he fast?'). During the second phase, the question was a negative diagnostic test situated between two positive non-diagnostic ones (e.g., 'Is he odourless?', 'Is he light?', 'Is he from X'). Balzan et al. (2013) found delusion-prone participants and those with schizophrenia preferred non-diagnostic/non-specific positive tests over diagnostic negative tests compared with non-clinical individuals. Results were hypothesised to indicate biased searching. Furthermore, they demonstrated biased interpretation, rating confirmatory evidence more importantly than disconfirmatory, whilst remembering confirming evidence easier than disconfirming. Participants with greater DI failed to integrate disconfirmatory evidence to modify earlier hypotheses, with further support provided by Luk et al. (2018), regarding impaired evidence integration and DI specifically. Menon et al. (2013) found

that both data-gathering bias and BADE were associated with subclinical DI in healthy samples with no psychiatric history. However, methodological issues, namely a lack of clearly delineated A Priori power analyses to help avoid type I and II errors (Balzan et al., 2013; Menon et al., 2013), and unreported inclusion criteria (Luk et al., 2018) increase study bias.

JTC Bias

Delusional ideation and JTC were explored in ten studies. Cafferkey et al. (2013) reported that participants who completed the 81:15 Beads Task and showed greater DI (measured by PDI-21), did not JTC. However, those completing the more difficult 60:40 variant of the JTC task and showing greater DI were significantly more likely to JTC. Conversely, Falcone et al. (2014) found that 50% of FEP participants JTC on the 85:15 Beads task only, compared to 25% of the healthy control group; a statistically significant result. Furthermore, they found delusional severity was independently associated with JTC in the FEP group. Nevertheless, unreported power analyses in both studies omits clarity on whether power present was adequate in justifying conclusions. Cafferkey et al. (2013) reported that JTC bias significantly contributed to the total variance explained for PDI-21 total, and each of its three subscales. Moreover, they found healthy individuals also display the JTC bias, noting its association with DI. However, pre-defined inclusion/exclusion criteria would better delineate how ‘healthy individuals’ were conceptualised. Falcone et al. (2015) found that JTC was associated with increased baseline delusion severity, which persisted at follow-up for 40% of the clinical sample, all experiencing JTC bias. This is compared against 54% of those with no- or changeable delusions. Unfortunately, less than 50% participation of eligible individuals suggests inadequate representation of the target population, thus increasing bias. However, Howe et al. (2018) found no evidence for elevated over-adjustment — belief-updating in the face of disconfirmatory evidence (Croft et al., 2021) — or belief inflexibility in a ‘high’-delusion-prone sample. However, unreported inclusion criteria limits confidence in results, decreasing both internal/external validity. So et al. (2023) found that JTC was milder in groups of individuals predicted to have highly/moderately stable delusional conviction over time (as predicted by latent class growth analysis). Yet, the target population is under-represented given the less-than 50% participation rate. Results by Baker et al. (2019) reinforce the relationship between delusion severity and cognitive biases, finding

participants with greater delusional severity demonstrated increased information-seeking before deciding ('draws-to-decision' on Beads task) compared with healthy controls. This increase was specific to delusion severity, compared to other psychotic symptomatology (e.g., hallucinations). Furthermore, given that delusion-related information-seeking increases were observed in unmedicated participants, antipsychotics were excluded as a cause. Participants with greater delusion severity showed unusual belief-updating, due to increased reliance on prior beliefs generated early in inferential processes (i.e., understanding sensory stimuli from predictions based on prior experiences), which are correlated with increased information-seeking. Reporting an A Priori power analysis would have strengthened the justification for conclusions. Klein and Pinkham (2018) found clinical participants showed greater JTC bias compared with healthy controls, and in both groups, JTC was greater with the salience task. However, they found a significant effect for non-Bayesian judgements, implying probabilistic reasoning impairments, as JTC bias effects diminished after controlling for probabilistic reasoning ability. Conversely, Menon et al. (2013) found that despite demonstrating JTC, the 'draws-to-decision' number was negatively correlated with subclinical DI. This is supported by Medlin and Warman (2014), who found participants exhibiting greater subclinical DI, within a stress-induction experimental condition, were significantly less likely to JTC on the easy reasoning task.

Results from Ross et al. (2016) suggest that Analytic Cognitive Style, (i.e., the willingness to evaluate natural cognitive processes and engage in more analytical ones), predicts data-gathering in non-clinical individuals undertaking the beads task, instead of DI. However, Menon et al. (2013), Medlin and Warman (2014) and Ross et al. (2016) failed to evidence power analyses, so influence of type I and II error is unknown. Sulik et al. (2023) were able to replicate cognitive biases seen using the JTC Beads and BADE tasks. However, after controlling for 'careless' responses within the dataset, these relationships diminished, indicating that some well-established relationships between cognitive biases and DI may stem from 'careless' responding.

Attention-to-Threat Bias (ATB)

Two studies examined the relationship between Attention-to-Threat-Bias and Delusion-like experiences. Prochwicz and Klosowska (2017) found greater attentional focus (i.e., the process of allocating mental resources to stimuli, such as a lecture)

correlated with greater ATB effect on DLE frequency. Results show that ATB contributes to DLE prevalence in those with high and moderate attentional focus capacity (measured by the Attentional Control Scale – focusing attention subscale), compared with low scorers. Prochwicz et al. (2017) reported the threatening events theme (measured by the DACOBS) fully mediated the relationship between fear of social situations and DLEs. Furthermore, the theme partially-mediated the link between social avoidance and DLEs, and between overall social anxiety level and DLEs. Conclusions made would have been strengthened with the inclusion of a power analysis.

Attribution Biases

Four studies investigated attribution biases. Pankow et al. (2015) reported that participants with schizophrenia demonstrated greater Aberrant Salience Attribution (ASA) compared with subclinical DI participants and healthy controls. Diaconescu et al. (2020) found participants who scored higher on the PCL held more rigid beliefs about adviser fidelity across two tasks (adviser's possible intentions [dispositional] and rules of the task [situational]), relying less on advice in the situational experiment than low scorers, suggesting linkage between persecutory delusions and rigid beliefs. Schmack et al. (2013) found DI was underpinned by weaker perceptual stability, but greater belief-induced bias (i.e., judging arguments based on how plausible the conclusion is to an individual, rather than evidence for/against) on perception. Furthermore, Self-serving-bias (SSB) was found in clinical and non-clinical samples, but not in healthy controls. Compared to controls, non-clinical PLEs participants demonstrated exaggerated SSB, whilst the relationship between delusional belief frequency and SSB was stronger in clinical participants than in non-clinical individuals. Regarding personalising bias (PB), there were no significant differences across groups, and both SSB and PB were associated with delusional dimensions. Mehl et al. (2018) found that when using CBTp, there was a significant effect on observer-rated delusions (measured by PANSS), compared with a waiting-list group. However, they found no significant differences on post-scores of self-rated generalised delusions. Ultimately, they found that changes in reasoning biases did not mediate intervention effects on delusions. The detection of true effects in Schmack et al. (2013), Pankow et al. (2015), and Mehl et al. (2018) is precluded by unreported A Priori power analyses.

Affective Factors associated with Delusions and Delusion-like Experiences

Positive & Negative Affectivity

Two studies looked at the association between affectivity and DI. Kingston and Schuurmans-Stekhoven (2016) found self-criticism and negative affectivity mediated the association between life hassles (i.e., accumulation of small daily stressful events and/or traumatic triggers) and delusions. Moreover, life hassles positively predicted negative affectivity directly and indirectly, via self-criticism. They found negative affectivity predicted delusions, and life events had a direct effect on delusions. Conversely, they found neither positive affectivity nor self-reassurance mediated the life hassles-delusion link. So et al. (2023) found samples with high delusional stability regarding conviction, distress, and preoccupation demonstrated significantly worse emotional outcomes at 18 months, compared to 'moderately stable', 'low stable' and 'moderately decreasing' (recovering) groups. Within the 'high stable' class for conviction, 35.2% were moderately depressed. In the 'high stable' group for distress, 38.2% were moderately depressed, and the 'high stable' class for preoccupation showed that 55.2% were moderately depressed, suggesting a positive correlation between higher delusional stability across the three domains and increased anxiety and depression.

Worry

So et al. (2023) found higher levels of worry and meta-worry increased the risk of being categorised as 'high stable' for delusional conviction, distress, and preoccupation over time. Classes 2 ('moderately stable') and 3 ('moderately decreasing' or recovering) differed on worry and meta-worry, with class 2 demonstrating elevated levels of worry and meta-worry at baseline, compared to class 3. Moreover, worry and meta-worry differentiated the decreasing/recovering groups from the more persistently deluded groups. Overall, results show worry and meta-worry predict trajectories of both persistent and improving DI. Furthermore, they are related to emotional and functional outcomes, with individuals experiencing persistent delusions facing poorer outcomes. Again, the target population is under-represented given the less-than 50% participation rate.

Anxiety

Westermann et al. (2014) found cognitive reappraisal (e.g., anger-prone individuals considering alternative interpretations of their manager shouting at them) was more effective than expressive suppression (e.g., stifling crying) in anxiety regulation. However, delusion-prone individuals were less successful in employing reappraisal. They also found lower reappraisal ability correlated with higher state DI. However, the study's ability to justify conclusions remains unknown resulting from an unreported power analysis, combined with potential internal/external validity issues resulting from unreported inclusion criteria. Within the 3 'high stable' classes, So et al. (2023) found that 34.4%, 46.9%, and 43.6% of participants were moderately anxious for delusional conviction, distress, and preoccupation respectively.

Discussion

The aims of the current review were to 1) offer a comprehensive narrative review of quantitative studies investigating the association between cognitive and affective factors and delusional ideation across the psychosis-spectrum; 2) appraise the methodological quality of studies included in the review; and 3) provide recommendations for future research relating to delusions and the psychosis-spectrum. Twenty-two papers were systematically identified, analysed, and critically appraised, with a mixed evidence base for contributory factors to DI.

The review suggests biased scoping, interpretation, remembering, and recall of information is evident within the psychosis-spectrum, which is commensurate with existing literature. The use of non-clinical samples in research by Balzan et al. (2013) and Menon et al. (2013) provide a safe base for testing bias-proneness across the psychosis-spectrum. Secondly, their results support existing literature around hypersalience of confirmatory evidence, suggesting psychotherapeutic interventions like metacognitive training and cognitive bias modification (CBM) may be effective. The efficacy of metacognitive training for psychosis samples was highlighted in a systematic review and meta-analysis by Penney et al. (2022), whereas the efficacy of CBM for psychosis populations is currently limited (Leung et al., 2019).

Cafferkey et al. (2013) highlighted a positive correlation between task difficulty, greater DI, and JTC bias. These results correspond with findings from Kingston and

Schuurmans-Stekhoven (2016), whereby stress appears to amplify DI. However, contrary findings of JTC only occurring on the easier task variant (Falcone et al., 2014) suggests further research is required. Nonetheless, Cafferkey et al. (2013) provide evidence for a continuum of delusional ideation. Delusional severity may be an important variable in cognitive bias studies, as Falcone et al. (2015) and Baker et al. (2019) show greater severity is associated with JTC and information-seeking ('draws-to-decision') biases, respectively. However, Howe et al. (2018) found no evidence of over-adjustment or belief-inflexibility in highly delusion-prone individuals, and Menon et al. (2013) highlighted negative correlation between 'draws' and subclinical DI. This was supported by Medlin and Warman (2014), finding high-SDI individuals exhibited more cautious reasoning (less likely to JTC) under stress. However, the latter requires careful interpretation due to methodological issues including lack of power analysis, pre-post design preventing cause-and-effect testing, and pre-test of reasoning ability. So et al. (2023) showed worry and meta-worry mediated delusional trajectories, thus underpinning DI. However, Baker et al. (2019) disregarding antipsychotic cause for delusions is fundamental in the ongoing debate surrounding psychopharmacology usage/over-usage in psychosis-spectrum disorders.

Attentional focus ability appears to moderate the relationship between ATB and DLEs, suggesting that strengthening attentional control may reduce DLE frequency. The effectiveness of greater attentional control is demonstrated regarding social anxiety/fear (Prochwicz et al., 2017; Mazidi et al., 2021) and GAD (Bardeen et al., 2021), highlighting its widely positive influence, although more focused study regarding PSD is needed.

Aberrant salience is evident throughout the review. Ross et al. (2016) believe the cognitive ability to compartmentalise highly salient instincts when problem-solving underpins DI. Accordingly, others hypothesise poor working memory is the cause (Lee et al., 2020). Therefore, cognitive training (Lawlor-Savage & Goghari, 2014) may assist in development of working memory performance. Social inference difficulties are said to underpin persecutory delusions with rigid beliefs preventing adaptive use of social information. Given these types of delusions are commonly treated pharmacologically, an innovative cognitive-behavioural treatment (Freeman et al., 2021) is a welcome, progressive treatment approach, with promising results. Again, this challenges the necessity of antipsychotic treatment. Schmack et al. (2013)

suggested that perceptual instability caused by weakened sensory predictions, reinforced by biased beliefs, preceded DI. Ross et al. (2016) propose Analytic Cognitive Style predicts data-gathering as opposed to DI, which is contrasted by a recent meta-analysis finding delusional ideation was negatively associated with data gathering (Ross et al., 2015).

This review suggests negative affectivity mediates the relationship between stressors and delusions, and the findings from Kingston & Schuurmans-Stekhoven (2016) may bridge the gap between task difficulty and commencement of DI, whereby self-criticism results in negative affectivity, ultimately initiating delusions. So et al. (2023) suggest worry and meta-worry determine delusional trajectories, alongside emotional and functional outcomes. They reported an effect size of 0.8, suggesting a meaningful relationship between worry and delusions. There is strong evidence to support Westermann et al. (2014) regarding cognitive reappraisal as an anxiety-regulation strategy (Cutuli, 2014), with healthier affect, social functioning, and wellbeing as outcomes.

Limitations

This review carries limitations. Firstly, only English papers were included. Grey literature was also excluded meaning relevant studies reporting null findings were potentially missed. Authors did not quantitatively synthesise papers statistically, given mixed findings across studies, and thus unable to determine the strength/magnitude of experimental effects. Only the first author performed the quality appraisal.

Future Research

While links have been identified between cognitive and affective factors associated with DI, further research needs to build on existing findings using robust methodologies. A Priori power analyses are essential for determining sample sizes, reducing type I and type II errors, and ensuring the reliability of results. Despite the necessity for larger DD samples, the rarity of DD makes obtaining sufficient sample sizes difficult (Marneros et al. 2012). In studies using control groups, pre-defined inclusion/exclusion criteria enhance the characterisation of ‘healthy individuals’ or ‘healthy controls’, improving external validity of results (Patino & Ferreira, 2018).

Baker et al. (2019) found a correlation between delusional severity and information-seeking specific to delusion severity compared to other psychotic

phenomena. However, more research is required regarding comparison with other psychosis-spectrum symptoms, as only hallucinations were described. Longitudinal research faces challenges in attrition, which compromises generalisability (Gustavson et al., 2012). Participant encouragement and motivation are time-consuming, so using computational models to control for attrition by examining/predicting its effect on variable relationships would be beneficial, as more longitudinal studies are required to strengthen conclusions.

Research by Sulik et al. (2023) indicates that controlling for 'careless' responses during JTC Beads and BADE tasks diminishes the relationship between cognitive biases and DI. Replication studies are essential in supporting/disputing findings. Future research could examine the cause(s) of careless responses, which may highlight potential for meaningful intervention. Findings by Kingston and Schuurmans-Stekhoven (2016) and So et al. (2023) around negative affectivity, life hassles and DI warrants further examination of the effectiveness of various psychotherapies on mood in the context of psychosis. Despite the supported efficacy of CBTp (O'Keeffe et al., 2017), its discontinuation rate of 16% and lack of reliable symptom improvement in 50% of continuers (Lincoln et al., 2014) make it a tenuous approach.

Conclusion

This review identifies cognitive and affective factors associated with DI across the psychosis-spectrum. Ensuring methodological robustness is essential for professional rigour in research. Additional replication studies will strengthen recent findings, and exploring the efficacy of diverse psychotherapeutic models is crucial for meaningful intervention. However, conclusions are constrained by methodological challenges and scarcity of longitudinal studies, emphasising need for more robust research in this area.

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Appendices

1. Study Quality Appraisal Tables

Yes	✓
No	✕
NR	–
CD	?
NA	\

CD – Cannot determine

NR – Not reported

NA – Not applicable

	Study Question	Population	Power Analysis	Controls	Inclusion Criteria	Cases & Controls Defined	Random Selection	Concurrent Controls	Exposure Prior Assessment	Exposure Measures	Blinded Assessors	Confounding	Total (/12)	**Overall Quality Rating**
Baker et al. (2019)	✓	✓	✗	?	✓	✓	?	—	✗	✓	—	✓	**6/12**	**Fair**
Balzan et al. (2013)	✓	✓	✗	?	✓	✓	?	—	✗	✓	—	✓	**6/12**	**Fair**
Falcone et al. (2014)	✓	✓	✗	?	✓	✓	?	—	✗	✓	—	—	**5/12**	**Fair**
Klein & Pinkham (2018)	✓	✓	✓	?	✓	✓	?	—	✗	✓	—	✓	**7/12**	**Fair**
Pankow et al. (2015)	✓	✓	✗	?	✓	✓	?	—	✗	✓	—	—	**5/12**	**Fair**
So, S. H., Tang, V., & Leung, P. S. (2015).	✓	✓	✓	?	✓	✓	?	—	✗	✓	—	—	**6/12**	**Fair**

Case-Control Studies

Poor (0-4); Fair (5-8); Good (9-12)

	Study Question	Population	Power Analysis	Inclusion Criteria	Exposure Prior Assessment	Outcome Measures	Assessors Blinded	Confounding	Participation Rate 50%+	Sufficient Timeframe	Different Exposure Levels	Exposure Repeated Assessment	Loss to Follow-Up	Exposure Measures	Total (/13)	**Overall Quality Rating**
Cafferkey et al. (2013)	✓	✓	✗	✗	✗	✓	\	✓	✓	✗	✗	✗	\	✓	**6/13**	**Fair**
Diaconescu et al. (2020)	✓	✓	✓	✓	✗	✓	\	–	✓	✗	✗	✗	\	✓	**7/13**	**Fair**
Falcone et al. (2015)	✓	✓	✗	✓	✗	✓	\	✓	✗	✓	✗	✓	✓	✓	**9/13**	**Good**
Howe et al. (2018)	✓	✓	✓	✗	✗	✓	\	✓	✓	✗	✗	✗	\	✓	**6/13**	**Fair**
Kingston & Schuurmans-Stekhoven (2016)	✓	✓	✓	✓	✗	✓	\	–	✓	✗	✗	✗	\	✓	**7/13**	**Fair**
Luk et al. (2018)	✓	✓	✓	?	✗	✓	\	–	✓	✗	✗	✗	\	✓	**6/13**	**Fair**
Medlin & Warman (2014)	✓	✓	✗	✓	✗	✓	\	✓	✓	✗	✗	✗	\	✓	**7/13**	**Fair**
Mehl et al. (2018)	✓	✓	X	✓	✗	✓	\	–	✓	✗	✗	✗	\	✓	**6/13**	**Fair**
Menon et al. (2013)	✓	✓	✗	✓	✗	✓	\	–	✓	✗	✗	✗	\	✓	**6/13**	**Fair**
Prochwicz &	✓	✓	✗	✓	✗	✓	\	–	✓	✗	✗	✗	\	✓	**6/13**	**Fair**

Klosowska (2017)																
Prochwicz et al. (2017)	✓	✓	✕	✕	✕	✓	\	✓	✓	✕	✕	✕	\	✓	**6/13**	**Fair**
Ross et al. (2016)	✓	✓	✕	✓	✕	✓	\	✓	✓	✕	✕	✕	\	✓	**7/13**	**Fair**
Schmack et al. (2013)	✓	✓	✕	✓	✕	✓	\	–	✓	✕	✕	✕	\	✓	**6/13**	**Fair**
So et al. (2023)	✓	✓	✓	✓	✕	✓	\	✓	✕	✓	✕	✓	✓	✓	**10/13**	**Good**
Sulik et al. (2023)	✓	✓	✓	✓	✕	✓	\	–	✓	✕	✕	✕	\	✓	**7/13**	**Fair**
Westermann et al. (2014)	✓	✓	✕	✕	✕	✓	\	✓	✓	✕	✕	✕	\	✓	**6/13**	**Fair**

Cross-Sectional Studies
Poor (0-4); Fair (5-8); Good (9-13)

2. Journal Author Guidelines

Author guidelines for the *Behavioural and Cognitive Psychotherapy* Journal can be accessed here: https://www.cambridge.org/core/journals/behavioural-and-cognitive-psychotherapy/information/author-instructions

Paper Two

Childhood trauma and hearing voices: the role of dissociation and cognitive inhibition

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Abstract

Background: There is emerging evidence to support the link between childhood trauma and hearing voices. More recently, dissociative processes have been proposed to mediate this link.

Aims: This study aimed to replicate recent findings supporting the association between childhood trauma and hearing voices in a sample of people who reported hearing voices. In addition, the study aimed to empirically test whether dissociation is associated with underlying deficits in cognitive inhibition, in a sample of participants reporting hearing voices.

Method: Thirty-three participants who reported hearing voices were recruited. Participants completed questionnaire measures of childhood trauma, dissociative experiences, and hallucination-proneness. Additionally, participants completed a cognitive inhibition task.

Results: A significant correlation was found between childhood trauma and the severity of hallucinatory experiences. However, dissociation did not significantly mediate this relationship.

Conclusion: The findings provide support for the childhood trauma-hearing voices link. However, in the current study, dissociation did not mediate this link. Future research should aim to recruit a larger sample to explore whether intentional inhibition can explain the link between dissociation and hearing voices.

Keywords: Childhood trauma, hallucinations, psychosis, cognitive inhibition, dissociation

Introduction

Childhood trauma refers to distressing or harmful events that endanger a child's life or physical, emotional, and psychological wellbeing. Such trauma encompasses various adverse experiences like emotional, physical, or sexual abuse; parental death/loss; neglect; and bullying (Michel et al., 2022). Recent estimates suggest that approximately one-third of the general population have experienced childhood adversity (Misiak et al., 2017). A growing body of research suggests that childhood trauma may increase the likelihood of experiencing psychotic symptomatology (for reviews, see Read et al., 2004, 2005; van Os et al., 2010). More recent research suggests that among individuals with early psychosis and those at clinically high risk (CHR) for psychosis, exposure to childhood trauma is highly prevalent, with up to 80% of individuals having experienced some form of childhood adversity. Exposure to adverse childhood experiences has also been associated with increased symptom severity (Mayo et al., 2017; Stanton et al., 2020). Furthermore, emerging research indicates associations between different types of early adversities (e.g., sexual abuse) and specific psychotic symptoms (hallucinations in schizophrenia; Bentall et al., 2012; 2014). More recently, dissociative processes have been proposed to account for the relationship between early trauma and psychotic symptoms (Anketell et al. 2010; Varese et al. 2012a). Dissociation has been defined as the "*lack of normal integration of thoughts, feelings, and experiences into the stream of consciousness and memory*" (Bernstein & Putnam, 1986, p. 727). Varese and colleagues (2012b) were the first to empirically examine this hypothesis in a cohort of patients with psychosis-spectrum disorders. Commensurate with previous research (Bentall et al., 2012), Varese et al., (2012b) found an association between childhood sexual abuse and higher dissociative tendencies in participants reporting hallucinations compared to both clinical control participants without hallucinations and healthy controls. Moreover, dissociation was found to positively mediate the effect of childhood trauma on hallucination-proneness. This effect was particularly robust for sexual abuse in contrast with other trauma types. Additionally, the influence of dissociative symptoms on a cognitive process - reality discrimination - was investigated. Results showed impaired reality discrimination in both hallucinating participants and those with a history of hallucination-proneness, but this was not associated with dissociative symptoms. Overall, these findings corroborate existing research supporting a link between early trauma and later psychosis, suggesting this relationship may be underpinned by dissociative symptoms (Longden et al., 2020; Heriot-Maitland et al., 2022). However, in Varese et al. (2012b) study, there was no evidence to support a relationship

between reality discrimination and dissociation, suggesting that other cognitive processes, such as cognitive inhibition, may explain the relationship between dissociation and hallucinatory experiences.

Cognitive inhibition is defined as "*the stopping or overriding of a mental process or action, in whole or in part, with or without intention*" (MacCleod, 2007, p.5). An example of cognitive inhibition is wilfully stopping an ongoing action when it is no longer appropriate, such as stopping acceleration if a pedestrian walks into the road in front of your car. Deficits in cognitive inhibition are well supported in the empirical literature investigating dissociation (for review, see Giesbrecht et al., 2008). Similarly, impairments in cognitive control are robustly associated with psychosis-spectrum disorders (Ravizza & Salo, 2014; Fett et al., 2019), particularly in relation to positive symptoms of psychosis, such as hallucinations (Thomas et al., 2021; Horne et al., 2022). Whilst there is a large body of evidence suggesting that cognitive inhibition is impaired in patients with psychosis-spectrum disorders, it is only more recently that studies have started to link inhibitory deficits with *specific* symptoms (e.g., auditory verbal hallucinations; AVHs) in patients with psychotic disorders. For example, Waters et al. (2003, 2006) and Sun et al. (2021) showed that the frequency of AVHs (but not other symptoms) was associated with an impairment of inhibitory control in patients with a clinical diagnosis of schizophrenia. Furthermore, Waters et al. (2003, 2006) reported a dose-response relationship between the severity of AVHs and impaired cognitive control on two intentional inhibition tasks[3]. No significant correlations were found between the indices of inhibition and either negative, general, or positive symptoms (excluding AVHs scores) of psychosis. Additionally, patients experiencing current AVHs performed significantly poorer on both inhibition tasks compared with non-hallucinating patients, whose performance was no different from healthy controls. Waters et al. (2003) concluded that their results "*clearly implicate the role of an inhibitory impairment in auditory hallucinations*" (p. 279). In a further study integrating published data on cognitive inhibition and a symptom-specific deficit (namely AVHs) in psychosis, Waters et al. (2006) reported that nearly 90% of patients currently experiencing AVHs showed a predicted combination of deficits, including impairments on an inhibition task, in contrast to only one-third of patients without hallucinations. Moreover, the results showed that those patients with the specified cognitive deficits were at an especially

[3] Intentional inhibition has been proposed to be conceptually distinct from automatic inhibition (Waters et al. 2003). It has been argued that since AVHs are consciously experienced mental events, it is reasonable to suppose they may reflect impairment in intentional inhibition processes (i.e., reflecting conscious effort). In Waters and colleagues' (2003, 2006) studies, intentional inhibition was measured using the Hayling Sentence Completion Task (HSCT) and the Inhibition of Currently Irrelevant Memories Task (ICMT)—both tasks measure the ability to inhibit currently active mental events.

increased risk of experiencing AVHs compared with patients without the deficits. Based on these findings, Waters et al. (2012) proposed a novel model of cognitive mechanisms and AVHs in patients with psychosis-spectrum disorders, with inhibitory deficits as a central feature. They hypothesised that deficits in intentional inhibitory processes might contribute to a diminished sense of control over the perceptual experience. Furthermore, a recent synthesis of the evidence on inhibitory control and auditory hallucinations based on the Research Domain Criteria (RDoC) framework highlights the robust evidence for the role of cognitive inhibition in AVHs in psychosis-spectrum disorders (Badcock & Hugdahl, 2014).

In summary, recent empirical studies have reported a relationship between early childhood trauma and hallucinations (Bentall et al., 2012, 2014), which may be explained by dissociative processes (Varese et al., 2012b). However, the precise mechanism(s) by which dissociation might promote hallucinations remains unclear. To date, only one study has empirically examined the relationship between dissociation and a cognitive mechanism hypothesised to underpin hallucinatory experiences (i.e., reality discrimination; Varese et al., 2012b) and reported no association between these variables. Recent findings indicate that deficits in cognitive inhibition may play a role in the development and maintenance of auditory hallucinations (Badcock & Hugdahl, 2014; Waters et al., 2003, 2006). Clarifying the cognitive mechanism(s) through which dissociation might promote hallucinations is an important step in advancing the understanding of factors involved in the initiation and maintenance of auditory hallucinations. This study aimed to replicate earlier findings for the childhood trauma-hallucinations link and examine the mediatory role of dissociation in this relationship. Furthermore, the study investigated the influence of dissociative symptoms on a cognitive process believed to underpin hallucinatory experiences (i.e., cognitive inhibition) in people with a psychosis-spectrum disorder.

The aim of this study was twofold: First, we aimed to replicate the findings reported in Varese et al. (2012b). Specifically, we: 1) examined the association between childhood trauma and hallucinatory experiences in people with a psychosis spectrum disorder; and 2) investigated whether any observed association was mediated by dissociative symptoms. The second aim was to extend this work to determine the influence of dissociative symptoms on a cognitive process - intentional inhibition - believed to underlie hallucinatory experiences. We achieved this by examining between-group differences for participants with ‘mild/moderate’ versus ‘severe’ hallucination severity on a task of intentional inhibition. In order to investigate whether

dissociation was directly related to cognitive inhibition, we planned to group participants into those who reported high vs. low dissociation (based on self-report scores on a dissociation questionnaire) and examine group-differences on the cognitive inhibition measure.

Hypothesis 1: There will be a positive correlation between different types of childhood trauma (e.g., emotional, physical, sexual abuse, neglect) and hallucinatory experiences.

Hypothesis 2: Dissociation will mediate the relationship between childhood trauma and hallucinatory experiences.

Hypothesis 3: There will be a significant association between dissociation and cognitive inhibition in people with a psychosis-spectrum disorder.

Hypothesis 4: Participants with higher levels of dissociation will experience higher levels of hallucinatory severity compared to participants with lower levels of dissociation.

Method

Power analysis

To determine the number of participants required, and to detect between-group differences in cognitive inhibition and dissociation, an *a-priori* power calculation was conducted using G*power (Faul et al., 2009). To detect a small-medium effect size, in-line with similar studies, and power set at the conventional 0.8, and alpha at 0.05, 156 participants were required. However, given the specialist nature of the sample to be recruited (i.e., participants with psychosis-spectrum disorders), in addition to the complexities of recruiting clinical / mental health samples, it was deemed that recruiting this sample size was likely not feasible. Given that part of the study is a replication of a previous study (Varese et al., 2012b), in conjunction with the empirical recommendation to increase the sample size from that of the original study to remain conservative regarding the potential under-estimation of true effect sizes originally reported (Brandt et al., 2014), a sample size one third beyond that of Varese et al. (2012b) was considered appropriate. This would mean recruiting a sample of 60 participants, which would have been larger than any previously reported sample size (and more than one third larger than the sample size of the study we were providing a conceptual replication of).

Participants

A total of 33 participants were recruited to the study. Participants were recruited via local clinical NHS services and online via social media (i.e., 'LinkedIn', 'Facebook', 'X'). Clinical participants were recruited via NHS clinical services including an Early Intervention Service, an Acute and Urgent Care service, and four Community Mental Health Teams (CMHTs) in North Staffordshire. Participants were recruited online via social media to broaden the recruitment strategy. Eligible participants were: (***a***) 18 years or older; (***b***) either had a confirmed diagnosis of a psychosis-spectrum disorder (e.g., schizophrenia, schizoaffective disorder, or delusional disorder) and reported a history of- or were- hearing voices, or self-reported currently experiencing hearing voices for those recruited online; (***c***) may have been experiencing co-morbid conditions (e.g., depression, anxiety); (***d***) were able to provide informed consent; (***e***) had sufficient cognitive ability to complete questionnaire measures and a computerised task; and (***f***) were fluent in English.

For the between-group analyses, participants were divided into two subgroups; 'severe' or 'moderate/mild', based on their responses to the severity items of the Positive and Negative Syndrome Scale (PANSS) auditory hallucinations subscale. Participants in the 'severe' hallucinations group (n=10) scored between 5-7[4] on the 'hallucinations' subscale of the PANSS. Participants in the 'moderate/mild' hallucinations group (n=23) scored between 1-4 on the 'hallucinations' subscale of the PANSS. These groups were concordant with the group categorisations made by Varese et al. (2012b, p.1027); the study we were aiming to provide a conceptual replication of.

Between-group differences on the clinical and demographic variables were examined using independent t-tests and Pearson's χ^2 test (see Table 1). For age, Levene's test for equality of variances indicated unequal variances, $F(1, 361) = 6.065$, $p = .014$ and therefore, the t-test for unequal variances was selected. Participants in the 'severe' hallucinations group were significantly older than participants in the 'mild-moderate' hallucinations group ($p<.001$). For years of education, the Levene's test for equality of variances showed that variances were equal, $F(1, 361) = 2.587$, $p = .109$. Participants in the 'severe' hallucinations group had fewer years of

[4] PANSS 'hallucinations' subscale scoring: 1 = 'absent'; 2 = 'minimal'; 3 = 'mild'; 4 = 'moderate' 5 = 'moderate-severe'; 6 = 'severe'; and 7 = 'extreme'.

education than participants in the 'mild/moderate' hallucinations group (p<.001). There were no significant between-group differences for gender or duration of voice-hearing in years.

Table 1: *Means (S.D.) and observed frequencies for the demographic and clinical characteristics*

Variable	Mild-Moderate PANSS score (n=23)	Severe PANSS score (n=10)	t/χ^2	p-value
Age (years)	45.3 (12.1)	48.8 (13.2)	t(267.204) = 3.432	<.001
Education (years)	14.5 (2.3)	13.6 (2.1)	t(361) = -5.175	<.001
Gender	Female (n=15, 65%)	Female (n=2, 20%)	χ^2(2, N = 363) = 5.558	.062
	Male (n=8, 35%)	Male (n=8, 80%)		
Years hearing voices	6.0 (4.2)	8.3 (5.7)	χ^2(6, N = 33) = 4.065	.668

Six participants (18%) were recruited from participating NHS clinical services and 27 (82%) were recruited online. Twenty-two participants were female (66.7%). The overall mean age of the sample was 37.18 years (*SD* = 9.80, range = 22-60 years). Most participants were from England (66.7%). Demographic and clinical characteristics are provided in Table 2.

Table 2: *Participant demographic characteristics*

Demographic Variable	n (%) of sample
Education	
College qualifications	15 (40%)
Secondary school qualifications	5 (15%)
Other (please specify)	*
Undergraduate degree	*
Post-graduate degree/qualifications	*
None of the above qualifications	*
Gender	
Female	25 (70%)
Male	10 (25%)
Non-binary/Third gender	*
Ethnicity	
White British	20 (60%)
White (other)	5 (15%)
Asian (Pakistani origin)	5 (10%)
White Irish	*
Prefer not to say	*
White and Asian	*
Mixed (other)	*
White and Black African	*
Country	
UK	25 (71%)
USA	10 (29%)
Other	*
First Language	
English	30 (96%)
Other	*
Employment Status	
Unemployed	20 (65%)
Other (Please specify)	5 (15%)
Employed (Full-time)	*
Student	*
Voluntary worker	*
Employed (Part-time)	*

Note: Counts are rounded to the nearest multiple of 5. Counts lower than 5 and percentages based on these counts are suppressed (*) to maintain confidentiality.

Table 3 presents the clinical characteristics of the sample. Most participants were diagnosed with psychiatric conditions, with the most common being "*Other*" diagnoses (36.4%), followed by psychosis (24.2%), schizoaffective disorder (15.2%), and schizophrenia (15.2%). A small percentage (9.1%) reported no diagnosis. Participants taking antipsychotic medication accounted for around 90% of the sample. Over half of the sample (54.5%) reported hearing voices for 8 or more years. The mean duration of voice hearing was 13.72 years (SD = 8.98).

Table 3: *Clinical characteristics*

Variable	n (%) of sample
Specific Psychiatric Diagnosis	
No diagnosis/Not applicable	5 (10%)
Other (Please specify):	15 (35%)
Psychosis	10 (25%)
Schizoaffective Disorder	5 (15%)
Schizophrenia	5 (15%)
Antipsychotic Medication	
Yes	30 (90%)
No	*

Note: Counts are rounded to the nearest multiple of 5. Counts lower than 5 and percentages based on these counts are suppressed (*) to maintain confidentiality.

Procedure

The study was approved by the NHS HRA committee (REC reference: 23/WM/0235; Appendix 1) and by the ethics committee at the school of Health, Education, Policing, and Sciences at Staffordshire University (Appendix 2). For participants recruited via NHS services, within each service, a single point of contact for the research project identified potential participants from their active caseloads, who met study inclusion criteria. Potential participants were then approached by their clinician and were asked **a)** if they would like a study information sheet (Appendix 3) and in what format (paper copy or e-mail), and **b)** if they consented to a researcher contacting them approximately a week later to discuss the study, either by telephone, e-mail, or using a virtual platform. Participants who agreed to be contacted were given the opportunity to discuss the research study with the first author and were asked if they would like to participate in the research. Prior to inclusion in the study, participants gave their written informed consent (Appendix 4). For participants recruited online, potential participants contacted the first author via e-mail to provide their contact details (e.g., phone number, e-mail address, or both). The first author then contacted the participant using their preferred method to provide the participant information sheet (Appendix 5), explain the study, answer any questions/queries, and ask if they would like to consent to take part. Following written informed consent, data collection was completed with participants remotely (via Microsoft Teams). Data collection involved both online questionnaires and virtual interviews. Self-report measures, such as the Dissociative Experiences Scale (DES), Childhood Trauma Questionnaire (CTQ), and Launay-Slade Hallucination Scale-Revised (LSHS-R), were completed by participants via a secure online platform (Gorilla Experiment Builder). For the Positive and Negative Syndrome Scale (PANSS), participants scheduled an appointment for a structured clinical interview, which was conducted remotely via Microsoft Teams by the first author. All participants were offered a full debrief at the

end of study participation (Appendix 6).

Measures

Positive and Negative Symptoms Rating Scale, Hallucinations Subscale (PANSS; Kay, Fiszbein, & Opler, 1987)

The PANSS is a clinician-rated measure used to assess positive, negative, and general psychopathology symptoms. The total PANSS score ranges from 30 to 210, with subscale ranges as follows: Positive Symptoms (7-49), Negative Symptoms (7-49), and General Psychopathology (16-112). Higher scores are indicative of greater symptom severity. For this study, the PANSS P3 Hallucinations Subscale was used to assess the presence and severity of hallucinatory experiences in the week preceding the data collection session. This subscale comprises 27 items (questions 64-91), although only questions pertaining to auditory hallucinations (i.e., questions 64-82) were administered. Each item is rated on a 7-point scale according to symptom severity where 1 (‘*absent*’) demonstrates that no hallucinations are present, and the participant does not report experiencing any hallucinations, through to 7 (‘*extreme*’), where hallucinations dominate the participant’s thinking and behaviour. These experiences are rigidly interpreted as real, and provoke frequent verbal and behavioural responses, including compliance with command hallucinations.

The PANSS was administered using a structured clinical interview by the first author, who rated participants' symptoms based on their verbal reports and observations made during the interview. Cut-offs for the PANSS were determined based on established clinical guidelines (Kay, Fiszbein, & Opler, 1987). For the purposes of this study, participants were grouped into ‘mild/moderate’ or ‘severe’ hallucinations based on their scores. Scores of 1 to 3 indicated minimal or no significant hallucinations, 4 to 5 reflected moderate symptomatology, where hallucinations were present but did not dominate thinking and behavior, and scores of 6 to 7 represented severe or extreme hallucinations that significantly interfered with functioning.

An example item is ‘Auditory Hallucinations’, which is rated based on the frequency and the impact of auditory hallucinations on the participant (e.g., "*How often have you experienced hearing voices that others do not hear, and how much have these voices affected your daily activities over the past week?*"). Each item is scored individually, with the total score for the subscale being the sum of the individual item scores, with higher scores indicative of more

severe hallucinatory experiences. The possible range of scores for this measure was 1 = ‘absent’ to 7 = ‘extreme’.

The Revised Launay-Slade Hallucinations Scale (LSHS-R; Bentall & Slade, 1985b)

The LSHS-R is a widely used self-report measure of hallucination-proneness. The LSHS-R is a 12-item scale containing items measuring three factors, relating to: 1) vivid mental events; 2) hallucinations with a religious theme; and 3) auditory and visual hallucinatory experiences. Participants are asked to rate each item using a 5-point Likert rating (1 = ‘certainly does not apply’; 5 = ‘certainly applies’). The questionnaire provides three subscale scores relating to each of the three factors described, however, commensurate with Varese et al. (2012b), only the Total Score was used for this study. The LSHS-R total score ranges between 0 and 48, with a higher score indicative of a greater predisposition towards hallucinatory experiences. The LSHS-R has been validated for measuring hallucinatory vulnerability in both clinical (Kot & Serper, 2002) and non-clinical (Levine et al., 2004) samples. Studies have examined the psychometric and structural properties of the LSHS-R (Cella et al., 2008; Paulik et al., 2008; Hagen et al., 2017), with the latter reporting a Cronbach’s alpha (*α)* coefficient of 0.85.

The Childhood Trauma Questionnaire – Short Form (CTQ-SF; Bernstein et al., 2003)

The CTQ-SF consists of 28 items and includes 5 subscales with each subscale containing 5 items. The subscales are Emotional Abuse (EA), Physical Abuse (PA), Sexual Abuse (SA), Emotional Neglect (EN), and Physical Neglect (PN). Additionally, three items are designed to measure Minimisation/Denial (M/D). The five abuse and neglect subscales are scored from ‘never true’ (a score of 1), to ‘very often true’ (a score of 5), and the scores of each subscale are summed to provide subscale scores. These subscale scores can also be summed to provide a Total Score, which is representative of overall childhood trauma. The total possible score for the CTQ-SF ranges from 25-125, with higher scores indicating greater exposure to childhood trauma. Subscale scores range from 5-25. The internal consistency of the CTQ-SF was evaluated with a Cronbach’s alpha (*α)* coefficient of >0.70 (Peng et al., 2023), which is considered acceptable, but *α* >0.60 has also been used (Devellis, 2017). In this study, we used both the subscale scores and the Total Score.

The Dissociative Experiences Scale (DES; Bernstein & Putnam, 1986)

The Dissociative Experiences Scale-Revised (DES-II) is a 28-item self-report scale that measures dissociative experiences in daily life, including depersonalisation, derealisation, amnesia, and absorption. Participants are required to estimate the frequency of dissociative phenomena on a Likert-type scale ranging from 0% ('never') to 100% ('always'). An example item includes "*Some people have the experience of finding themselves in a place and having no idea how they got there. Select the percentage of time this happens to you.*" The total DES-II score is the mean of all 28 items scores, with the overall possible score range being 0-100, where higher scores indicate more severe dissociation. Previous research (Carlson & Putnam, 1993) has shown that the DES-II has high reliability (test-retest = $0.79 < r < 0.84$; split-half = $0.83 < r < 0.93$; Cronbach's $\alpha = 0.95$). Using taxometric analysis, Waller et al. (1996) identified an eight-item subset of the DES (known as the Dissociative Experiences Scale–Taxon [DES-T]) used to estimate the probability that an individual belongs to the pathological dissociation taxon (Waller, Putman, & Carlson, 1996; Waller & Ross, 1997). A Bayesian probability cutoff of 0.90 was used to differentiate between high and low dissociation, with scores above 0.90 indicating pathological dissociation. The DES and DES-T have demonstrated good internal consistency (e.g., Varese et al., 2012).

Stop-Signal Task (SST)

The SST is a variation on the classic go/no-go task. In the current study, participants were required to perform a simple primary task on a computer as quickly and accurately as possible. The task comprised two sets of 50 trials where arrows displayed on screen pointed either left or right. Participants were instructed to click either the 'j' button on the keyboard if the arrow pointed to the right, or an 'f' key on the keyboard if the arrow pointed to the left. However, participants were told not to respond using either button if a red 'X' appeared immediately after the arrow. Participants were required to respond as quickly and as accurately as possible. Participants were given a break in between each set of trials.

The primary outcome variable measured in this task was % accuracy of successful inhibitions on Stop Trials, which reflects participants' response inhibition abilities. Higher accuracy on Stop Trials was determined by the percentage of correct responses 'stop' trials (correctly withholding a response when the red 'X' appeared). Recent studies have validated the use of % accuracy on Stop Trials as a reliable measure of inhibitory control, particularly in the

Stop-Signal Task (SST). This measure effectively reflects participants' response inhibition abilities and is widely used for its robustness and ease of comparison across different studies (Verbruggen & Aron, 2019; Aron & Poldrack, 2020; Zsófia Logemann-Molnár et al., 2024).

Data Analysis

Analysis was conducted in SPSS version 29.0.1.0 (IBM Corporation, 2024). Outcome data was screened for missing data. To assess the extent and pattern of missingness, a comprehensive missing data analysis was performed (Appendix 7). The dataset contained 239 missing values, which equated to 14.48% of missing data across all data points. To determine whether the data were missing completely at random (MCAR), the Little's test for MCAR was applied (Appendix 8), which examines whether the pattern of missing data is random and does not rely on any observed or unobserved data. The Little's test results indicated the data was MCAR, $\chi^2(10) = 5.23$, $p = 1.000$, supporting the assumption that the data was missing completely at random. Given the extent of missing data, in conjunction with the results from the Little's test, multiple imputation (MI) was selected as the method of data handling. MI is a robust statistical method that allows for the uncertainty associated with missing data, by creating multiple imputed datasets and then combining results.

Following multiple imputation, the distributions of all continuous demographic and clinical variables were assessed for normality using the Shapiro–Wilk and Kolmogorov-Smirnov tests (Appendix 9), and visual inspection of Q–Q plots. Across all continuous variables, both tests indicated significant deviations from normality ($p < .001$) and therefore, non-parametric tests were selected.

To test Hypothesis 1, which examined the relationship between different types of childhood trauma and hallucinatory experiences, Spearman's correlations were conducted between the subscales of the Childhood Trauma Questionnaire (CTQ) and the Launay-Slade Hallucination Scale-Revised (LSHS-R). This method was selected to account for the non-normal distribution of the variables. To test Hypothesis 2, which explored whether dissociation mediates the relationship between childhood trauma and hallucinatory experiences, mediation analyses were conducted using both simple and multiple regression models. The significance of the indirect effect was tested using the Sobel test, which assessed whether dissociation (as measured by the Dissociative Experiences Scale (DES)) mediated the observed relationship

between childhood trauma (CTQ) and hallucinatory experiences (LSHS-R). To test Hypothesis 3, which aimed to explore the association between dissociation and cognitive inhibition in people with a psychosis-spectrum disorder, a series of Mann-Whitney U tests were performed. This non-parametric test was used to compare performance on the Stop-Signal Task (SST) between participants classified as having high vs. low dissociation, based on their scores on the DES. To test Hypothesis 4, which predicted that participants with higher levels of dissociation would experience higher levels of hallucinatory severity, Mann-Whitney U tests were conducted to compare hallucination severity (LSHS-R) between groups with high and low dissociation. Finally, to test for overall between-group differences in PANSS, hallucination-proneness (LSHS-R), childhood trauma (CTQ), and dissociation (DES) scores, further Mann-Whitney U tests were conducted.

To test for between-group differences on the PANSS, hallucination-proneness (LSHS-R), childhood trauma (CTQ), and dissociation (DES) questionnaires, a series of Mann-Whitney U tests were undertaken, due to the non-parametric nature of the data. To examine associations between childhood trauma (CTQ), dissociation (DES), and hallucination-proneness (LSHS-R), Spearman's correlations were completed. Mediation analyses were conducted to explore whether dissociation (measured by the DES) mediated the relationship between childhood trauma (measured by the CTQ) and hallucination-proneness (measured by the LSHS-R). Simple and multiple regression analyses were undertaken, and the Sobel test was used to examine the significance of indirect effects. Mann-Whitney U tests were conducted to evaluate between-group differences in cognitive inhibition.

Results

The mean scores and standard deviations for each of the main variables are presented in Table 4.

Table 4: *Means and Std. Deviation (S.D.) for all main measures*

Subscale	Mean	Std. Deviation	Possible Score Range
PANSS - P3 Category Score	4.98	0.86	7-49
CTQ - Emotional Abuse Subscale	18.35	4.69	5-25
CTQ - Physical Abuse Subscale	12.10	6.12	5-25
CTQ - Sexual Abuse Subscale	12.48	7.12	5-25
CTQ - Emotional Neglect Subscale	17.01	4.03	5-25
CTQ - Physical Neglect Subscale	11.82	3.56	5-25
CTQ - Minimisation/Denial Subscale	0.04	0.19	0-3 (control items)
CTQ - Total Score	73.14	10.93	25-125
DES - Total Score	39.36	17.53	0-100
LSHS-R - Total Score	22.41	5.78	0-48
SST - Number of successful inhibitions on Stop Trials	74.14%	7.19%	(Percentage Accuracy)

Between-group differences on the PANSS, and questionnaire measures:

Group differences on the PANSS, hallucination-proneness (LSHS-R), childhood trauma (CTQ), and dissociation (DES) questionnaire measures were examined using a series of Mann-Whitney U tests (Table 5).

Table 5. *Median and Interquartile Range (IQR) for the PANSS, LSHS-R, CTQ, and DES questionnaires.*

	Mild-Moderate (PANSS); (Median, IQR)	**Severe (PANSS); (Median, IQR)**	**Mean Ranks (Mild-Moderate, Severe)**	**p-value**
PANSS p3 Category Scores	5.00, 2.00	5.00, 2.00	11.65, 28.15	< .05
LSHS-R Total Score	23.00, 7.00	23.00, 7.00	16.59, 17.90	> .05
CTQ Emotional Abuse	13.00, 8.00	16.00, 8.00	14.57, 20.54	> .05
CTQ Physical Abuse	9.00, 6.00	11.00, 6.00	15.27, 18.67	> .05
CTQ Sexual Abuse	8.00, 8.00	9.00, 9.00	15.00, 19.08	> .05
CTQ Emotional Neglect	15.00, 8.00	17.00, 10.00	14.93, 19.20	> .05
CTQ Physical Neglect	11.00, 6.00	12.00, 7.00	16.00, 17.25	> .05
CTQ Total Score	56.00, 25.00	63.00, 30.00	14.63, 20.34	> .05
DES Total Score	38.00, 20.00	41.00, 25.00	14.57, 19.70	> .05

Note: PANSS = Positive and Negative Syndrome Scale for Schizophrenia; LSHS-R = Launay-Slade Hallucination Scale-Revised; CTQ = Childhood Trauma Questionnaire; DES = Dissociative Experiences Scale; IQR = Interquartile Range.

The analyses of the PANSS showed that participants in the ‘severe’ hallucinations group scored significantly higher than participants in the ‘mild-moderate’ hallucinations group in terms of their hallucination severity. Mean ranks were 11.65 for participants in the ‘mild-moderate’

hallucinations group and 28.15 for participants in the 'severe' hallucinations, indicating a large effect size.

The results of the hallucination-proneness scores (LSHS-R) revealed no significant group differences (all *p's* > .05). The analysis of the childhood trauma measure showed there were no significant between-group differences for any of the subscale scores nor the total score (all *p's* > .05). The analysis of dissociation scores showed there were no significant group differences between participants in the 'severe' versus 'mild/moderate' hallucinations group (all *p's* > .05).

A Spearman's rank-order correlation was undertaken to examine associations between childhood trauma, dissociation, and hallucination-proneness (Table 6). Hallucination-proneness was significantly associated with dissociation, emotional abuse, and emotional neglect. Dissociation was significantly associated with emotional abuse, but no other CTQ subscales, nor the CTQ total score. Emotional abuse was significantly associated with physical abuse, emotional neglect, physical neglect, and CTQ total score. Physical abuse was significantly associated with emotional neglect and CTQ total score. Sexual abuse was only significantly correlated with CTQ total score, whilst emotional neglect showed a significant correlation with CTQ total score. Physical neglect was also significantly associated with CTQ total score.

Table 6: *Non-parametric correlations (Spearman's rho) between childhood trauma, dissociation, and hallucination-proneness measures*

Measure	DES	Emotional Abuse	Physical Abuse	Sexual Abuse	Emotional Neglect	Physical Neglect	Minimisation	CTQ	LSHS-R
DES	—								
Emotional Abuse	.311*	—							
Physical Abuse	.178	.662**	—						
Sexual Abuse	.179	.290	.288	—					
Emotional Neglect	.338*	.547**	.416*	.153	—				
Physical Neglect	.286	.443**	.294	.295	.434**	—			
Minimisation	.183	.199	-.048	.249	.261	.014	—		
CTQ	.186	.623**	.716**	.722**	.214	.361*	.083	—	
LSHS-R	.384*	.342*	.180	.094	.321*	.247	.114	.084	—

*Note: *p < .05, **p < .01*

Mediation Analyses

Mediation analyses were conducted to examine whether dissociation mediated the relationship between childhood trauma (Table 7; see *appendix 10* for SPSS output) and

hallucination-proneness. First, mediation analysis was undertaken to examine whether the association between the CTQ Total Score and the LSHS-R Total score was mediated by dissociative tendencies. In addition, separate analyses were undertaken using the five subscales of the CTQ as independent variables to examine whether the hypothesised mediating role of dissociation could be attributable to specific experiences of childhood trauma. The results indicated that childhood trauma did not significantly predict dissociation, *B* = 0.443, *SE* = 0.278, *t* = 1.59, *p* = .111. A simple linear regression was conducted to examine whether childhood trauma predicted hallucination-proneness. Results indicated that childhood trauma did not significantly predict hallucination-proneness, *B* = 0.046, *SE* = 0.097, *t* = .475, *p* = .635. A multiple regression was conducted to test if dissociation predicted hallucination-proneness when controlling for childhood trauma. The results showed that dissociation was not a significant mediator of the relationship between childhood trauma and hallucination-proneness, *B* = 0.083, *SE* = 0.062, *t* = 1.34, *p* = .182. The Sobel test was conducted to examine the significance of the indirect effect (0.046). The test results were not significant, *Z* = 1.03, *SE* = 0.036, *p* = .305. The results are outlined in Figure 1.

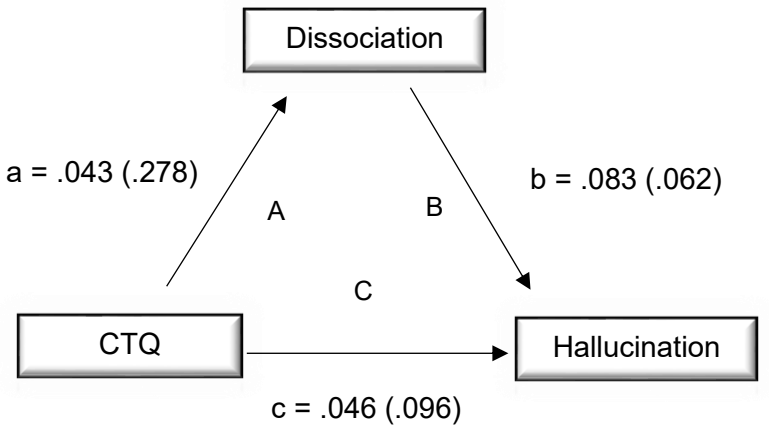

Fig 1. *A mediation model showing the relationship between childhood trauma, dissociation, and hallucination-proneness (n=33).*

The second analysis examined the relationship between the CTQ Emotional Abuse subscale and LSHS-R Total Score. The first linear regression for this relationship showed that emotional abuse did not significantly predict dissociation, *B* = 1.340, *SE* = 0.631, *t* = 2.12, *p* = 0.34. The second linear regression showed that emotional abuse did not significantly predict hallucination-proneness, *B* = 0.379, *SE* = 0.226, *t* = 1.68, *p* = .094. The results of the multiple regression demonstrated that dissociation, as a mediator, was not a significant predictor of

hallucination-proneness, B = 0.055, SE = 0.062, t = .885, p = .376. The results of the Sobel test were not significant, Z = 0.82, SE = 0.090, p = .413. The results are shown in Figure 2.

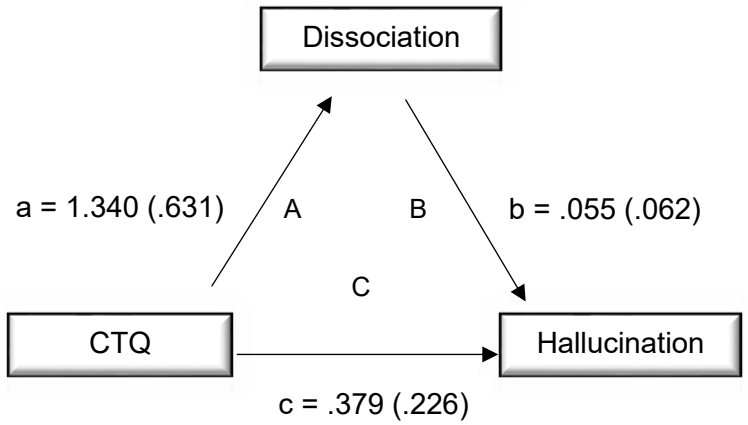

Fig 2. *A mediation model showing the relationship between emotional abuse, dissociation, and hallucination-proneness (n=33).*

The third mediation analysis explored the relationship between the CTQ Physical Abuse subscale and the LSHS-R Total Score. The results of the first linear regression showed that physical abuse was not a significant predictor of dissociation, B = 0.591, SE = 0.504, t = 1.17, p = .241. The second linear regression showed that physical abuse did not significantly predict hallucination-proneness, B = 0.139, SE = 0.183, t = 0.76, p = .447. The multiple regression highlighted that dissociation, as a mediator, was not a significant predictor of hallucination-proneness, B = 0.078, SE = 0.061, t = 1.27, p = .203. The results of the Sobel test were not significant, Z = 0.86, SE = 0.053, p = .387. The results are depicted in Figure 3.

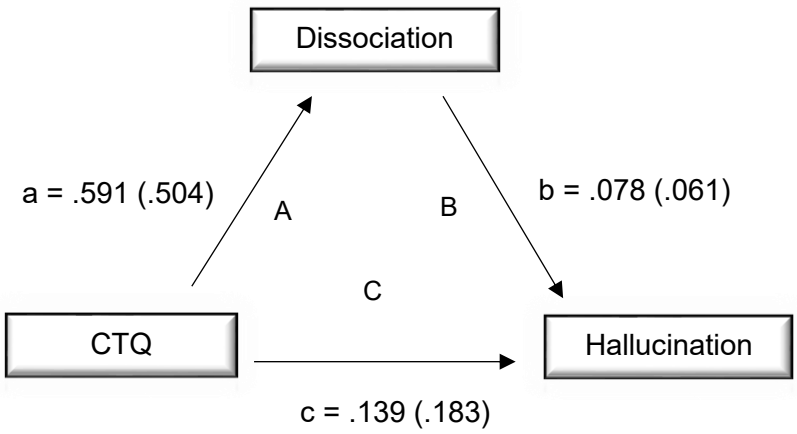

Fig 3. *A mediation model showing the relationship between physical abuse, dissociation, and hallucination-proneness (n=33).*

The fourth analysis examined the relationship between the CTQ Sexual Abuse subscale and the LSHS-R Total Score. The first linear regression showed that sexual abuse was not a significant predictor of dissociation, $B = 0.608$, $SE = 0.427$, $t = 1.42$, $p = .155$. The results of the second linear regression demonstrated that sexual abuse did not significantly predict hallucination-proneness, $B = 0.100$, $SE = 0.150$, $t = 0.67$, $p = .504$. The results of the multiple regression showed that dissociation, as a mediator, was not a significant predictor of hallucination-proneness, $B = 0.080$, $SE = 0.063$, $t = 1.27$, $p = .204$. The Sobel test results were also not significant, $Z = 0.95$, $SE = 0.051$, $p = .343$. The results are shown below in Figure 4.

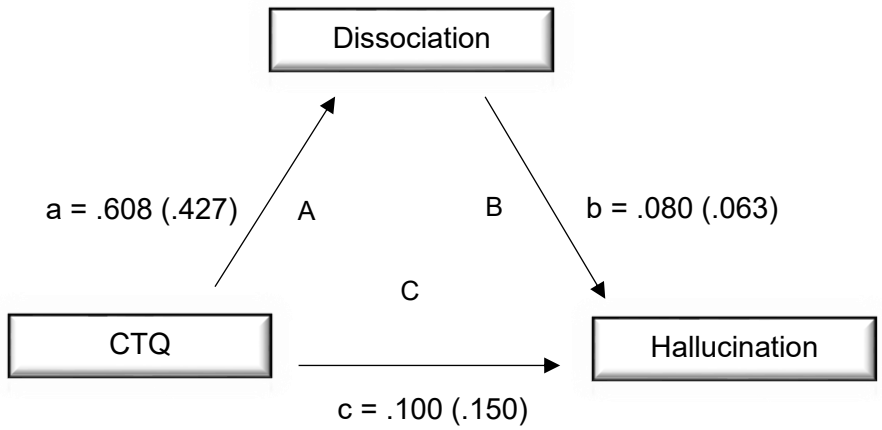

Fig 4. *A mediation model showing the relationship between sexual abuse, dissociation, and hallucination-proneness (n=33).*

The fifth mediation analysis looked at the relationship between the CTQ Emotional Neglect subscale and the LSHS-R Total Score. The first linear regression suggested that emotional neglect significantly predicted dissociation, $B = 1.555$, $SE = 0.751$, $t = 2.07$, $p = .039$. The second linear regression showed that emotional neglect was not a significant predictor of hallucination-proneness, $B = 0.452$, $SE = 0.262$, $t = 1.73$, $p = .085$. The multiple regression results demonstrated that dissociation, as a mediator, was not a significant predictor of hallucination-proneness, $B = 0.054$, $SE = 0.064$, $t = 0.86$, $p = .392$. The results of the Sobel test were also not significant, $Z = 0.78$, $SE = 0.107$, $p = .435$. The results are depicted below in Figure 5.

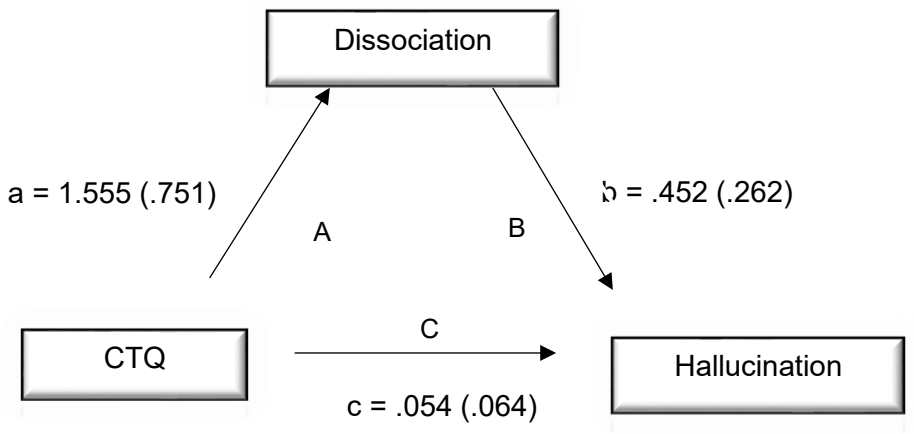

Fig 5. *A mediation model showing the relationship between emotional neglect, dissociation, and hallucination-proneness (n=33).*

The sixth analysis explored the relationship between the CTQ Physical Neglect subscale and the LSHS-R Total Score. Results from the first linear regression highlighted that physical neglect was not a significant predictor of dissociation, *B* = 1.176, *SE* = 0.859, *t* = 1.37, *p* = .171. The second linear regression demonstrated that physical neglect did not significantly predict hallucination-proneness, *B* = 0.480, *SE* = 0.290, *t* = 1.65, *p* = .099. The multiple regression showed that dissociation, as a mediator, was not a significant predictor of hallucination-proneness, *B* = 0.065, *SE* = 0.060, *t* = 1.09, *p* = .277. The results of the Sobel test were also not significant, *Z* = 0.85, *SE* = 0.090, *p* = .396. The results are depicted in Figure 6.

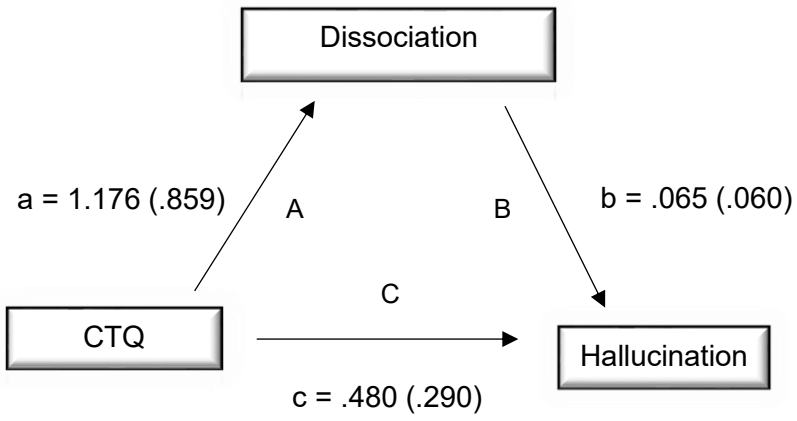

Fig 6. *A mediation model showing the relationship between physical neglect, dissociation, and hallucination-proneness (n=33).*

Table 7 presents the total, direct, and indirect effects (mediated via dissociative tendences) of different types of childhood trauma on hallucination-proneness. The indirect effects of Emotional Abuse (0.074), Physical Abuse (0.046), Sexual Abuse (0.049), Emotional Neglect

(0.084), and Physical Neglect (0.076) are provided, alongside the direct and total effects. These results highlight the mediating role of dissociation in these relationships.

Table 7: *Total, direct, and indirect (i.e., mediated via dissociative tendencies) effects of trauma on hallucination-proneness.*

Independent Variable	Indirect Effect	Direct Effect	Total Effect
CTQ Total Score	0.037	0.046	0.083
Emotional Abuse	0.074	0.379	0.453
Physical Abuse	0.046	0.139	0.185
Sexual Abuse	0.049	0.100	0.149
Emotional Neglect	0.084	0.452	0.536
Physical Neglect	0.076	0.480	0.556

Between-group differences on the Stop Signal Task

To examine whether the percentage of successful inhibitions on Stop Trials (SST) differed significantly between participants in the 'mild/moderate' versus 'severe' groups, a Mann-Whitney U test was undertaken. There were no significant differences between the groups in the original dataset ($p = .104$) and most imputed datasets ($p > .05$). Only one imputed dataset (Imputation 6) indicated a significant difference ($p = .033$).

In order to examine whether dissociation was directly related to difficulties with cognitive inhibition, we had planned to undertake a between-groups analysis of participants categorised into those who scored within the 'pathological' range versus those who scored within the 'non-pathological' range, according to their scores on the DES. The aim was to use the DES-T scores of participants to estimate their individual Bayesian probability of being part of the pathological dissociation taxon. We planned to undertake this analysis using an Excel adaptation of the SAS algorithm created by Waller & Ross (1997), available from the International Society for the Study of Trauma and Dissociation website (Perry, 2004). According to the cutoff suggested by Waller & Ross (1997), participants with a Bayesian probability greater than 0.90 should be classified into the 'pathological' dissociation group, while the remaining participants should be placed within the 'non-pathological' group. Due to the low number of participants in the non-pathological group (n=6), it was not possible to undertake this analysis.

Discussion

Our results indicated a significant correlation between childhood trauma and the severity of hallucinatory experiences. However, in contrast to the findings reported in Varese et al. (2012b), in this study, dissociation did not significantly mediate the relationship between childhood trauma and hallucination-proneness. Performance on the cognitive inhibition measure was not significantly correlated with hallucination severity.

Our findings partially replicate previous research indicating a link between childhood trauma and hallucinatory experiences (Read et al., 2004, 2005; Bentall et al., 2012; Varese et al., 2012b). While we confirmed the association between childhood trauma and the severity of hallucinations, dissociation did not significantly mediate this relationship, diverging from the findings of Varese et al. (2012b). This suggests that the role of dissociation in the trauma-hallucinations pathway may be underpinned by other processes, such as deficits in reality discrimination (e.g., the inability to distinguish between internal and external cognitive events, Varese et al., 2012, p. 1026) and weakened cognitive inhibition, which might allow intrusive thoughts to be misattributed as external voices (Varese et al., 2012, p. 1032). Additionally, increased state dissociation in response to acute stress (Varese et al., 2012, p. 1032), and specific cognitive biases (that lead to the misinterpretation of neutral stimuli as threatening), might also contribute to the development of hallucinations (Varese et al., 2012, p. 1032). Recent studies have also questioned the linearity of the dissociation-hallucination link, proposing that other cognitive processes, such as emotional regulation and attention, might play crucial roles (Rokita et al., 2020; Heriot-Maitland et al., 2022). Moreover, our study did not find a strong association between cognitive inhibition deficits and hallucination severity. This contrasts with earlier findings that highlighted the significance of inhibitory processes in auditory hallucinations (Waters et al., 2003, 2006; Badcock et al., 2005). This raises the possibility that other cognitive mechanisms, such as deficits in working memory or attentional control, may be more critical in this context, as recent evidence has suggested (Johnson & Weinberg, 2023). These discrepancies highlight the need for further research to explore alternative pathways and mechanisms, including longitudinal studies that can measure the relationship between trauma, dissociation, and cognitive processes over time.

Clinical Implications

The study found that certain types of childhood trauma, notably emotional and physical abuse, were significantly associated with the presence of hallucinatory experiences in individuals with psychosis-spectrum disorders. In contrast, other forms of trauma, such as neglect, did not show a similar relationship. This distinction has important clinical implications, particularly for how clinicians assess and treat individuals who experience hallucinations. Clinicians may need to adopt a more targeted approach during trauma assessments, focusing on the specific types of trauma that are most predictive of hallucinatory experiences. By giving priority to emotional and physical abuse in clinical interviews and standardised trauma assessments, clinicians can identify individuals at higher risk of hallucinations more accurately. This suggests that assessing for differentiated trauma experiences—rather than treating all forms of trauma as equally impactful—could lead to more tailored interventions.

From a treatment perspective, interventions that address the specific consequences of emotional and physical abuse may be especially beneficial for individuals who experience hallucinations. Trauma-informed approaches, such as Cognitive Behavioral Therapy for Trauma (CBT-T) or Eye Movement Desensitisation and Reprocessing (EMDR), may be more effective when they target the emotional and psychological effects of these specific types of abuse. These therapies could help reduce the frequency and intensity of hallucinatory experiences by addressing the underlying trauma. Moreover, the findings suggest that not all trauma contributes equally to psychotic symptoms. This nuanced understanding challenges the traditional view that any form of trauma increases the risk for hallucinations and points to the need for clinicians to consider how different types of trauma manifest in psychosis. For instance, neglect, while harmful, may not directly contribute to hallucinatory symptoms in the same way as emotional and physical abuse do. However, the study also found that dissociation did not emerge as a significant mediator in the relationship between trauma and hallucinations, a result that diverges from some extant literature. This highlights the complexity of the trauma-psychosis relationship, suggesting that while dissociation may not be a direct pathway, it remains relevant within the broader psychological profile of individuals with psychosis. Clinicians should remain mindful of this complexity and avoid overemphasising any single pathway or treatment approach based on this study alone.

Given the limitations of this study—including its underpowered sample, correlational design, and the potential insensitivity of the cognitive inhibition measure—the clinical implications

should be interpreted with caution. Future research with larger samples and refined methodologies may provide more definitive guidance on how best to prioritise different therapeutic strategies.

In summary, the differential impact of trauma types underscores the importance of a customised approach in both assessment and treatment. Clinicians should carefully consider specific trauma histories to improve the accuracy of assessments and the effectiveness of interventions, ensuring that treatment strategies are aligned with the individual's unique trauma profile.

Limitations

There are several limitations to this study. First, the study is significantly underpowered. Additionally, the measure of cognitive inhibition used in this study, the Stop-Signal Task (SST), may not have been sensitive enough to capture the full range of inhibitory control abilities. The SST primarily assesses the ability to inhibit a predominant response, but it may not fully capture other aspects of cognitive inhibition, such as the ability to suppress intrusive thoughts or irrelevant information, which are crucial in understanding hallucination-proneness (Verbruggen & Logan, 2008; Aron, 2011). Furthermore, the reliance on a single outcome measure (% accuracy) from the SST might have limited our ability to detect subtle differences in cognitive inhibition across participants (Verbruggen & Logan, 2008).

Our reliance on self-reported diagnoses of psychosis-spectrum disorders introduces variability that might not reflect clinical reality, particularly given that we could not control for the presence of co-morbid dissociative disorders. Furthermore, the study's reliance on self-report measures for key constructs like dissociation, childhood trauma, and hallucinatory experiences, introduces the possibility of biases, namely recall bias and social desirability bias. While self-report measures are practical, more logistically feasible, and commonly used in psychological research, they are limited by the accuracy of participants' self-perception and willingness to disclose highly sensitive information. Future research could benefit from a more robust, multimethod assessment approach, utilising clinician-administered tools, behavioural tasks, and/or neuropsychological measures, to help triangulate data and enhance the reliability of findings.

Due to the cross-sectional design, it was not possible to draw causal inferences or conclusions. More longitudinal research is necessary to explore how these variables interact over time, and whether changes in one variable predict changes in another/others.

The study did not control for potential confounding variables, such as medication status and the presence of co-morbid psychiatric conditions. Furthermore, the sample was predominantly female, White, and Western, potentially limiting the generalisability of the results. Future studies should aim to recruit more diverse samples, considering factors such as gender, ethnicity and cultural background.

Future Research

Future studies should seek to replicate these findings in larger and more diverse samples. Second, the role of other cognitive processes which may mediate the trauma-hallucinations link should be explored. While this study focused on dissociation and cognitive inhibition, other cognitive domains – such as attention and memory (Johnson & Weinberg, 2023), and emotion regulation (Rokita et al., 2020) – may also play roles in the development and maintenance of psychotic phenomena following traumatic experiences. For example, research could consider investigation into whether deficits in working memory, or attentional control, exacerbate the effects of trauma on hallucination-proneness, or whether improvements in these areas through cognitive training could mitigate these effects.

There is scope for future research to examine the impact of specific types of adverse childhood experiences on different psychotic symptoms, as there is emerging evidence suggesting that different types of traumas (e.g., emotional vs. physical) may have distinctly different effects (Teicher & Samson, 2023).

Conclusion

This study examined the relationship between childhood trauma, dissociation, and hallucinatory experiences in individuals with psychosis-spectrum disorders, while also exploring the potential role of cognitive inhibition as an additional factor. Although the results did not support a mediatory role for dissociation in the trauma-hallucination link, they confirmed a significant correlation between childhood trauma and the severity of hallucinatory experiences. This indicates the importance of investigating multiple pathways and mechanisms when addressing psychotic symptoms in trauma-exposed individuals. Future research should focus on larger, more diverse samples and consider longitudinal designs to better capture the dynamics of

trauma, dissociation, and cognitive processes over time. Additionally, exploring other cognitive factors, such as emotional regulation or working memory, could provide further insights into the complex relationships underpinning psychotic symptoms.

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Conflict(s) of interest: The authors have no conflicts of interest with respect to this publication.

Ethical statements: The authors have abided by the Ethical Principles of Psychologists and Code of Conduct as set out by the APA. Ethical approval was granted by Staffordshire University (2023), and the West Midlands – Black Country Research Ethics Committee and HRA and Health and Care Research Wales (REC reference: 23/WM/0235).

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Appendices

1. **West Midlands – Black Country Research Ethics Committee and HRA approval.**

Health Research Authority

West Midlands - Black Country Research Ethics Committee

2 Redman Place,
Stratford London
E20 1JQ

Telephone: 0207 104 8210

Please note: This is the favourable opinion of the REC only and does not allow

you to start your study at NHS sites in England until you receive HRA Approval

12 December 2023

Mr Steven Lovatt
Newlands
Springfield Road
Leek, Staffordshire
ST13 6LQ

Dear Mr Lovatt

Study title:	**Childhood trauma and hallucinatory experiences in psychosis: the role of dissociation and cognitive inhibition. **PLEASE NOTE THIS APPLICATION RELATES TO A PREVIOUS RESEARCH PROPOSAL REVIEWED BY THE REC (IRAS NO: 333321 - REC REFERENCE NUMBER: 23/WM/0207).****
REC reference:	**23/WM/0235**
IRAS project ID:	**335396**

Thank you for your letter of 01 December 2023, responding to the Research Ethics Committee's (REC) request for further information on the above research and submitting revised documentation.

The further information has been considered on behalf of the Committee by the Chair and Lead Reviewer.

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

Good practice principles and responsibilities

The UK Policy Framework for Health and Social Care Research sets out principles of good practice in the management and conduct of health and social care research. It also outlines the responsibilities of individuals and organisations, including those related to the four elements of research transparency:

1. registering research studies
2. reporting results
3. informing participants
4. sharing study data and tissue

Conditions of the favourable opinion

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

Confirmation of Capacity and Capability (in England, Northern Ireland and Wales) or NHS management permission (in Scotland) should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements. Each NHS organisation must confirm through the signing of agreements and/or other documents that it has given permission for the research to proceed (except where explicitly specified otherwise).

Guidance on applying for HRA and HCRW Approval (England and Wales)/ NHS permission for research is available in the Integrated Research Application System.

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

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

Registration of Clinical Trials

All research should be registered in a publicly accessible database and we expect all researchers, research sponsors and others to meet this fundamental best practice standard.

It is a condition of the REC favourable opinion that **all clinical trials are registered** on a publicly accessible database within six weeks of recruiting the first research participant. For this purpose, 'clinical trials' are defined as:

- clinical trial of an investigational medicinal product
- clinical investigation or other study of a medical device
- combined trial of an investigational medicinal product and an investigational medicaldevice
- other clinical trial to study a novel intervention or randomised clinical trial to compare interventions in clinical practice.

Failure to register a clinical trial is a breach of these approval conditions, unless a deferral has been agreed by the HRA (for more information on registration and requesting a deferral see: Research registration and research project identifiers).

If you have not already included registration details in your IRAS application form you should notify the REC of the registration details as soon as possible.

Publication of Your Research Summary

We will publish your research summary for the above study on the research summaries section of our website, together with your contact details, no earlier than three months from the date of this favourable opinion letter.

Should you wish to provide a substitute contact point, make a request to defer, or require further information, please visit:
https://www.hra.nhs.uk/planning-and-improving-research/application-summaries/research-summaries/

N.B. If your study is related to COVID-19 we will aim to publish your research summary within 3 days rather than three months.

During this public health emergency, it is vital that everyone can promptly identify all relevant research related to COVID-19 that is taking place globally. If you haven't already done so, please register your study on a public registry as soon as possible and provide the REC with the registration detail, which will be posted alongside other information relating to your project. We are also asking sponsors not to request deferral of publication of research summary for any projects relating to COVID-19. In addition, to facilitate finding and extracting studies related to COVID-19 from public databases, please enter the WHO official acronym for the coronavirus disease (COVID-19) in the full title of your study. Approved COVID-19 studies can be found at:
https://www.hra.nhs.uk/covid-19-research/approved-covid-19-research/

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

After ethical review: Reporting requirements

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

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

- Final report
- Reporting results

The latest guidance on these topics can be found at https://www.hra.nhs.uk/approvals-amendments/managing-your-approval/.

Ethical review of research sites

NHS/HSC sites

The favourable opinion applies to all NHS/HSC sites taking part in the study, subject to confirmation of Capacity and Capability (in England, Northern Ireland and Wales) or management permission (in Scotland) being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

Non-NHS/HSC sites

I am pleased to confirm that the favourable opinion applies to any non-NHS/HSC sites listed in the application, subject to site management permission being obtained prior to the start of the study at the site.

Approved documents

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

Document	*Version*	*Date*
Cover Letter [Cover Letter]		01 December 2023
Evidence of Sponsor insurance or indemnity (non NHS Sponsors only) [Professional Indemnity]	2	01 August 2023
GP/consultant information sheets or letters [DRAFT GP letter]	1	28 September 2023
IRAS Application Form [IRAS_Form_09102023]		09 October 2023
IRAS Checklist XML [Checklist_13112023]		13 November 2023
IRAS Checklist XML [Checklist_01122023]		01 December 2023
Letter from sponsor [Approval Letter]	1	28 April 2023
Non-validated questionnaire [Demographics Questionnaire]	1	06 September 2023
Other [Professional Liability]	2	01 August 2023
Other [Participant Debrief Sheet]	3	28 September 2023
Other [Revised LSHS Measure]	1	15 June 2023
Other [DES Measure]	1	15 June 2023
Other [CTQ Scale]	1	15 June 2023
Other [Cover Letter - IRAS Application Amendments]	3	28 September 2023
Other [Social Care REC Letter]	1	26 September 2023
Other [HRA Letter]	1	26 September 2023
Other [Draft GP Letter]	1	28 September 2023
Other [Distress Protocol]	1	28 September 2023
Other [NSCHT Lone Worker Policy]	1	12 November 2023
Other [IRAS Application Amendments]	4	12 November 2023

Other [DRAFT GP Letter Version 2]	2	01 December 2023
Other [Cover Letter - IRAS Amendments Version 4]	4	01 December 2023
Participant consent form [Participant Consent Form]	3	28 September 2023
Participant consent form [Participant Consent Form]	4	12 November 2023
Participant information sheet (PIS) [Participant Information Sheet]	4	12 November 2023
Research protocol or project proposal [Research Proposal]	9	28 September 2023
Summary CV for Chief Investigator (CI) [Chief Investigator CV]	1	04 May 2023
Summary CV for student [Chief Investigator CV]	1	04 May 2023
Summary CV for supervisor (student research) [Academic Supervisor CV]	1	26 May 2023

Statement of compliance

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

User Feedback

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

HRA Learning

We are pleased to welcome researchers and research staff to our HRA Learning Events and online learning opportunities– see details at:
https://www.hra.nhs.uk/planning-and-improving-research/learning/

IRAS project ID: 335396 Please quote this number on all correspondence

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

pp.

Miss Nicola Brooks
Chair

Email:blackcountry.rec@hra.nhs.uk

Enclosures: "After ethical review – guidance forresearchers

Copy to: Professor Nachiappan Chockalingam

Ymchwil Iechyd a Gofal Cymru
Health and Care Research Wales

NHS
Health Research Authority

Mr. Steven Lovatt
Newlands
Springfield Road
Leek, Staffordshire
ST13 6LQ

Email: approvals@hra.nhs.uk

12 December 2023

Dear Mr Lovatt

HRA and Health and Care Research Wales (HCRW) Approval Letter

Study title:	**Childhood trauma and hallucinatory experiences in psychosis: the role of dissociation and cognitive inhibition. **PLEASE NOTE THIS APPLICATION RELATES TO A PREVIOUS RESEARCH PROPOSAL REVIEWED BY THE REC (IRAS NO: 333321 - REC REFERENCE NUMBER: 23/WM/0207).****
IRAS project ID:	**335396**
REC reference:	**23/WM/0235**
Sponsor	**Staffordshire University**

I am pleased to confirm that **HRA and Health and Care Research Wales (HCRW) Approval**has been given for the above referenced study, on the basis described in the application form,protocol, supporting documentation and any clarifications received. You should not expect to receive anything further relating to this application.

Please now work with participating NHS organisations to confirm capacity and capability, in line with the instructions provided in the “Information to support study set up” section towardsthe end of this letter.

How should I work with participating NHS/HSC organisations in Northern Ireland and Scotland?
HRA and HCRW Approval does not apply to NHS/HSC organisations within Northern Irelandand Scotland.

If you indicated in your IRAS form that you do have participating organisations in either of these devolved administrations, the final document set and the study wide governance report (including this letter) have been sent to the coordinating centre of each participating nation.The relevant national coordinating function/s will contact you as appropriate.

Please see IRAS Help for information on working with NHS/HSC organisations in Northern Ireland and Scotland.

How should I work with participating non-NHS organisations?
HRA and HCRW Approval does not apply to non-NHS organisations. You should work withyour non-NHS organisations to obtain local agreement in accordance with their procedures.

What are my notification responsibilities during the study?
The standard conditions document "*After Ethical Review – guidance for sponsors and investigators*", issued with your REC favourable opinion, gives detailed guidance on reporting expectations for studies, including:

- Registration of research
- Notifying amendments
- Notifying the end of the study

The HRA website also provides guidance on these topics, and is updated in the light ofchanges in reporting expectations or procedures.

Who should I contact for further information?
Please do not hesitate to contact me for assistance with this application. My contact detailsare below. Your IRAS project ID is **335396**. Please quote this on all correspondence.Yours sincerely,

Juliana Araujo

Approvals

Specialist

Email: approvals@hra.nhs.uk

Copy to: *Professor Nachiappan Chockalingam*

List of Documents

The final document set assessed and approved by HRA and HCRW Approval is listed below.

Document	*Version*	*Date*
Cover Letter [Cover Letter]		01 December 2023
Evidence of Sponsor insurance or indemnity (non NHS Sponsors only) [Professional Indemnity]	2	01 August 2023
GP/consultant information sheets or letters [DRAFT GP letter]	1	28 September 2023
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Other [Organisation Information Document]	3	06 September 2023
Other [IRAS Events Schedule]	1	20 June 2023
Other [Cover Letter - IRAS Application Amendments]	3	28 September 2023
Other [Social Care REC Letter]	1	26 September 2023
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Summary CV for supervisor (student research) [Academic Supervisor CV]	1	26 May 2023

Information to support study set up

IRAS project ID	335396

The below provides all parties with information to support the arranging and confirming of capacity and capability with participating NHSorganisations in England and Wales. This is intended to be an accurate reflection of the study at the time of issue of this letter.

Types of participating NHS organisation	Expectations related toconfirmation of capacity and capability	Agreement to beused	Funding arrangements	Oversight expectations	HR Good Practice Resource Packexpectations
Research activities and procedures as per the protocol and other study documents will take place at participating NHS organisations.	Research activities should not commence atparticipating NHS organisations in Englandor Wales prior to their formal confirmation of capacity and capability to deliver the study in accordance with the contracting expectationsdetailed.	An Organisation Information Documenthas been submitted and the sponsor is not requesting and does not expect any other agreement to be usedwith participating NHS organisations of this type.	Study funding arrangements are detailed inthe Organisation Information Document.	A Local Collaborator should be appointed at participating NHS organisations.	Where an external individual will be conducting any of the research activities that will be undertaken at this site type then they would be expected to hold a Letter of Access. This should be issued be on the basisof a Research Passport (if university employed) or an NHS-to-NHS confirmation of pre-engagement checks letter (if NHS employed). These should confirm OccupationalHealth Clearance. These should confirm standard DBS checks.

Other information to aid study set-up and delivery

This details any other information that may be helpful to sponsors and participating NHS organisations in England and Wales in study set-up.
The applicant has indicated that they do not intend to apply for inclusion on the NIHR CRN Portfolio.

2. Staffordshire University IPR panel approval

INDEPENDENT PEER REVIEW APPROVAL FEEDBACK

Researcher Name	Steven Lovatt
Title of Study	Childhood trauma and hallucinatory experiences in psychosis: the role of dissociation and cognitive inhibition
Status of approval:	**Approved**

Thank you for your submission to the Independent Peer Review (IPR) Panel. Your application is now approved

Action now required:
You must now apply to the Integrated Research Applications System (IRAS) for approval to conduct your study. You must not commence the study without Health Research Authority (HRA) approval, and relevant site-specific approvals. Please note that the University Sponsor contact to be named on the form is Prof Nachi Chockalingam.

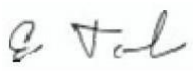
Please forward a copy of the letter you receive from the IRAS process to ethics@staffs.ac.uk as soon as possible after you have received approval.

Once you have received HRA approval, and participating Trusts/organisations have confirmed their capacity and capability to support your study, you can commence your research. You should be sure to do so in consultation with your supervisor.

You should note that any divergence from the approved procedures and research method will invalidate any insurance and liability cover from the University. You should, therefore, notify the Panel of any significant divergence from this approved proposal.

When your study is complete, please send an end of study report to Dr Edward Tolhurst: e.tolhurst@staffs.ac.uk. A template can be found on the ethics Blackboard site.

Comments for your consideration: None



Signed: Dr Edward Tolhurst
University IPR coordinator

Date: 28th April 2023

3. **Participant Information Sheet (PIS) – Clinical Sample**

INFORMATION SHEET FOR PARTICIPANTS

Title of study

Childhood trauma and hallucinatory experiences in psychosis: the role of dissociation and cognitive inhibition.

Hello,

My name is Steve Lovatt, a researcher from Staffordshire University, and I would like to invite you to be a part of my study. I am working on my Professional Doctorate in Clinical Psychology, focusing on childhood trauma and hallucinatory experiences in relation to dissociation and cognitive inhibition. I want to explain why this research is important and what your participation will involve. Please take your time to read this information carefully and feel free to discuss it with others in your care team. If you have any questions, do not hesitate to ask.

In any research, there's an organisation responsible for overseeing the project. In this case, Staffordshire University is the sponsor, ensuring that the study is conducted properly, and the results are reported accurately.

What is the purpose of the study?

Research supports a link between childhood trauma (e.g., abuse or neglect), and hearing voices. Some researchers think that disconnecting from thoughts, feelings, and memories explains this link. The first aim is to try and find this link in this study as well.

There is evidence that difficulties with the ability to stop and/or ignore thoughts and actions make people more likely to hear voices. This study will test whether being able to disconnect from thoughts, feelings, and memories is linked with problems stopping and/or ignoring thoughts and actions, in a group of people with psychosis experiences.

Why have I been invited to take part?

You are being invited to take part in this research because you have received a diagnosis of a psychosis-spectrum disorder (such as schizophrenia or schizoaffective disorder) and are over 18 years old. You have been invited to take part because you are also under the care of a local mental health service currently.

What will happen if I take part?

If you decide to take part, you will be asked to sign a consent form before you can start. The researcher will ask you to fill in some questionnaires and complete a task on a laptop. Information about your current medication, age, gender, and years of education will be collected by the researcher. You can complete the tasks virtually, using the Gorilla Experiment Builder website, or by completing a paper copy face-to-face. Other questionnaires will look at experiences you have relating to your diagnosis, your experiences of hearing voices, and your ability to disconnect from thoughts, feelings, and memories. You will also be asked about any traumatic experiences in your childhood, as the research project is looking for a link between

these and some of the experiences you have relating to your diagnosis of psychosis. Another task involves asking you to complete sentences, some that make sense and some that do not. Finally, the researcher will ask you to complete a simple task on a laptop where you identify shapes freely but are also asked not to give a response. The laptop task will need to be done face-to-face, so an appointment will be arranged for you to complete this.

The researcher hopes to complete these assessments with you either in an NHS setting (such as a clinic room), within your home, or virtually using the Gorilla Experiment Builder website and Microsoft Teams (MST). The researcher will block out a 2-hour period for us to complete the assessments, although it should not take this long. Having a longer period means that you do not feel rushed, and time to access comfort breaks can also be scheduled if they are needed.

If you decide to take part in the research study, you will be given a unique study number by the researcher, which will be used to identify you if you decide to withdraw from the study. This unique number will be kept by the researcher, and you will be asked to keep a copy too.

Do I have to take part?

No, it is totally up to you. You should only take part if you want to and choosing not to take part will not affect your care and treatment in any way. Once you have read the information sheet, please contact the researcher, or the person you have been working with at your mental health service if you have any questions that will help you decide about taking part. If you decide to take part, we will ask you to sign a consent form before you can take part in the research study, and you will be given a copy of this consent form to keep.

What are the possible risks of taking part?

Some of the questionnaires may involve thinking about distressing or painful memories. If you become upset, the researcher will provide you with information so you can get support. You are also free to withdraw from the study if you become distressed at any point without your medical care or legal rights being affected. If you disclose that you are at risk of harm to yourself or others, or if you cause harm to yourself or someone else during the data collection session, the researcher will alert the most appropriate person to help, so that we follow safeguarding processes to make sure that you and others are safe and supported. This might include contacting your GP so they can support you, and / or it might include the researcher (Steve Lovatt) speaking with staff members at the clinic that you are currently receiving care from. It might also mean contacting the emergency services to get immediate support.

What are the possible benefits of taking part?

There probably will not be any direct benefits to you, but by sharing your experiences with the researcher, you will be helping to better understand the impact of childhood trauma on the experiences of individuals with psychosis-spectrum disorders. It is hoped that this will inform future practice within the NHS in supporting those individuals.

How will we use information about you?

We will need to use information from you for this research project. This information will include your name and contact details. People will use this information to do the research. People who do not need to know who you are will not be able to see your name or contact details. Your data will have a unique study identification number instead. We will keep all information about you safe and secure. Once we have finished the study, we will keep some of the data so we can check the results. We will write our reports in a way that no-one can work out that you took part in the study.

What are your choices about how your information is used?

- You are free to withdraw your data from the study until it is processed and anonymised by the researcher. Your data will be processed and anonymised within 28 days of you taking part in the research study. Therefore, it is not possible to request for your data to be withdrawn 28 days after your data collection session. If you would like to withdraw your data, you can do this by telling the researcher (either by phone and/or e-mail). You will need to include your unique study identification number when requesting to withdraw your data so that the researcher can make sure to withdraw the correct data. You can withdraw at any time without giving a reason, and without your medical care or legal rights being affected.
- If you choose to withdraw from the study before the 28 days, we will not keep any information you have given to us as part of this study and your data will be destroyed confidentially in-line with Staffordshire University Policy. We need to manage your records in specific ways for the research to be reliable. This means that we won't be able to let you change the data we hold about you.

Where can you find out more about how your information is used?

You can find out more about how we use your information.

- At www.hra.nhs.uk/information-about-patients/
- The leaflet available from www.hra.nhs.uk/patientdataandresearch
- By asking one of the research team
- By sending an email to l026374l@student.staffs.ac.uk or dataprotection@staffs.ac.uk

What will happen to the results of the study?

The results of the study will be used as part of the researcher's doctoral thesis submission, and may also be published in a scientific, peer reviewed journal, presented in conferences, seminars, or workshops, or used for teaching purposes. All data will be anonymised. You will also be able to request a copy of the research project report on the consent form.

The study has been reviewed by an ethics panel at Staffordshire University, as well as an NHS ethics committee for participant involvement, and by the Health Research Authority (HRA) for legal compliance. The study is being sponsored by Staffordshire University as part of the researcher's Professional Doctorate in Clinical Psychology.

Who should I contact for further information?

If you have any questions or require more information about this study, please contact me using the following contact details:

Steven Lovatt,
Trainee Clinical Psychologist, Department of
Clinical Psychology,
School of Health, Science and Wellbeing, Staffordshire University, Leek Road
Campus,
32 Leek Road, Stoke-on-
Trent, ST4 2RU.
l026374l@student.staffs.ac.uk

What if I have further questions, or if something goes wrong?

If this study has upset you in any way, or if you wish to make a complaint about the study, you can contact the study supervisors or the Chair of the Staffordshire University Ethics Committee for further advice and information:

Prof. Nachiappan Chockalingam, Chair, University
Ethics,
Staffordshire University, Leek Road
Campus,
32 Leek Road, Stoke-on-
Trent, ST4 2RU.
n.chockalingam@staffs.ac.uk

You may also wish to contact the Patient Advice Liaison Service (PALS) associated with the North Staffordshire Combined Healthcare NHS Trust (NSCHT):

Tel: 01782 275031
Freephone: 0800 389 9676
Email: patientexperienceteam@combined.nhs.uk (emails are monitored Monday-Friday, 9am-5pm)
Text: 07718 971 123 (please note: this text service is available Monday-Friday, 9am-5pm and is charged at your provider's rate)

Thank you for reading this information sheet and for considering taking part in this research

Appendices

1. Support Services

Please also see below some alternative, external sources of support that can be accessed outside of the service that you are currently receiving treatment from.

- Your GP.

- ***The Samaritans*** offer emotional support 24 hours a day - in full confidence. Call **116 123** - it's FREE, or e-mail: jo@samaritans.org.uk

- For free, confidential support, 24/7, text **SHOUT** to **85258**. If you are struggling to cope and need to talk, trained Shout volunteers are available day or night. Shout can help with urgent issues such as:
- Abuse
- Anxiety and stress
- Depression or sadness
- Loneliness or isolation
- Panic attacks
- Self-harm
- Suicidal thoughts
- Find out more at https://giveusashout.org/get-help/

- ***Anxiety UK*** was established in 1970 and is run by and for those with anxiety, offering an extensive range of support services designed to help support those affected by anxiety disorders, anxiety and anxiety-based depression.
- Helpline services - **03444 775 774**, open from 9:30am to 17:30pm Mon to Friday, along with a text service **07537 416905** and **'Ask Anxia'** chatbot service, available 24/7 for all anxiety queries at anxietyuk.org.uk. See Helpline services for more information.
- Anxiety UK also offer fast access to a range of psychological therapy services, including counselling, Cognitive Behavioural Therapy (CBT), Compassion Focused Therapy (CFT), clinical hypnotherapy and Eye Movement Desensitisation and Reprocessing (EMDR) therapy, with appointments available in person, online and by telephone. See Therapy services for more information.

- You can call the **Rethink** advice and information line Monday to Friday, 10am to 2pm for practical advice on:
- different types of therapy and medication
- benefits, debt, money issues
- police, courts, prison
- your rights under the Mental Health Act.
- Call Rethink on **0300 5000 927** (calls are charged at your local rate).

- **Mind** offer an information line to answer questions about:
- Types of mental health problem
- Where to get help
- Drug and alternative treatments
- Advocacy. Call the Mind Infoline on **0300 123 3393** (UK landline calls are charged at local rates, and charges from mobile phones will vary considerably). Or email: info@mind.org.uk
- The Mind Legal Advice service. If you need legal advice, you can speak to Mind about:
- Mental health
- Mental capacity
- Community care
- Human rights and discrimination/equality related to mental health issues. Call the Mind Legal Advice service on **0300 466 6463** (UK landline calls are charged at local rates, and charges from mobile phones will vary considerably). Or email: legal@mind.org.uk

- **The Campaign Against Living Miserably (CALM)** is leading a movement against suicide. You can talk to CALM about anything. Call the CALM helpline on **0800 58 5858**. The helpline and webchat are both open 5pm to midnight, 365 days a year.

4. **Participant Consent Form (Clinical Sample)**

RESEARCH PROJECT CONSENT FORM

Title of Research Project: Childhood trauma and hallucinatory experiences in psychosis: the role of dissociation and cognitive inhibition.

Researcher(s): Steve Lovatt

PLEASE INITIAL BOXES

I have read and understood the information sheet (v3, 28.09.2023).	Yes ☐	No ☐
I have been given the opportunity to ask questions, and I have had any questions answered satisfactorily.	Yes ☐	No ☐
I understand that my participation in this study is entirely my choice, and I can withdraw at any time without reason, without my medical care or legal rights being affected.	Yes ☐	No ☐
I understand that information about my current medication, age, gender, and years of education will be collected by the researcher. Either this will be done virtually or face-to-face using a paper copy.	Yes ☐	No ☐
I understand that anonymised data I provide could be used in a scientific journal, or presented in conferences, seminars, or workshops, or used for teaching purposes and I understand that all data will be presented anonymously.	Yes ☐	No ☐
I understand that anonymised data collected from me during the study may be seen by individuals from Staffordshire University, the NHS Trust, and authorities that set standards about my taking part in the research.	Yes ☐	No ☐
I understand that I can withdraw my data from the research project, without reason, at any time before my data is anonymised. I can withdraw by letting the researcher (Steve Lovatt) know.	Yes ☐	No ☐
I know how to withdraw my data from this study.	Yes ☐	No ☐
I understand that my general practitioner (GP) will be informed of my participation in this study.	Yes ☐	No ☐
I would like to receive a copy of the study report once the study is completed.	Yes ☐	No ☐

I give consent to take part in this study. Yes ☐ No ☐

I understand that I have been given a copy of this consent form to keep. I understand that a copy will be stored in a locked filing cabinet at Staffordshire University, that only the researcher (Steve Lovatt) and the research director can access. Yes ☐ No ☐

Name Participant (print)	Date	Signature

Name Researcher (print)	Date	Signature

5. Participant Information Sheet (PIS) – Non-Clinical Sample

INFORMATION SHEET FOR PARTICIPANTS

Title of study

Childhood trauma and hallucinatory experiences in psychosis: the role of dissociation and cognitive inhibition.

Hello,

My name is Steve Lovatt, a researcher from Staffordshire University, and I would like to invite you to be a part of my study. I am working on my Professional Doctorate in Clinical Psychology, focusing on childhood trauma and hallucinatory experiences in relation to dissociation and cognitive inhibition. I want to explain why this research is important and what your participation will involve. Please take your time to read this information carefully and feel free to discuss it with others in your care team. If you have any questions, do not hesitate to ask.

In any research, there's an organisation responsible for overseeing the project. In this case, Staffordshire University is the sponsor, ensuring that the study is conducted properly, and the results are reported accurately.

What is the purpose of the study?

Research supports a link between childhood trauma (e.g., abuse or neglect), and hearing voices. Some researchers think that disconnecting from thoughts, feelings, and memories explains this link. The first aim is to try and find this link in this study as well.

There is evidence that difficulties with the ability to stop and/or ignore thoughts and actions make people more likely to hear voices. This study will test whether being able to disconnect from thoughts, feelings, and memories is linked with problems stopping and/or ignoring thoughts and actions, in a group of people with psychosis experiences.

Why have I been invited to take part?

You are being invited to take part in this research because you are 18 years or older and either have either received a diagnosis of a psychosis-spectrum disorder (such as schizophrenia or schizoaffective disorder), or you experience hearing voices and have not necessarily been formally diagnosed with a psychosis-spectrum disorder. You ***may*** be under the care of a local mental health service currently, but you do not need to be to participate in this research.

What will happen if I take part?

If you decide to take part, you will be asked to sign a consent form before you can start. The researcher will ask you to fill in some questionnaires and complete a task on a laptop. Information about your current

medication (if you are taking any), age, gender, and years of education will be collected by the researcher. You will complete the tasks using the Gorilla Experiment Builder website. Other questionnaires will look at experiences you have relating to your diagnosis, your experiences of hearing voices, and your ability to disconnect from thoughts, feelings, and memories. You will also be asked about any traumatic experiences in your childhood, as the research project is looking for a link between these and some of the experiences you have relating to your diagnosis of psychosis. Another task involves asking you to complete sentences, some that make sense and some that do not. Finally, the researcher will ask you to complete a simple task on a laptop where you identify shapes freely but are also asked not to give a response. You will need to arrange a convenient time to meet with the researcher using a remote platform such as Microsoft Teams so that you can complete these questionnaires and tasks. You will not need to meet with the researcher face-to-face.

The researcher will block out a 1-hour period for you to complete the questionnaires and tasks, although it should not take this long. Having a longer period means that you do not feel rushed, and time to access comfort breaks can also be scheduled if they are needed.

If you decide to take part in the research study, you will be given a unique study number by the researcher, which will be used to identify you if you decide to withdraw from the study. This unique number will be kept by the researcher, and you will be asked to keep a copy too.

Do I have to take part?

No, it is totally up to you. You should only take part if you want to and choosing not to take part will not affect your care and treatment in any way. Once you have read the information sheet, please contact the researcher, or the person you have been working with at your mental health service if you have any questions that will help you decide about taking part. If you decide to take part, we will ask you to sign a consent form before you can take part in the research study, and you will be given a copy of this consent form to keep.

What are the possible risks of taking part?

Some of the questionnaires may involve thinking about distressing or painful memories. If you become upset, the researcher will provide you with information so you can get support. You are also free to withdraw from the study if you become distressed at any point without your medical care or legal rights being affected. If you disclose that you are at risk of harm to yourself or others, or if you cause harm to yourself or someone else during the data collection session, the researcher will alert the most appropriate person to help, so that we follow safeguarding processes to make sure that you and others are safe and supported. It might also mean contacting the emergency services to get immediate support.

What are the possible benefits of taking part?

There probably will not be any direct benefits to you, but by sharing your experiences with the researcher, you will be helping to better understand the impact of childhood trauma on the experiences of individuals with psychosis-spectrum disorders. It is hoped that this will inform future practice within the NHS in supporting those individuals.

How will we use information about you?

We will need to use information from you for this research project. This information will include your name and contact details. People will use this information to do the research. People who do not need to know who you are will not be able to see your name or contact details. Your data will have a unique study identification number instead. We will keep all information about you safe and secure. Once we have finished the study, we will keep some of the data so we can check the results. We will write our reports in a way that no-one can work out that you took part in the study.

What are your choices about how your information is used?

- You are free to withdraw your data from the study until it is processed and anonymised by the researcher. Your data will be processed and anonymised within 28 days of you taking part in the research study. Therefore, it is not possible to request for your data to be withdrawn 28 days after your data collection session. If you would like to withdraw your data, you can do this by telling the researcher (either by phone and/or e-mail). You will need to include your unique study identification number when requesting to withdraw your data so that the researcher can make sure to withdraw the correct data. You can withdraw at any time without giving a reason, and without your medical care or legal rights being affected.
- If you choose to withdraw from the study before the 28 days, we will not keep any information you have given to us as part of this study and your data will be destroyed confidentially in-line with Staffordshire University Policy. We need to manage your records in specific ways for the research to be reliable. This means that we won't be able to let you change the data we hold about you.

Where can you find out more about how your information is used?

You can find out more about how we use your information.

- At www.hra.nhs.uk/information-about-patients/
- The leaflet available from www.hra.nhs.uk/patientdataandresearch
- By asking one of the research team
- By sending an email to l026374l@student.staffs.ac.uk or dataprotection@staffs.ac.uk

What will happen to the results of the study?

The results of the study will be used as part of the researcher's doctoral thesis submission, and may also be published in a scientific, peer reviewed journal, presented in conferences, seminars, or workshops, or used for teaching purposes. All data will be anonymised. You will also be able to request a copy of the research project report on the consent form.

The study has been reviewed by an ethics panel at Staffordshire University, as well as an NHS ethics committee for participant involvement, and by the Health Research Authority (HRA) for legal compliance. The study is being sponsored by Staffordshire University as part of the researcher's Professional Doctorate in Clinical Psychology.

Who should I contact for further information?

If you have any questions or require more information about this study, please contact me using the following contact details:

Steven Lovatt,
Trainee Clinical Psychologist,
Department of Clinical Psychology,
School of Health, Science and Wellbeing, Staffordshire University,
Leek Road Campus,
32 Leek Road,
Stoke-on-Trent,
ST4 2RU.
l026374l@student.staffs.ac.uk

What if I have further questions, or if something goes wrong?

If this study has upset you in any way, or if you wish to make a complaint about the study, you can contact the study supervisors or the Chair of the Staffordshire University Ethics Committee for further advice and information:

Prof. Nachiappan Chockalingam,
Chair, University Ethics,
Staffordshire University,
Leek Road Campus,
32 Leek Road,
Stoke-on-Trent,
ST4 2RU.
n.chockalingam@staffs.ac.uk

You may also wish to contact the Patient Advice Liaison Service (PALS) associated with the North Staffordshire Combined Healthcare NHS Trust (NSCHT):

Tel: 01782 275031
Freephone: 0800 389 9676
Email: patientexperienceteam@combined.nhs.uk (emails are monitored Monday-Friday, 9am-5pm)
Text: 07718 971 123 (please note: this text service is available Monday-Friday, 9am-5pm and is charged at your provider's rate)

Thank you for reading this information sheet and for considering taking part in this research.

Appendices

1. Support Services

Please also see below some alternative, external sources of support that can be accessed outside of the service that you are currently receiving treatment from.

- Your GP.

- ***The Samaritans*** offer emotional support 24 hours a day - in full confidence. Call **116 123** - it's FREE, or e-mail: jo@samaritans.org.uk

- For free, confidential support, 24/7, text **SHOUT** to **85258**. If you are struggling to cope and need to talk, trained Shout volunteers are available day or night. Shout can help with urgent issues such as:

- Abuse
- Anxiety and stress
- Depression or sadness
- Loneliness or isolation
- Panic attacks
- Self-harm
- Suicidal thoughts
- Find out more at https://giveusashout.org/get-help/

- ***Anxiety UK*** was established in 1970 and is run by and for those with anxiety, offering an extensive range of support services designed to help support those affected by anxiety disorders, anxiety and anxiety-based depression.
- Helpline services - **03444 775 774**, open from 9:30am to 17:30pm Mon to Friday, along with a text service **07537 416905** and **'Ask Anxia'** chatbot service, available 24/7 for all anxiety queries at anxietyuk.org.uk. See Helpline services for more information.
- Anxiety UK also offer fast access to a range of psychological therapy services, including counselling, Cognitive Behavioural Therapy (CBT), Compassion Focused Therapy (CFT), clinical hypnotherapy and Eye Movement Desensitisation and Reprocessing (EMDR) therapy, with appointments available in person, online and by telephone. See Therapy services for more information.

- You can call the **Rethink** advice and information line Monday to Friday, 10am to 2pm for practical advice on:
- different types of therapy and medication
- benefits, debt, money issues
- police, courts, prison
- your rights under the Mental Health Act.
- Call Rethink on **0300 5000 927** (calls are charged at your local rate).

- **Mind** offer an information line to answer questions about:
- Types of mental health problem
- Where to get help
- Drug and alternative treatments
- Advocacy. Call the Mind Infoline on **0300 123 3393** (UK landline calls are charged at local rates, and charges from mobile phones will vary considerably). Or email: info@mind.org.uk
- The Mind Legal Advice service. If you need legal advice, you can speak to Mind about:
- Mental health
- Mental capacity
- Community care
- Human rights and discrimination/equality related to mental health issues. Call the Mind Legal Advice service on **0300 466 6463** (UK landline calls are charged at local rates, and charges from mobile phones will vary considerably). Or email: legal@mind.org.uk

- **The Campaign Against Living Miserably (CALM)** is leading a movement against suicide. You can talk to CALM about anything. Call the CALM helpline on **0800 58 58 58**. The helpline and webchat are both open 5pm to midnight, 365 days a year.

6. Participant Debrief Form

Research Participant Debrief Form for:

Childhood Trauma and hallucinatory experiences in psychosis: The role of dissociation and cognitive inhibition.

Thank you for taking the time to take part in this research project.

Research Aims

The research project had two aims.

1. To find the link between childhood trauma and hearing voices reported in individuals with a psychosis-spectrum disorder and investigate whether any link is facilitated by the ability to disconnect from thoughts, feelings, and emotions.

2. To extend this work to look at the influence of the ability to disconnect (described above) on problems with stopping and/or ignoring thoughts and actions.

More Information

If you would like to find out more about this research, place contact,

Steven Lovatt,
Trainee Clinical Psychologist,
Department of Clinical Psychology,
School of Health, Science and Wellbeing, Staffordshire University,
Leek Road Campus,
32 Leek Road,
Stoke-on-Trent,
ST4 2RU.
l026374l@student.staffs.ac.uk

Withdrawing information

You are free to withdraw your data from the study within 28 days without reason by letting the researcher know (i.e., via telephone and/or e-mail). If you choose to withdraw from the study within 28 days, we will not retain any information that you have provided us as a part of this study. You can withdraw at any time without reason, without my medical care or legal rights being affected.

Further support

If you have any questions about the research project or feel you need to speak with someone for support, please contact a member of your clinical team, your psychologist, or your GP.

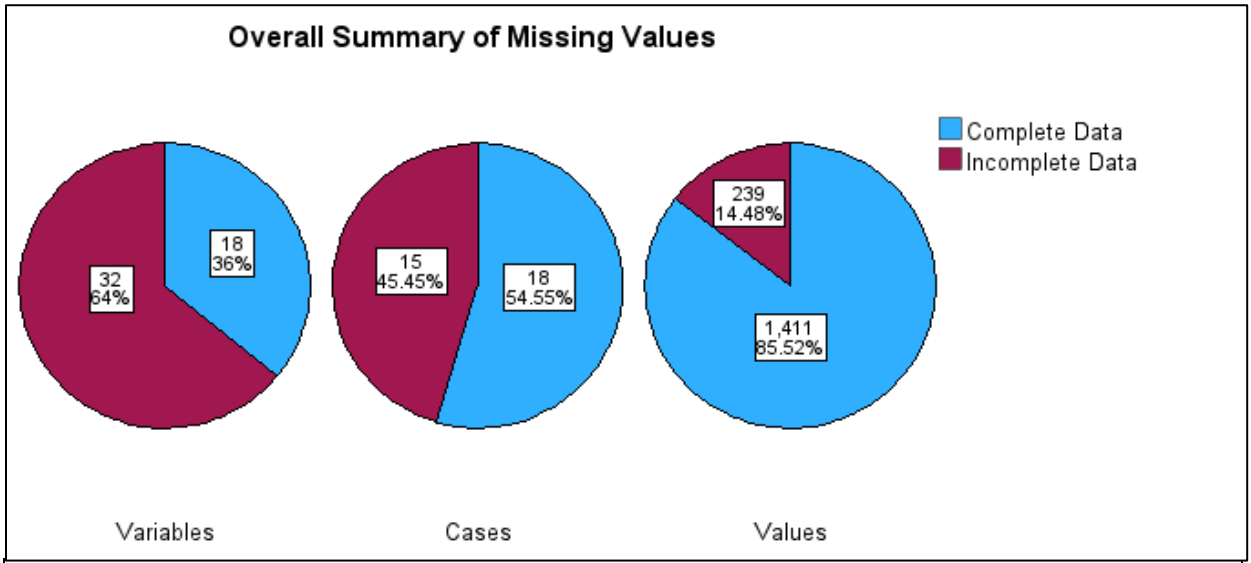
Complaints

If you feel this study has upset you in any way or if you wish to make a complaint about the study, you can contact the study supervisor or the Chair of the Staffordshire University Ethics Committee for further advice and information:

Prof. Nachiappan Chockalingam,
Chair, University Ethics,
Staffordshire University,
Leek Road Campus,
32 Leek Road,
Stoke-on-Trent,
ST4 2RU.
n.chockalingam@staffs.ac.uk

Thank you once again for your participation in this research project.

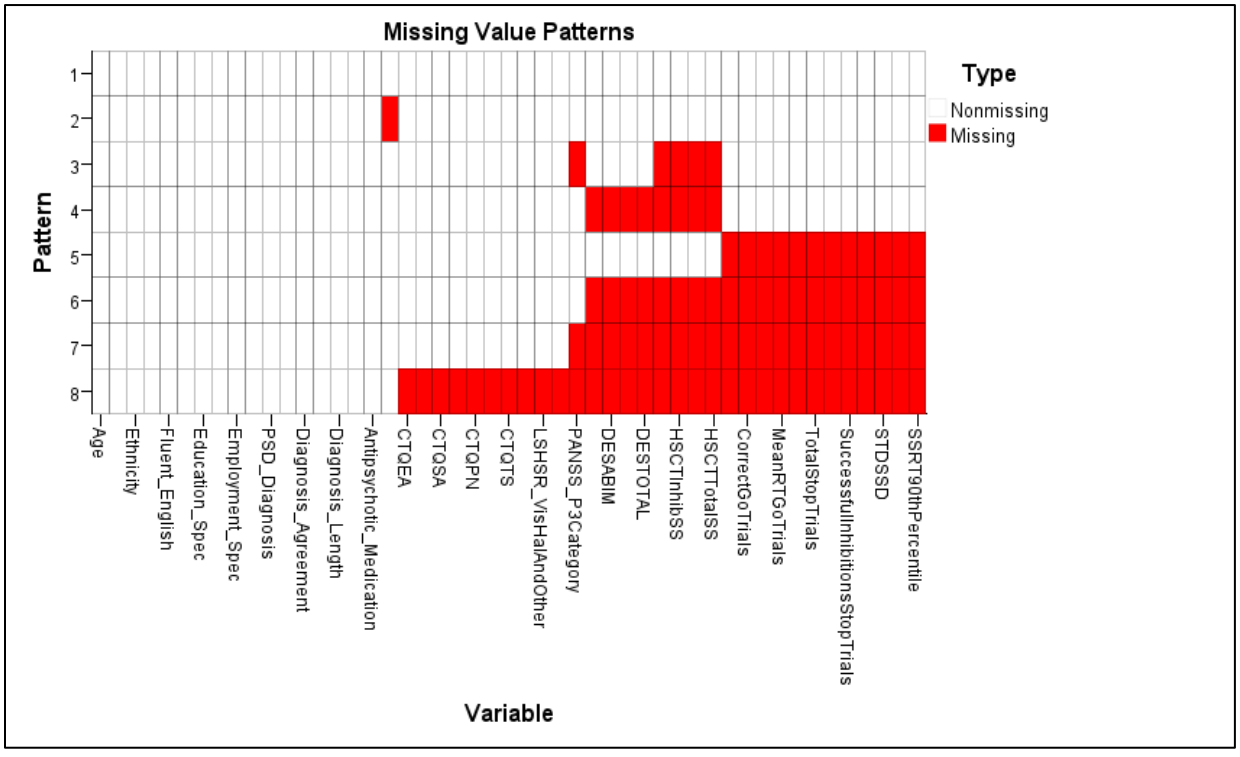
7. Overall Summary of Missing Values – SPSS Output

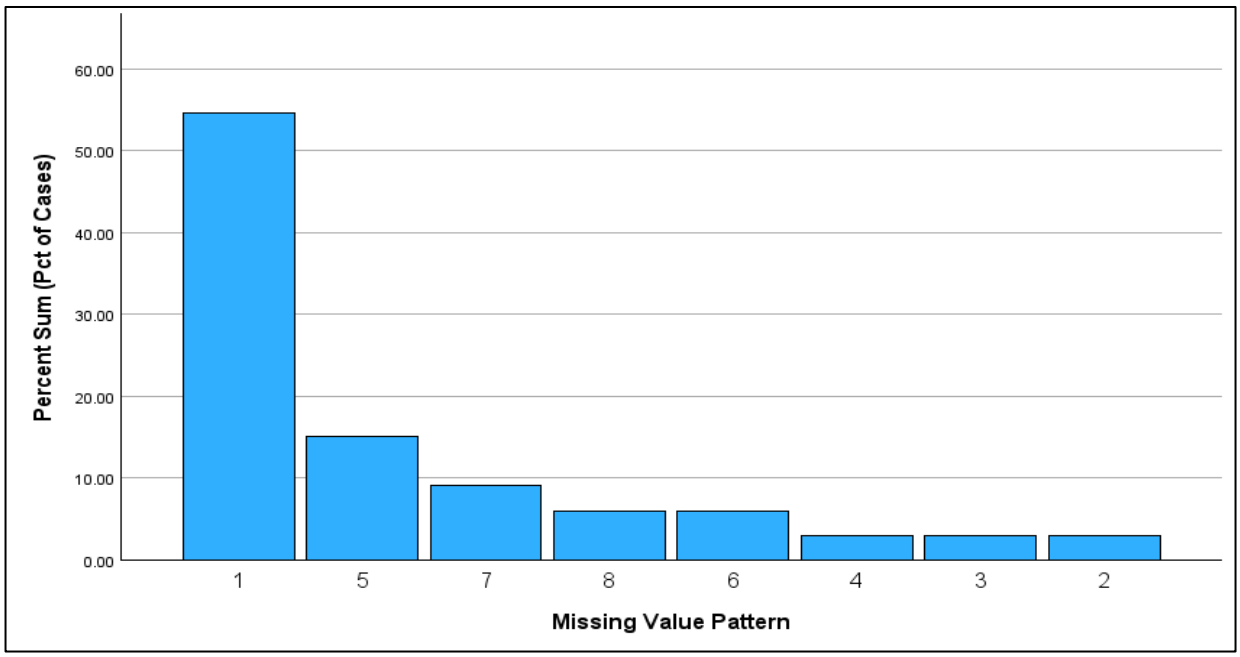


Variable Summary[a,b]

	Missing		Valid N	Mean	Std. Deviation
	N	Percent			
SST - Stop Signal Reaction Time at 90th percentile	12	36.4%	21	1972.9640	17.75331
SST - Reaction time at 90th Percetile for Go Trials	12	36.4%	21	1974.4606	17.74763
SST - Standard Deviation for Stop Signal Delay	12	36.4%	21	.5025	.00024
SST - Mean Stop Signal Delay	12	36.4%	21	1.4966	.00834
SST - Number of successful inhibitions on Stop Trials	12	36.4%	21	74.10	8.780
SST - Failed inhibitions on Stop Trials	12	36.4%	21		
SST - Total number of Stop Trials	12	36.4%	21	96.19	.512
SST - Standard Deviation of Reaction Time for Go Trials	12	36.4%	21	859.8327	644.41201
SST - Mean Reaction Time for Go Trials	12	36.4%	21	1414.6165	264.77749
SST - Number of incorrect Go Trials	12	36.4%	21		
SST - Number of correct Go Trials	12	36.4%	21	84.95	12.812
SST - Total Go Trials Score	12	36.4%	21	96.05	.669

HSCT - Total Scaled Score	9	27.3%	24	2.63	1.469
HSCT - Errors Scaled Score	9	27.3%	24	4.63	2.464
HSCT - Inhibition Scaled Score	9	27.3%	24	3.83	1.857
HSCT - Initiation Scaled Score	9	27.3%	24	2.50	.978
DES - Total Score	8	24.2%	25	39.5440	20.09407
DES - Depersonalisation/Derealisation Subscale	8	24.2%	25	43.2640	25.31524
DES - Absorption/Imagination Subscale	8	24.2%	25	50.5960	23.21550
DES - Amnesia Subscale	8	24.2%	25	23.9280	20.57502
PANSS - P3 Category Score	6	18.2%	27		
a. Maximum number of variables shown: 50					
b. Minimum percentage of missing values for variable to be included: 10.0%					




Percent Sum (Pct of Cases)
60.00
50.00
40.00
30.00
20.00
10.00
0.00
1
5
7
8
6
4
3
2
Missing Value Pattern

8. Little's Test of MCAR - SPSS Output

Univariate Statistics							
			Std.	Missing		No. of Extremes[a]	
	N	Mean	Deviation	Count	Percent	Low	High
Age	33	37.18	9.799	0	.0	0	3
Gender	33	1.79	.545	0	.0	0	0
Ethnicity	33	3.88	5.290	0	.0	0	7
Fluent_English	33	2.76	.663	0	.0	.	.
Education	33	2.97	1.630	0	.0	0	0
Employment_Status	33	2.94	3.082	0	.0	0	5
Voice_Hearing_Length	33	6.39	3.307	0	.0	0	0
PSD_Diagnosis	33	1.27	.452	0	.0	0	0
Specific_PSD_Diagnosis	33	4.06	1.903	0	.0	0	0
Diagnosis_Agreement	33	1.30	.467	0	.0	0	0
Diagnosis_Length	33	5.97	3.087	0	.0	0	0
Current_Medication	33	1.12	.331	0	.0	.	.
Antipsychotic_Medication	33	1.48	.834	0	.0	0	1
CTQEA	31	18.3226	4.77065	2	6.1	3	0
CTQPA	31	12.0645	6.16407	2	6.1	0	0
CTQSA	31	12.4194	7.25155	2	6.1	0	0
CTQEN	31	17.0323	4.08643	2	6.1	0	0
CTQPN	31	11.9032	3.62726	2	6.1	0	0
CTQMD	31	.0323	.17961	2	6.1	.	.
CTQTS	31	73.1935	11.19649	2	6.1	0	0
DESAM	25	23.9280	20.57502	8	24.2	0	0
DESABIM	25	50.5960	23.21550	8	24.2	0	0
DESDEPDER	25	43.2640	25.31524	8	24.2	0	0
DESTOTAL	25	39.5440	20.09407	8	24.2	0	0
LSHSR_AudHal	31	11.5484	3.44324	2	6.1	0	0
LSHSR_VisHalAndOther	31	10.6129	2.80092	2	6.1	0	0
LSHSRTotalScore	31	22.1613	5.75672	2	6.1	0	0
TotalGoTrials	21	96.05	.669	12	36.4	.	.
CorrectGoTrials	21	84.95	12.812	12	36.4	1	0
IncorrectGoTrials	21	11.10	12.864	12	36.4	0	1
MeanRTGoTrials	21	1414.6165	264.77749	12	36.4	0	0
STDRTGoTrials	21	859.8327	644.41201	12	36.4	2	2
TotalStopTrials	21	96.19	.512	12	36.4	.	.
FailedInhibitionsStopTrials	21	22.10	8.797	12	36.4	1	1

SuccessfulInhibitionsStopTrials	21	74.10	8.780	12	36.4	0	1
MeanSSD	21	1.4966	.00834	12	36.4	.	.
STDSSD	21	.5025	.00024	12	36.4	.	.
@90thPercentileRT	21	1974.4606	17.74763	12	36.4	1	0
SSRT90thPercentile	21	1972.9640	17.75331	12	36.4	1	0
HSCTInitSS	24	2.50	.978	9	27.3	0	0
HSCTInhibSS	24	3.83	1.857	9	27.3	0	0
HSCTErrorSS	24	4.63	2.464	9	27.3	0	0
HSCTTotalSS	24	2.63	1.469	9	27.3	0	0
PANSS_P3Category	27	5.00	.877	6	18.2	0	0

a. Number of cases outside the range (Q1 - 1.5*IQR, Q3 + 1.5*IQR).

EM Means[a]							
Age	Gender	Ethnicity	Fluent_English	Education	Employment_Status	Voice_Hearing_Length	PSD_Diagnosis
37.18	1.79	3.88	2.76	2.97	2.94	6.39	1.27

EM Means[a]							
Specific_PSD_Diagnosis	Diagnosis_Agreement	Diagnosis_Length	Current_Medication	Antipsychotic_Medication	CTQEA	CTQPA	CTQSA
4.06	1.30	5.97	1.12	1.48	18.5698	12.4637	12.5294

EM Means[a]							
CTQEN	CTQPN	CTQMD	CTQTS	DESAM	DESABIM	DESDEPDER	DESTOTAL
16.9901	11.8030	.0349	73.8240	32.0042	65.8315	56.2395	51.1365

EM Means[a]							
LSHSR_AudHal	LSHSR_VisHalAndOther	LSHSRTotalScore	TotalGoTrials	CorrectGoTrials	IncorrectGoTrials	MeanRTGoTrials	STDRTGoTrials
11.6887	10.6195	22.3081	95.90	84.47	11.43	1413.3756	1092.8640

EM Means[a]							
TotalStopTrials	FailedInhibitionsStopTrials	SuccessfullnhibitionsStopTrials	MeanSSD	STDSSD	@90thPercentileRT	SSRT90thPercentile	HSCTInitSS
96.33	23.76	72.56	1.4953	.5025	1977.3465	1975.8512	3.27

EM Means[a]			
HSCTInhibSS	HSCTErrorSS	HSCTTotalSS	PANSS_P3Category
5.40	2.91	2.97	5.00

a. Little's MCAR test: Chi-Square = 48.642, DF = 167, Sig. = 1.000

9. Normality Checks Summary Table from SPSS Output

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Demographics - Age	.142	349	<.001	.923	349	<.001
Demographics - Length of time experienced hearing voices	.332	349	<.001	.731	349	<.001
Demographics - How long have you had this diagnosis?	.264	349	<.001	.848	349	<.001
CTQ - Emotional Abuse Subscale	.185	349	<.001	.896	349	<.001
CTQ - Physical Abuse Subscale	.181	349	<.001	.902	349	<.001
CTQ - Sexual Abuse Subscale	.200	349	<.001	.846	349	<.001
CTQ - Emotional Neglect Subscale	.176	349	<.001	.958	349	<.001
CTQ - Physical Neglect Subscale	.133	349	<.001	.950	349	<.001
CTQ - Minimisation/Denial Subscale	.541	349	<.001	.184	349	<.001
CTQ - Total Score	.092	349	<.001	.958	349	<.001
DES - Amnesia Subscale	.123	349	<.001	.922	349	<.001
DES - Absorption/Imagination Subscale	.126	349	<.001	.939	349	<.001
DES - Depersonalisation/Derealisation Subscale	.111	349	<.001	.972	349	<.001
DES - Total Score	.100	349	<.001	.969	349	<.001
LSHS-R - Auditory Hallucinations Subscale	.092	349	<.001	.974	349	<.001
LSHS-R - Visual Hallucinations and other Perceptual Abnormalities Subscale	.120	349	<.001	.967	349	<.001
LSHS-R - Total Score	.088	349	<.001	.973	349	<.001

SST - Total Go Trials Score	.349	349	<.001	.750	349	<.001
SST - Number of correct Go Trials	.167	349	<.001	.811	349	<.001
SST - Number of incorrect Go Trials	.261	349	<.001	.767	349	<.001
SST - Mean Reaction Time for Go Trials	.189	349	<.001	.871	349	<.001
SST - Standard Deviation of Reaction Time for Go Trials	.389	349	<.001	.549	349	<.001
SST - Total number of Stop Trials	.476	349	<.001	.523	349	<.001
SST - Failed inhibitions on Stop Trials	.164	349	<.001	.908	349	<.001
SST - Number of successful inhibitions on Stop Trials	.163	349	<.001	.910	349	<.001
SST - Mean Stop Signal Delay	.428	349	<.001	.595	349	<.001
SST - Standard Deviation for Stop Signal Delay	.332	349	<.001	.648	349	<.001
SST - Reaction time at 90th Percetile for Go Trials	.246	349	<.001	.807	349	<.001
SST - Stop Signal Reaction Time at 90th percentile	.252	349	<.001	.798	349	<.001
HSCT - Initiation Scaled Score	.322	349	<.001	.813	349	<.001
HSCT - Inhibition Scaled Score	.179	349	<.001	.879	349	<.001
HSCT - Errors Scaled Score	.197	349	<.001	.914	349	<.001
HSCT - Total Scaled Score	.170	349	<.001	.896	349	<.001
PANSS - P3 Category Score	.208	349	<.001	.844	349	<.001

a. Lilliefors Significance Correction

10. Mediation Analyses – SPSS Output

ANOVA[a]

Imputation Number	Model		Sum of Squares	df	Mean Square	F	Sig.
Original data	1	Regression	7.067	1	7.067	.208	.652[b]
		Residual	987.126	29	34.039		
		Total	994.194	30			
1	1	Regression	5.230	1	5.230	.144	.707[b]
		Residual	1124.951	31	36.289		
		Total	1130.182	32			
2	1	Regression	4.647	1	4.647	.145	.706[b]
		Residual	994.869	31	32.093		
		Total	999.515	32			
3	1	Regression	6.861	1	6.861	.179	.675[b]
		Residual	1188.654	31	38.344		
		Total	1195.515	32			
4	1	Regression	14.129	1	14.129	.400	.532[b]
		Residual	1096.052	31	35.357		
		Total	1110.182	32			
5	1	Regression	3.551	1	3.551	.107	.745[b]
		Residual	1026.328	31	33.107		
		Total	1029.879	32			
6	1	Regression	19.288	1	19.288	.553	.463[b]
		Residual	1080.348	31	34.850		
		Total	1099.636	32			
7	1	Regression	8.619	1	8.619	.266	.609[b]
		Residual	1003.381	31	32.367		
		Total	1012.000	32			
8	1	Regression	2.662	1	2.662	.066	.799[b]
		Residual	1254.853	31	40.479		
		Total	1257.515	32			
9	1	Regression	8.555	1	8.555	.264	.611[b]
		Residual	1006.172	31	32.457		
		Total	1014.727	32			
10	1	Regression	15.398	1	15.398	.425	.519[b]
		Residual	1121.935	31	36.191		
		Total	1137.333	32			

a. Dependent Variable: LSHS-R - Total Score

b. Predictors: (Constant), CTQ - Total Score

Coefficients[a]

Imputation Number	Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	Fraction Missing Info.	Relative Increase Variance	Relative Efficiency
Original data	1	(Constant)	18.988	7.042		2.697	.012			
		CTQ - Total Score	.043	.095	.084	.456	.652			
1	1	(Constant)	19.833	7.222		2.746	.010			
		CTQ - Total Score	.037	.097	.068	.380	.707			
2	1	(Constant)	19.601	6.697		2.927	.006			
		CTQ - Total Score	.034	.090	.068	.381	.706			
3	1	(Constant)	19.773	7.208		2.743	.010			
		CTQ - Total Score	.041	.097	.076	.423	.675			
4	1	(Constant)	18.006	7.112		2.532	.017			
		CTQ - Total Score	.060	.096	.113	.632	.532			
5	1	(Constant)	20.213	6.733		3.002	.005			
		CTQ - Total Score	.030	.092	.059	.328	.745			
6	1	(Constant)	17.254	6.945		2.484	.019			
		CTQ - Total Score	.070	.094	.132	.744	.463			
7	1	(Constant)	18.572	6.717		2.765	.010			
		CTQ - Total Score	.047	.091	.092	.516	.609			
8	1	(Constant)	20.994	7.434		2.824	.008			
		CTQ - Total Score	.026	.101	.046	.256	.799			
9	1	(Constant)	18.624	6.824		2.729	.010			
		CTQ - Total Score	.048	.093	.092	.513	.611			
10	1	(Constant)	18.089	7.096		2.549	.016			

		CTQ - Total Score	.062	.096	.116	.652	.519			
Pooled	1	(Constant)	19.096	7.109		2.686	.007	.030	.030	.997
		CTQ - Total Score	.046	.096		.475	.635	.026	.027	.997

a. Dependent Variable: LSHS-R - Total Score

ANOVA[a]

Imputation Number	Model		Sum of Squares	df	Mean Square	F	Sig.
Original data	1	Regression	972.893	1	972.893	2.567	.123[b]
		Residual	8717.628	23	379.027		
		Total	9690.522	24			
1	1	Regression	905.156	1	905.156	3.159	.085[b]
		Residual	8883.201	31	286.555		
		Total	9788.357	32			
2	1	Regression	756.620	1	756.620	2.580	.118[b]
		Residual	9089.672	31	293.215		
		Total	9846.291	32			
3	1	Regression	733.890	1	733.890	2.496	.124[b]
		Residual	9116.483	31	294.080		
		Total	9850.373	32			
4	1	Regression	1070.345	1	1070.345	3.775	.061[b]
		Residual	8790.532	31	283.566		
		Total	9860.877	32			
5	1	Regression	642.207	1	642.207	2.130	.155[b]
		Residual	9348.367	31	301.560		
		Total	9990.574	32			
6	1	Regression	773.708	1	773.708	2.637	.115[b]
		Residual	9096.192	31	293.426		
		Total	9869.900	32			
7	1	Regression	639.775	1	639.775	2.133	.154[b]
		Residual	9298.265	31	299.944		
		Total	9938.041	32			
8	1	Regression	881.218	1	881.218	3.049	.091[b]
		Residual	8958.182	31	288.974		
		Total	9839.400	32			
9	1	Regression	755.862	1	755.862	2.521	.122[b]

		Residual	9292.930	31	299.772		
		Total	10048.792	32			
10	1	Regression	589.159	1	589.159	1.948	.173[b]
		Residual	9375.692	31	302.442		
		Total	9964.851	32			

a. Dependent Variable: DES - Total Score

b. Predictors: (Constant), CTQ - Total Score

Coefficients[a]

Imputation Number	Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	Fraction Missing Info.	Relative Increase Variance	Relative Efficiency
Original data	1	(Constant)	.273	24.819		.011	.991			
		CTQ - Total Score	.543	.339	.317	1.602	.123			
1	1	(Constant)	3.416	20.294		.168	.867			
		CTQ - Total Score	.486	.274	.304	1.777	.085			
2	1	(Constant)	7.148	20.242		.353	.726			
		CTQ - Total Score	.439	.273	.277	1.606	.118			
3	1	(Constant)	8.236	19.961		.413	.683			
		CTQ - Total Score	.426	.269	.273	1.580	.124			
4	1	(Constant)	1.061	20.142		.053	.958			
		CTQ - Total Score	.526	.271	.329	1.943	.061			
5	1	(Constant)	10.828	20.321		.533	.598			
		CTQ - Total Score	.404	.277	.254	1.459	.155			
6	1	(Constant)	6.778	20.151		.336	.739			
		CTQ - Total Score	.443	.273	.280	1.624	.115			
7	1	(Constant)	9.354	20.447		.457	.651			
		CTQ - Total Score	.406	.278	.254	1.460	.154			
8	1	(Constant)	5.627	19.863		.283	.779			

		CTQ - Total Score	.470	.269	.299	1.746	.091			
9	1	(Constant)	6.311	20.739		.304	.763			
		CTQ - Total Score	.447	.281	.274	1.588	.122			
10	1	(Constant)	10.528	20.513		.513	.611			
		CTQ - Total Score	.386	.277	.243	1.396	.173			
Pooled	1	(Constant)	6.929	20.522		.338	.736	.025	.025	.998
		CTQ - Total Score	.443	.278		1.596	.111	.025	.026	.997

a. Dependent Variable: DES - Total Score

ANOVA[a]

Imputation Number	Model		Sum of Squares	df	Mean Square	F	Sig.
Original data	1	Regression	76.373	2	38.187	1.381	.272[b]
		Residual	608.187	22	27.645		
		Total	684.560	24			
1	1	Regression	68.929	2	34.464	.974	.389[b]
		Residual	1061.253	30	35.375		
		Total	1130.182	32			
2	1	Regression	63.113	2	31.556	1.011	.376[b]
		Residual	936.402	30	31.213		
		Total	999.515	32			
3	1	Regression	83.886	2	41.943	1.132	.336[b]
		Residual	1111.629	30	37.054		
		Total	1195.515	32			
4	1	Regression	78.452	2	39.226	1.141	.333[b]
		Residual	1031.730	30	34.391		
		Total	1110.182	32			
5	1	Regression	47.991	2	23.995	.733	.489[b]
		Residual	981.888	30	32.730		
		Total	1029.879	32			
6	1	Regression	92.428	2	46.214	1.376	.268[b]
		Residual	1007.208	30	33.574		
		Total	1099.636	32			
7	1	Regression	98.389	2	49.195	1.615	.216[b]

		Residual	913.611	30	30.454		
		Total	1012.000	32			
8	1	Regression	42.326	2	21.163	.522	.598[b]
		Residual	1215.190	30	40.506		
		Total	1257.515	32			
9	1	Regression	55.714	2	27.857	.871	.429[b]
		Residual	959.013	30	31.967		
		Total	1014.727	32			
10	1	Regression	102.619	2	51.309	1.488	.242[b]
		Residual	1034.715	30	34.490		
		Total	1137.333	32			

a. Dependent Variable: LSHS-R - Total Score

b. Predictors: (Constant), DES - Total Score, CTQ - Total Score

Coefficients[a]

Imputation Number	Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	Fraction Missing Info.	Relative Increase Variance	Relative Efficiency
Original data	1	(Constant)	18.700	6.703		2.790	.011			
		CTQ - Total Score	.016	.097	.035	.167	.869			
		DES - Total Score	.085	.056	.321	1.516	.144			
1	1	(Constant)	19.544	7.134		2.740	.010			
		CTQ - Total Score	-.004	.101	-.008	-.042	.967			
		DES - Total Score	.085	.063	.249	1.342	.190			
2	1	(Constant)	19.028	6.618		2.875	.007			
		CTQ - Total Score	-.001	.093	-.002	-.009	.993			
		DES - Total Score	.080	.059	.252	1.369	.181			
3	1	(Constant)	19.016	7.105		2.677	.012			
		CTQ - Total Score	.002	.099	.004	.020	.984			
		DES - Total Score	.092	.064	.264	1.442	.160			

4	1	(Constant)	17.916	7.015		2.554	.016			
		CTQ - Total Score	.015	.100	.029	.155	.878			
		DES - Total Score	.086	.063	.255	1.368	.182			
5	1	(Constant)	19.467	6.725		2.895	.007			
		CTQ - Total Score	.002	.094	.004	.023	.982			
		DES - Total Score	.069	.059	.215	1.165	.253			
6	1	(Constant)	16.646	6.829		2.438	.021			
		CTQ - Total Score	.030	.096	.057	.314	.755			
		DES - Total Score	.090	.061	.269	1.476	.150			
7	1	(Constant)	17.653	6.537		2.700	.011			
		CTQ - Total Score	.007	.092	.014	.079	.938			
		DES - Total Score	.098	.057	.308	1.717	.096			
8	1	(Constant)	20.619	7.446		2.769	.010			
		CTQ - Total Score	-.005	.106	-.010	-.052	.959			
		DES - Total Score	.067	.067	.186	.990	.330			
9	1	(Constant)	18.175	6.783		2.680	.012			
		CTQ - Total Score	.016	.095	.030	.164	.871			
		DES - Total Score	.071	.059	.224	1.215	.234			
10	1	(Constant)	17.073	6.957		2.454	.020			
		CTQ - Total Score	.025	.096	.047	.261	.796			
		DES - Total Score	.096	.061	.285	1.590	.122			
Pooled	1	(Constant)	18.514	7.039		2.630	.009	.034	.035	.997
		CTQ - Total Score	.009	.098		.089	.929	.018	.018	.998

DES - Total Score	.083	.062		1.336	.182	.037	.038	.996

a. Dependent Variable: LSHS-R - Total Score

Input:			Test statistic:	Std. Error:	*p*-value:
a	0.443	Sobel test:	1.02500946	0.03587186	0.30535872
b	0.083	Aroian test:	0.9238937	0.03979787	0.35554166
s_a	0.278	Goodman test:	1.16876617	0.03145967	0.24249785
s_b	0.062	Reset all	Calculate		

ANOVA[a]

Imputation Number	Model		Sum of Squares	df	Mean Square	F	Sig.
Original data	1	Regression	100.834	1	100.834	3.273	.081[b]
		Residual	893.359	29	30.805		
		Total	994.194	30			
1	1	Regression	79.733	1	79.733	2.353	.135[b]
		Residual	1050.449	31	33.885		
		Total	1130.182	32			
2	1	Regression	83.817	1	83.817	2.838	.102[b]
		Residual	915.698	31	29.539		
		Total	999.515	32			
3	1	Regression	200.556	1	200.556	6.249	.018[b]
		Residual	994.959	31	32.095		
		Total	1195.515	32			
4	1	Regression	146.742	1	146.742	4.722	.038[b]
		Residual	963.440	31	31.079		
		Total	1110.182	32			
5	1	Regression	84.263	1	84.263	2.762	.107[b]
		Residual	945.616	31	30.504		
		Total	1029.879	32			
6	1	Regression	151.946	1	151.946	4.970	.033[b]
		Residual	947.690	31	30.571		
		Total	1099.636	32			
7	1	Regression	97.118	1	97.118	3.291	.079[b]
		Residual	914.882	31	29.512		
		Total	1012.000	32			
8	1	Regression	37.556	1	37.556	.954	.336[b]
		Residual	1219.959	31	39.354		

		Total	1257.515	32			
9	1	Regression	107.686	1	107.686	3.680	.064[b]
		Residual	907.042	31	29.259		
		Total	1014.727	32			
10	1	Regression	95.925	1	95.925	2.855	.101[b]
		Residual	1041.408	31	33.594		
		Total	1137.333	32			

a. Dependent Variable: LSHS-R - Total Score

b. Predictors: (Constant), CTQ - Emotional Abuse Subscale

Coefficients[a]

Imputation Number	Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	Fraction Missing Info.	Relative Increase Variance	Relative Efficiency
Original data	1	(Constant)	15.120	4.018		3.763	<.001			
		CTQ - Emotional Abuse Subscale	.384	.212	.318	1.809	.081			
1	1	(Constant)	16.381	4.145		3.952	<.001			
		CTQ - Emotional Abuse Subscale	.335	.218	.266	1.534	.135			
2	1	(Constant)	15.850	3.841		4.126	<.001			
		CTQ - Emotional Abuse Subscale	.339	.201	.290	1.684	.102			
3	1	(Constant)	13.209	3.957		3.338	.002			
		CTQ - Emotional Abuse Subscale	.512	.205	.410	2.500	.018			
4	1	(Constant)	14.101	3.965		3.556	.001			
		CTQ - Emotional Abuse Subscale	.453	.208	.364	2.173	.038			
5	1	(Constant)	16.267	3.809		4.270	<.001			
		CTQ - Emotional Abuse Subscale	.339	.204	.286	1.662	.107			

6	1	(Constant)	14.239	3.769		3.778	<.001			
		CTQ - Emotional Abuse Subscale	.445	.199	.372	2.229	.033			
7	1	(Constant)	15.118	3.910		3.867	<.001			
		CTQ - Emotional Abuse Subscale	.374	.206	.310	1.814	.079			
8	1	(Constant)	18.799	4.317		4.355	<.001			
		CTQ - Emotional Abuse Subscale	.226	.231	.173	.977	.336			
9	1	(Constant)	14.845	3.893		3.814	<.001			
		CTQ - Emotional Abuse Subscale	.395	.206	.326	1.918	.064			
10	1	(Constant)	15.846	4.160		3.809	<.001			
		CTQ - Emotional Abuse Subscale	.373	.221	.290	1.690	.101			
Pooled	1	(Constant)	15.466	4.303		3.595	<.001	.148	.169	.985
		CTQ - Emotional Abuse Subscale	.379	.226		1.677	.094	.138	.155	.986

a. Dependent Variable: LSHS-R - Total Score

ANOVA[a]

Imputation Number	Model		Sum of Squares	df	Mean Square	F	Sig.
Original data	1	Regression	1867.376	1	1867.376	5.490	.028[b]
		Residual	7823.146	23	340.137		
		Total	9690.522	24			
1	1	Regression	1498.337	1	1498.337	5.603	.024[b]
		Residual	8290.019	31	267.420		
		Total	9788.357	32			
2	1	Regression	1175.171	1	1175.171	4.201	.049[b]
		Residual	8671.120	31	279.714		
		Total	9846.291	32			
3	1	Regression	984.056	1	984.056	3.441	.073[b]
		Residual	8866.317	31	286.010		

		Total	9850.373	32			
4	1	Regression	1579.485	1	1579.485	5.913	.021[b]
		Residual	8281.392	31	267.142		
		Total	9860.877	32			
5	1	Regression	1095.261	1	1095.261	3.817	.060[b]
		Residual	8895.313	31	286.946		
		Total	9990.574	32			
6	1	Regression	1592.279	1	1592.279	5.963	.021[b]
		Residual	8277.621	31	267.020		
		Total	9869.900	32			
7	1	Regression	1149.050	1	1149.050	4.053	.053[b]
		Residual	8788.991	31	283.516		
		Total	9938.041	32			
8	1	Regression	1465.252	1	1465.252	5.424	.027[b]
		Residual	8374.148	31	270.134		
		Total	9839.400	32			
9	1	Regression	1144.995	1	1144.995	3.986	.055[b]
		Residual	8903.796	31	287.219		
		Total	10048.792	32			
10	1	Regression	1377.334	1	1377.334	4.972	.033[b]
		Residual	8587.517	31	277.017		
		Total	9964.851	32			

a. Dependent Variable: DES - Total Score

b. Predictors: (Constant), CTQ - Emotional Abuse Subscale

Coefficients[a]

Imputation Number	Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	Fraction Missing Info.	Relative Increase Variance	Relative Efficiency
Original data	1	(Constant)	5.252	15.093		.348	.731			
		CTQ - Emotional Abuse Subscale	1.884	.804	.439	2.343	.028			
1	1	(Constant)	12.378	11.643		1.063	.296			
		CTQ - Emotional Abuse Subscale	1.453	.614	.391	2.367	.024			

2	1	(Constant)	15.828	11.820		1.339	.190			
		CTQ - Emotional Abuse Subscale	1.270	.620	.345	2.050	.049			
3	1	(Constant)	18.196	11.812		1.540	.134			
		CTQ - Emotional Abuse Subscale	1.133	.611	.316	1.855	.073			
4	1	(Constant)	12.369	11.625		1.064	.296			
		CTQ - Emotional Abuse Subscale	1.485	.611	.400	2.432	.021			
5	1	(Constant)	18.065	11.684		1.546	.132			
		CTQ - Emotional Abuse Subscale	1.221	.625	.331	1.954	.060			
6	1	(Constant)	12.839	11.140		1.153	.258			
		CTQ - Emotional Abuse Subscale	1.439	.589	.402	2.442	.021			
7	1	(Constant)	15.218	12.118		1.256	.219			
		CTQ - Emotional Abuse Subscale	1.285	.638	.340	2.013	.053			
8	1	(Constant)	14.441	11.310		1.277	.211			
		CTQ - Emotional Abuse Subscale	1.411	.606	.386	2.329	.027			
9	1	(Constant)	15.267	12.196		1.252	.220			
		CTQ - Emotional Abuse Subscale	1.287	.644	.338	1.997	.055			
10	1	(Constant)	13.001	11.947		1.088	.285			
		CTQ - Emotional Abuse Subscale	1.414	.634	.372	2.230	.033			
Pooled	1	(Constant)	14.760	11.954		1.235	.217	.037	.038	.996

	CTQ - Emotional Abuse Subscale	1.340	.631		2.122	.034	.038	.039	.996

a. Dependent Variable: DES - Total Score

ANOVA[a]

Imputation Number	Model		Sum of Squares	df	Mean Square	F	Sig.
Original data	1	Regression	123.262	2	61.631	2.416	.113[b]
		Residual	561.298	22	25.514		
		Total	684.560	24			
1	1	Regression	106.995	2	53.497	1.569	.225[b]
		Residual	1023.187	30	34.106		
		Total	1130.182	32			
2	1	Regression	109.777	2	54.888	1.851	.175[b]
		Residual	889.739	30	29.658		
		Total	999.515	32			
3	1	Regression	224.910	2	112.455	3.476	.044[b]
		Residual	970.606	30	32.354		
		Total	1195.515	32			
4	1	Regression	165.439	2	82.720	2.627	.089[b]
		Residual	944.743	30	31.491		
		Total	1110.182	32			
5	1	Regression	101.231	2	50.616	1.635	.212[b]
		Residual	928.647	30	30.955		
		Total	1029.879	32			
6	1	Regression	175.970	2	87.985	2.858	.073[b]
		Residual	923.666	30	30.789		
		Total	1099.636	32			
7	1	Regression	145.757	2	72.878	2.524	.097[b]
		Residual	866.243	30	28.875		
		Total	1012.000	32			
8	1	Regression	57.623	2	28.811	.720	.495[b]
		Residual	1199.892	30	39.996		
		Total	1257.515	32			
9	1	Regression	124.880	2	62.440	2.105	.139[b]
		Residual	889.847	30	29.662		
		Total	1014.727	32			
10	1	Regression	143.037	2	71.518	2.158	.133[b]

Residual	994.297	30	33.143		
Total	1137.333	32			

a. Dependent Variable: LSHS-R - Total Score

b. Predictors: (Constant), DES - Total Score, CTQ - Emotional Abuse Subscale

Coefficients[a]

Imputation Number	Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	Fraction Missing Info.	Relative Increase Variance	Relative Efficiency
Original data	1	(Constant)	15.005	4.145		3.620	.002			
		CTQ - Emotional Abuse Subscale	.335	.245	.294	1.367	.186			
		DES - Total Score	.054	.057	.203	.947	.354			
1	1	(Constant)	15.671	4.233		3.702	<.001			
		CTQ - Emotional Abuse Subscale	.252	.238	.200	1.057	.299			
		DES - Total Score	.057	.064	.169	.894	.378			
2	1	(Constant)	14.984	3.959		3.785	<.001			
		CTQ - Emotional Abuse Subscale	.270	.215	.230	1.254	.219			
		DES - Total Score	.055	.058	.172	.936	.357			
3	1	(Constant)	12.255	4.122		2.973	.006			
		CTQ - Emotional Abuse Subscale	.452	.217	.362	2.088	.045			
		DES - Total Score	.052	.060	.150	.868	.392			
4	1	(Constant)	13.513	4.063		3.326	.002			
		CTQ - Emotional Abuse Subscale	.382	.229	.307	1.670	.105			

		DES - Total Score	.048	.062	.142	.771	.447			
5	1	(Constant)	15.478	3.983		3.886	<.001			
		CTQ - Emotional Abuse Subscale	.285	.218	.241	1.312	.200			
		DES - Total Score	.044	.059	.136	.740	.465			
6	1	(Constant)	13.547	3.863		3.507	.001			
		CTQ - Emotional Abuse Subscale	.367	.219	.307	1.680	.103			
		DES - Total Score	.054	.061	.161	.883	.384			
7	1	(Constant)	13.986	3.965		3.528	.001			
		CTQ - Emotional Abuse Subscale	.278	.217	.231	1.283	.209			
		DES - Total Score	.074	.057	.233	1.298	.204			
8	1	(Constant)	18.092	4.465		4.052	<.001			
		CTQ - Emotional Abuse Subscale	.157	.253	.120	.621	.540			
		DES - Total Score	.049	.069	.137	.708	.484			
9	1	(Constant)	14.174	4.017		3.528	.001			
		CTQ - Emotional Abuse Subscale	.338	.220	.279	1.537	.135			
		DES - Total Score	.044	.058	.138	.761	.452			
10	1	(Constant)	14.883	4.211		3.535	.001			
		CTQ - Emotional Abuse Subscale	.268	.236	.209	1.136	.265			
		DES - Total Score	.074	.062	.219	1.192	.243			
Pooled	1	(Constant)	14.658	4.417		3.319	<.001	.146	.165	.986

	CTQ - Emotional Abuse Subscale	.305	.242		1.259	.209	.130	.146	.987
	DES - Total Score	.055	.062		.885	.376	.035	.036	.997

a. Dependent Variable: LSHS-R - Total Score

Input:			Test statistic:	Std. Error:	*p*-value:
a	1.340	Sobel test:	0.81854924	0.09003734	0.41304364
b	0.055	Aroian test:	0.7507422	0.09816952	0.45280782
s_a	0.631	Goodman test:	0.90882492	0.08109373	0.36344255
s_b	0.062	Reset all	Calculate		

ANOVA[a]

Imputation Number	Model		Sum of Squares	df	Mean Square	F	Sig.
Original data	1	Regression	26.768	1	26.768	.802	.378[b]
		Residual	967.425	29	33.359		
		Total	994.194	30			
1	1	Regression	77.199	1	77.199	2.273	.142[b]
		Residual	1052.983	31	33.967		
		Total	1130.182	32			
2	1	Regression	19.098	1	19.098	.604	.443[b]
		Residual	980.417	31	31.626		
		Total	999.515	32			
3	1	Regression	1.783	1	1.783	.046	.831[b]
		Residual	1193.732	31	38.507		
		Total	1195.515	32			
4	1	Regression	50.772	1	50.772	1.486	.232[b]
		Residual	1059.410	31	34.175		
		Total	1110.182	32			
5	1	Regression	21.983	1	21.983	.676	.417[b]
		Residual	1007.895	31	32.513		
		Total	1029.879	32			
6	1	Regression	70.521	1	70.521	2.124	.155[b]
		Residual	1029.115	31	33.197		
		Total	1099.636	32			
7	1	Regression	13.855	1	13.855	.430	.517[b]

		Residual	998.145	31	32.198		
		Total	1012.000	32			
8	1	Regression	3.217	1	3.217	.080	.780[b]
		Residual	1254.298	31	40.461		
		Total	1257.515	32			
9	1	Regression	30.487	1	30.487	.960	.335[b]
		Residual	984.240	31	31.750		
		Total	1014.727	32			
10	1	Regression	11.633	1	11.633	.320	.575[b]
		Residual	1125.700	31	36.313		
		Total	1137.333	32			

a. Dependent Variable: LSHS-R - Total Score

b. Predictors: (Constant), CTQ - Physical Abuse Subscale

Coefficients[a]

Imputation Number	Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	Fraction Missing Info.	Relative Increase Variance	Relative Efficiency
Original data	1	(Constant)	20.312	2.310		8.793	<.001			
		CTQ - Physical Abuse Subscale	.153	.171	.164	.896	.378			
1	1	(Constant)	19.582	2.212		8.853	<.001			
		CTQ - Physical Abuse Subscale	.241	.160	.261	1.508	.142			
2	1	(Constant)	20.623	2.162		9.539	<.001			
		CTQ - Physical Abuse Subscale	.124	.160	.138	.777	.443			
3	1	(Constant)	22.342	2.336		9.563	<.001			
		CTQ - Physical Abuse Subscale	.038	.178	.039	.215	.831			
4	1	(Constant)	19.954	2.290		8.712	<.001			
		CTQ - Physical Abuse Subscale	.198	.163	.214	1.219	.232			
5	1	(Constant)	20.735	2.249		9.221	<.001			
		CTQ - Physical Abuse Subscale	.138	.168	.146	.822	.417			
6	1	(Constant)	19.536	2.184		8.945	<.001			

		CTQ - Physical Abuse Subscale	.232	.159	.253	1.457	.155			
7	1	(Constant)	20.702	2.211		9.363	<.001			
		CTQ - Physical Abuse Subscale	.105	.160	.117	.656	.517			
8	1	(Constant)	22.269	2.430		9.166	<.001			
		CTQ - Physical Abuse Subscale	.052	.184	.051	.282	.780			
9	1	(Constant)	20.120	2.238		8.992	<.001			
		CTQ - Physical Abuse Subscale	.162	.165	.173	.980	.335			
10	1	(Constant)	21.483	2.340		9.179	<.001			
		CTQ - Physical Abuse Subscale	.099	.176	.101	.566	.575			
Pooled	1	(Constant)	20.735	2.504		8.281	<.001	.186	.220	.982
		CTQ - Physical Abuse Subscale	.139	.183		.761	.447	.165	.191	.984

a. Dependent Variable: LSHS-R - Total Score

ANOVA[a]

Imputation Number	Model		Sum of Squares	df	Mean Square	F	Sig.
Original data	1	Regression	669.515	1	669.515	1.707	.204[b]
		Residual	9021.006	23	392.218		
		Total	9690.522	24			
1	1	Regression	330.104	1	330.104	1.082	.306[b]
		Residual	9458.253	31	305.105		
		Total	9788.357	32			
2	1	Regression	413.310	1	413.310	1.358	.253[b]
		Residual	9432.982	31	304.290		
		Total	9846.291	32			
3	1	Regression	379.223	1	379.223	1.241	.274[b]
		Residual	9471.150	31	305.521		
		Total	9850.373	32			
4	1	Regression	569.395	1	569.395	1.900	.178[b]
		Residual	9291.482	31	299.725		
		Total	9860.877	32			
5	1	Regression	395.691	1	395.691	1.278	.267[b]
		Residual	9594.883	31	309.512		

		Total	9990.574	32			
6	1	Regression	495.307	1	495.307	1.638	.210[b]
		Residual	9374.593	31	302.406		
		Total	9869.900	32			
7	1	Regression	338.018	1	338.018	1.092	.304[b]
		Residual	9600.023	31	309.678		
		Total	9938.041	32			
8	1	Regression	571.142	1	571.142	1.910	.177[b]
		Residual	9268.259	31	298.976		
		Total	9839.400	32			
9	1	Regression	296.067	1	296.067	.941	.340[b]
		Residual	9752.725	31	314.604		
		Total	10048.792	32			
10	1	Regression	566.263	1	566.263	1.868	.182[b]
		Residual	9398.589	31	303.180		
		Total	9964.851	32			

a. Dependent Variable: DES - Total Score

b. Predictors: (Constant), CTQ - Physical Abuse Subscale

Coefficients[a]

Imputation Number	Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	Fraction Missing Info.	Relative Increase Variance	Relative Efficiency
Original data	1	(Constant)	29.440	8.689		3.388	.003			
		CTQ - Physical Abuse Subscale	.880	.674	.263	1.307	.204			
1	1	(Constant)	32.974	6.629		4.974	<.001			
		CTQ - Physical Abuse Subscale	.498	.479	.184	1.040	.306			
2	1	(Constant)	32.340	6.706		4.822	<.001			
		CTQ - Physical Abuse Subscale	.578	.496	.205	1.165	.253			
3	1	(Constant)	32.913	6.581		5.001	<.001			
		CTQ - Physical Abuse Subscale	.557	.500	.196	1.114	.274			
4	1	(Constant)	31.400	6.783		4.629	<.001			

		CTQ - Physical Abuse Subscale	.664	.482	.240	1.378	.178			
5	1	(Constant)	33.114	6.938		4.773	<.001			
		CTQ - Physical Abuse Subscale	.587	.519	.199	1.131	.267			
6	1	(Constant)	31.647	6.592		4.801	<.001			
		CTQ - Physical Abuse Subscale	.615	.481	.224	1.280	.210			
7	1	(Constant)	32.480	6.857		4.737	<.001			
		CTQ - Physical Abuse Subscale	.518	.496	.184	1.045	.304			
8	1	(Constant)	31.802	6.604		4.815	<.001			
		CTQ - Physical Abuse Subscale	.691	.500	.241	1.382	.177			
9	1	(Constant)	32.753	7.043		4.650	<.001			
		CTQ - Physical Abuse Subscale	.504	.520	.172	.970	.340			
10	1	(Constant)	30.584	6.762		4.523	<.001			
		CTQ - Physical Abuse Subscale	.694	.508	.238	1.367	.182			
Pooled	1	(Constant)	32.201	6.806		4.731	<.001	.016	.016	.998
		CTQ - Physical Abuse Subscale	.591	.504		1.172	.241	.024	.024	.998

a. Dependent Variable: DES - Total Score

ANOVA[a]

Imputation Number	Model		Sum of Squares	df	Mean Square	F	Sig.
Original data	1	Regression	78.578	2	39.289	1.426	.262[b]
		Residual	605.982	22	27.545		
		Total	684.560	24			
1	1	Regression	123.449	2	61.725	1.839	.176[b]
		Residual	1006.733	30	33.558		
		Total	1130.182	32			
2	1	Regression	70.962	2	35.481	1.146	.331[b]
		Residual	928.553	30	30.952		
		Total	999.515	32			
3	1	Regression	84.092	2	42.046	1.135	.335[b]
		Residual	1111.423	30	37.047		

		Total	1195.515	32			
4	1	Regression	104.249	2	52.125	1.555	.228[b]
		Residual	1005.932	30	33.531		
		Total	1110.182	32			
5	1	Regression	59.383	2	29.691	.918	.410[b]
		Residual	970.496	30	32.350		
		Total	1029.879	32			
6	1	Regression	130.671	2	65.336	2.023	.150[b]
		Residual	968.965	30	32.299		
		Total	1099.636	32			
7	1	Regression	101.915	2	50.958	1.680	.203[b]
		Residual	910.085	30	30.336		
		Total	1012.000	32			
8	1	Regression	42.273	2	21.137	.522	.599[b]
		Residual	1215.242	30	40.508		
		Total	1257.515	32			
9	1	Regression	73.464	2	36.732	1.171	.324[b]
		Residual	941.263	30	31.375		
		Total	1014.727	32			
10	1	Regression	101.372	2	50.686	1.468	.247[b]
		Residual	1035.961	30	34.532		
		Total	1137.333	32			

a. Dependent Variable: LSHS-R - Total Score

b. Predictors: (Constant), DES - Total Score, CTQ - Physical Abuse Subscale

Coefficients[a]

Imputation Number	Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	Fraction Missing Info.	Relative Increase Variance	Relative Efficiency
Original data	1	(Constant)	19.238	2.819		6.824	<.001			
		CTQ - Physical Abuse Subscale	.061	.185	.068	.329	.745			
		DES - Total Score	.084	.055	.314	1.512	.145			
1	1	(Constant)	17.277	2.948		5.860	<.001			
		CTQ - Physical Abuse Subscale	.206	.162	.224	1.275	.212			

		DES - Total Score	.070	.060	.206	1.174	.250			
2	1	(Constant)	18.225	2.830		6.441	<.001			
		CTQ - Physical Abuse Subscale	.081	.162	.091	.504	.618			
		DES - Total Score	.074	.057	.233	1.294	.205			
3	1	(Constant)	19.274	3.080		6.257	<.001			
		CTQ - Physical Abuse Subscale	-.014	.178	-.014	-.077	.939			
		DES - Total Score	.093	.063	.268	1.491	.147			
4	1	(Constant)	17.571	2.950		5.955	<.001			
		CTQ - Physical Abuse Subscale	.148	.166	.160	.891	.380			
		DES - Total Score	.076	.060	.226	1.263	.216			
5	1	(Constant)	18.667	2.954		6.319	<.001			
		CTQ - Physical Abuse Subscale	.102	.171	.107	.594	.557			
		DES - Total Score	.062	.058	.194	1.075	.291			
6	1	(Constant)	17.001	2.844		5.977	<.001			
		CTQ - Physical Abuse Subscale	.183	.161	.199	1.134	.266			
		DES - Total Score	.080	.059	.240	1.365	.183			
7	1	(Constant)	17.592	2.818		6.243	<.001			
		CTQ - Physical Abuse Subscale	.055	.158	.062	.350	.729			
		DES - Total Score	.096	.056	.300	1.704	.099			
8	1	(Constant)	20.205	3.214		6.286	<.001			
		CTQ - Physical Abuse Subscale	.007	.190	.007	.037	.971			
		DES - Total Score	.065	.066	.182	.982	.334			
9	1	(Constant)	17.946	2.898		6.192	<.001			

		CTQ - Physical Abuse Subscale	.128	.167	.137	.770	.447			
		DES - Total Score	.066	.057	.209	1.170	.251			
10	1	(Constant)	18.494	2.940		6.290	<.001			
		CTQ - Physical Abuse Subscale	.032	.176	.032	.179	.859			
		DES - Total Score	.098	.061	.289	1.612	.117			
Pooled	1	(Constant)	18.225	3.123		5.836	<.001	.110	.121	.989
		CTQ - Physical Abuse Subscale	.093	.186		.499	.618	.179	.210	.982
		DES - Total Score	.078	.061		1.274	.203	.052	.054	.995

a. Dependent Variable: LSHS-R - Total Score

Input:			Test statistic:	Std. Error:	*p*-value:
a	0.591	Sobel test:	0.86423671	0.05333955	0.38745787
b	0.078	Aroian test:	0.74876443	0.06156542	0.4539992
s_a	0.504	Goodman test:	1.05758447	0.04358801	0.29024493
s_b	0.061	Reset all	Calculate		

ANOVA[a]

Imputation Number	Model		Sum of Squares	df	Mean Square	F	Sig.
Original data	1	Regression	16.006	1	16.006	.475	.496[b]
		Residual	978.188	29	33.731		
		Total	994.194	30			
1	1	Regression	6.010	1	6.010	.166	.687[b]
		Residual	1124.172	31	36.264		
		Total	1130.182	32			
2	1	Regression	19.159	1	19.159	.606	.442[b]
		Residual	980.356	31	31.624		
		Total	999.515	32			
3	1	Regression	9.501	1	9.501	.248	.622[b]
		Residual	1186.014	31	38.259		
		Total	1195.515	32			
4	1	Regression	31.502	1	31.502	.905	.349[b]
		Residual	1078.679	31	34.796		

		Total	1110.182	32			
5	1	Regression	26.161	1	26.161	.808	.376[b]
		Residual	1003.718	31	32.378		
		Total	1029.879	32			
6	1	Regression	2.457	1	2.457	.069	.794[b]
		Residual	1097.180	31	35.393		
		Total	1099.636	32			
7	1	Regression	19.687	1	19.687	.615	.439[b]
		Residual	992.313	31	32.010		
		Total	1012.000	32			
8	1	Regression	44.794	1	44.794	1.145	.293[b]
		Residual	1212.721	31	39.120		
		Total	1257.515	32			
9	1	Regression	16.831	1	16.831	.523	.475[b]
		Residual	997.897	31	32.190		
		Total	1014.727	32			
10	1	Regression	11.741	1	11.741	.323	.574[b]
		Residual	1125.593	31	36.309		
		Total	1137.333	32			

a. Dependent Variable: LSHS-R - Total Score

b. Predictors: (Constant), CTQ - Sexual Abuse Subscale

Coefficients[a]

Imputation Number	Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	Fraction Missing Info.	Relative Increase Variance	Relative Efficiency
Original data	1	(Constant)	20.910	2.094		9.984	<.001			
		CTQ – Sexual Abuse Subscale	.101	.146	.127	.689	.496			
1	1	(Constant)	21.792	2.126		10.249	<.001			
		CTQ – Sexual Abuse Subscale	.061	.149	.073	.407	.687			
2	1	(Constant)	20.793	1.968		10.568	<.001			
		CTQ – Sexual Abuse Subscale	.106	.137	.138	.778	.442			
3	1	(Constant)	21.853	2.163		10.102	<.001			

		CTQ – Sexual Abuse Subscale	.076	.152	.089	.498	.622			
4	1	(Constant)	20.689	2.121		9.755	<.001			
		CTQ – Sexual Abuse Subscale	.139	.146	.168	.951	.349			
5	1	(Constant)	20.795	2.036		10.212	<.001			
		CTQ – Sexual Abuse Subscale	.124	.138	.159	.899	.376			
6	1	(Constant)	21.889	2.077		10.539	<.001			
		CTQ – Sexual Abuse Subscale	.038	.144	.047	.263	.794			
7	1	(Constant)	20.667	1.965		10.520	<.001			
		CTQ – Sexual Abuse Subscale	.110	.140	.139	.784	.439			
8	1	(Constant)	20.782	2.242		9.271	<.001			
		CTQ – Sexual Abuse Subscale	.165	.154	.189	1.070	.293			
9	1	(Constant)	20.844	1.987		10.490	<.001			
		CTQ – Sexual Abuse Subscale	.102	.142	.129	.723	.475			
10	1	(Constant)	21.644	2.082		10.394	<.001			
		CTQ – Sexual Abuse Subscale	.082	.143	.102	.569	.574			
Pooled	1	(Constant)	21.175	2.154		9.830	<.001	.070	.074	.993
		CTQ – Sexual Abuse Subscale	.100	.150		.669	.504	.070	.075	.993

a. Dependent Variable: LSHS-R – Total Score

ANOVA[a]

Imputation Number	Model		Sum of Squares	df	Mean Square	F	Sig.
Original data	1	Regression	772.135	1	772.135	1.991	.172[b]
		Residual	8918.386	23	387.756		
		Total	9690.522	24			
1	1	Regression	737.160	1	737.160	2.525	.122[b]
		Residual	9051.197	31	291.974		
		Total	9788.357	32			
2	1	Regression	511.108	1	511.108	1.697	.202[b]
		Residual	9335.184	31	301.135		

		Total	9846.291	32			
3	1	Regression	652.413	1	652.413	2.199	.148[b]
		Residual	9197.961	31	296.708		
		Total	9850.373	32			
4	1	Regression	765.747	1	765.747	2.610	.116[b]
		Residual	9095.130	31	293.391		
		Total	9860.877	32			
5	1	Regression	497.300	1	497.300	1.624	.212[b]
		Residual	9493.274	31	306.235		
		Total	9990.574	32			
6	1	Regression	623.970	1	623.970	2.092	.158[b]
		Residual	9245.930	31	298.256		
		Total	9869.900	32			
7	1	Regression	552.660	1	552.660	1.825	.186[b]
		Residual	9385.381	31	302.754		
		Total	9938.041	32			
8	1	Regression	551.493	1	551.493	1.841	.185[b]
		Residual	9287.908	31	299.610		
		Total	9839.400	32			
9	1	Regression	689.848	1	689.848	2.285	.141[b]
		Residual	9358.943	31	301.901		
		Total	10048.792	32			
10	1	Regression	602.615	1	602.615	1.995	.168[b]
		Residual	9362.236	31	302.008		
		Total	9964.851	32			

a. Dependent Variable: DES - Total Score

b. Predictors: (Constant), CTQ - Sexual Abuse Subscale

Coefficients[a]

Imputation Number	Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	Fraction Missing Info.	Relative Increase Variance	Relative Efficiency
Original data	1	(Constant)	29.691	8.017		3.704	.001			
		CTQ – Sexual Abuse Subscale	.758	.537	.282	1.411	.172			
1	1	(Constant)	30.761	6.033		5.099	<.001			

		CTQ – Sexual Abuse Subscale	.673	.424	.274	1.589	.122			
2	1	(Constant)	32.448	6.071		5.344	<.001			
		CTQ – Sexual Abuse Subscale	.550	.422	.228	1.303	.202			
3	1	(Constant)	31.667	6.024		5.257	<.001			
		CTQ – Sexual Abuse Subscale	.628	.424	.257	1.483	.148			
4	1	(Constant)	31.070	6.158		5.045	<.001			
		CTQ – Sexual Abuse Subscale	.687	.425	.279	1.616	.116			
5	1	(Constant)	33.181	6.262		5.299	<.001			
		CTQ – Sexual Abuse Subscale	.540	.424	.223	1.274	.212			
6	1	(Constant)	31.581	6.029		5.238	<.001			
		CTQ – Sexual Abuse Subscale	.604	.418	.251	1.446	.158			
7	1	(Constant)	31.827	6.042		5.268	<.001			
		CTQ – Sexual Abuse Subscale	.583	.431	.236	1.351	.186			
8	1	(Constant)	32.570	6.203		5.250	<.001			
		CTQ – Sexual Abuse Subscale	.578	.426	.237	1.357	.185			
9	1	(Constant)	30.913	6.085		5.080	<.001			
		CTQ – Sexual Abuse Subscale	.655	.433	.262	1.512	.141			
10	1	(Constant)	31.517	6.005		5.248	<.001			
		CTQ – Sexual Abuse Subscale	.584	.414	.246	1.413	.168			
Pooled	1	(Constant)	31.753	6.146		5.166	<.001	.018	.018	.998
		CTQ – Sexual Abuse Subscale	.608	.427		1.423	.155	.016	.016	.998

a. Dependent Variable: DES – Total Score

ANOVA[a]

Imputation Number	Model		Sum of Squares	df	Mean Square	F	Sig.
Original data	1	Regression	80.645	2	40.323	1.469	.252[b]
		Residual	603.915	22	27.451		
		Total	684.560	24			

1	1	Regression	68.900	2	34.450	.974	.389[b]
		Residual	1061.282	30	35.376		
		Total	1130.182	32			
2	1	Regression	70.062	2	35.031	1.131	.336[b]
		Residual	929.454	30	30.982		
		Total	999.515	32			
3	1	Regression	84.434	2	42.217	1.140	.333[b]
		Residual	1111.081	30	37.036		
		Total	1195.515	32			
4	1	Regression	88.439	2	44.219	1.298	.288[b]
		Residual	1021.743	30	34.058		
		Total	1110.182	32			
5	1	Regression	61.382	2	30.691	.951	.398[b]
		Residual	968.497	30	32.283		
		Total	1029.879	32			
6	1	Regression	89.803	2	44.901	1.334	.279[b]
		Residual	1009.833	30	33.661		
		Total	1099.636	32			
7	1	Regression	102.869	2	51.435	1.697	.200[b]
		Residual	909.131	30	30.304		
		Total	1012.000	32			
8	1	Regression	70.365	2	35.183	.889	.422[b]
		Residual	1187.150	30	39.572		
		Total	1257.515	32			
9	1	Regression	59.870	2	29.935	.941	.402[b]
		Residual	954.858	30	31.829		
		Total	1014.727	32			
10	1	Regression	101.250	2	50.625	1.466	.247[b]
		Residual	1036.083	30	34.536		
		Total	1137.333	32			

a. Dependent Variable: LSHS-R - Total Score

b. Predictors: (Constant), DES - Total Score, CTQ - Sexual Abuse Subscale

Coefficients[a]

Imputation Number	Model	Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	Fraction Missing Info.	Relative Increase Variance	Relative Efficiency

Original data	1	(Constant)	20.312	2.695		7.537	<.001			
		CTQ - Sexual Abuse Subscale	-.064	.149	-.089	-.429	.672			
		DES - Total Score	.095	.055	.358	1.713	.101			
1	1	(Constant)	19.228	2.848		6.753	<.001			
		CTQ - Sexual Abuse Subscale	.005	.153	.006	.030	.976			
		DES - Total Score	.083	.063	.245	1.333	.192			
2	1	(Constant)	18.397	2.699		6.815	<.001			
		CTQ - Sexual Abuse Subscale	.066	.139	.086	.474	.639			
		DES - Total Score	.074	.058	.232	1.282	.210			
3	1	(Constant)	18.995	2.927		6.489	<.001			
		CTQ - Sexual Abuse Subscale	.019	.155	.022	.123	.903			
		DES - Total Score	.090	.063	.259	1.422	.165			
4	1	(Constant)	18.231	2.831		6.439	<.001			
		CTQ - Sexual Abuse Subscale	.085	.151	.103	.563	.577			
		DES - Total Score	.079	.061	.236	1.293	.206			
5	1	(Constant)	18.774	2.807		6.689	<.001			
		CTQ - Sexual Abuse Subscale	.091	.141	.117	.644	.524			
		DES - Total Score	.061	.058	.190	1.045	.305			
6	1	(Constant)	18.820	2.781		6.767	<.001			
		CTQ - Sexual Abuse Subscale	-.021	.145	-.026	-.144	.887			
		DES - Total Score	.097	.060	.291	1.611	.118			
7	1	(Constant)	17.671	2.631		6.715	<.001			
		CTQ - Sexual Abuse Subscale	.055	.140	.070	.393	.697			

		DES - Total Score	.094	.057	.295	1.657	.108			
8	1	(Constant)	19.073	3.099		6.155	<.001			
		CTQ - Sexual Abuse Subscale	.134	.159	.154	.843	.406			
		DES - Total Score	.052	.065	.147	.804	.428			
9	1	(Constant)	18.748	2.675		7.010	<.001			
		CTQ - Sexual Abuse Subscale	.058	.146	.073	.397	.694			
		DES - Total Score	.068	.058	.213	1.163	.254			
10	1	(Constant)	18.562	2.791		6.651	<.001			
		CTQ - Sexual Abuse Subscale	.024	.144	.030	.169	.867			
		DES - Total Score	.098	.061	.289	1.610	.118			
Pooled	1	(Constant)	18.650	2.853		6.538	<.001	.029	.029	.997
		CTQ - Sexual Abuse Subscale	.052	.155		.333	.739	.098	.107	.990
		DES - Total Score	.080	.063		1.270	.204	.070	.075	.993

a. Dependent Variable: LSHS-R - Total Score

Input:			Test statistic:	Std. Error:	*p*-value:
a	0.608	Sobel test:	0.94771394	0.0513235	0.3432751
b	0.080	Aroian test:	0.83939884	0.05794623	0.40124553
s_a	0.427	Goodman test:	1.1128255	0.04370856	0.26578338
s_b	0.063	Reset all	Calculate		

ANOVA[a]

Imputation Number	Model		Sum of Squares	df	Mean Square	F	Sig.
Original data	1	Regression	111.968	1	111.968	3.681	.065[b]
		Residual	882.225	29	30.422		
		Total	994.194	30			
1	1	Regression	111.832	1	111.832	3.404	.075[b]
		Residual	1018.350	31	32.850		
		Total	1130.182	32			

2	1	Regression	98.469	1	98.469	3.388	.075[b]
		Residual	901.046	31	29.066		
		Total	999.515	32			
3	1	Regression	40.725	1	40.725	1.093	.304[b]
		Residual	1154.790	31	37.251		
		Total	1195.515	32			
4	1	Regression	94.097	1	94.097	2.871	.100[b]
		Residual	1016.085	31	32.777		
		Total	1110.182	32			
5	1	Regression	100.916	1	100.916	3.368	.076[b]
		Residual	928.963	31	29.967		
		Total	1029.879	32			
6	1	Regression	104.726	1	104.726	3.263	.081[b]
		Residual	994.910	31	32.094		
		Total	1099.636	32			
7	1	Regression	126.947	1	126.947	4.446	.043[b]
		Residual	885.053	31	28.550		
		Total	1012.000	32			
8	1	Regression	220.415	1	220.415	6.588	.015[b]
		Residual	1037.100	31	33.455		
		Total	1257.515	32			
9	1	Regression	100.926	1	100.926	3.424	.074[b]
		Residual	913.801	31	29.477		
		Total	1014.727	32			
10	1	Regression	125.200	1	125.200	3.835	.059[b]
		Residual	1012.133	31	32.649		
		Total	1137.333	32			

a. Dependent Variable: LSHS-R - Total Score

b. Predictors: (Constant), CTQ - Emotional Neglect Subscale

Coefficients[a]

Imputation Number	Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	Fraction Missing Info.	Relative Increase Variance	Relative Efficiency
	1	(Constant)	14.109	4.313		3.272	.003			

Original data		CTQ - Emotional Neglect Subscale	.473	.246	.336	1.918	.065			
1	1	(Constant)	14.492	4.477		3.237	.003			
		CTQ - Emotional Neglect Subscale	.472	.256	.315	1.845	.075			
2	1	(Constant)	14.675	4.153		3.534	.001			
		CTQ - Emotional Neglect Subscale	.432	.235	.314	1.841	.075			
3	1	(Constant)	18.186	4.528		4.017	<.001			
		CTQ - Emotional Neglect Subscale	.275	.263	.185	1.046	.304			
4	1	(Constant)	15.229	4.379		3.478	.002			
		CTQ - Emotional Neglect Subscale	.428	.253	.291	1.694	.100			
5	1	(Constant)	15.314	3.974		3.853	<.001			
		CTQ - Emotional Neglect Subscale	.419	.229	.313	1.835	.076			
6	1	(Constant)	14.579	4.421		3.297	.002			
		CTQ - Emotional Neglect Subscale	.456	.252	.309	1.806	.081			
7	1	(Constant)	14.292	3.772		3.789	<.001			
		CTQ - Emotional Neglect Subscale	.460	.218	.354	2.109	.043			

8	1	(Constant)	11.879	4.402		2.699	.011			
		CTQ - Emotional Neglect Subscale	.635	.247	.419	2.567	.015			
9	1	(Constant)	14.549	4.184		3.477	.002			
		CTQ - Emotional Neglect Subscale	.444	.240	.315	1.850	.074			
10	1	(Constant)	14.179	4.447		3.189	.003			
		CTQ - Emotional Neglect Subscale	.497	.254	.332	1.958	.059			
Pooled	1	(Constant)	14.738	4.574		3.222	.001	.127	.142	.987
		CTQ - Emotional Neglect Subscale	.452	.262		1.726	.085	.127	.141	.987

a. Dependent Variable: LSHS-R - Total Score

ANOVA[a]

Imputation Number	Model		Sum of Squares	df	Mean Square	F	Sig.
Original data	1	Regression	1870.959	1	1870.959	5.503	.028[b]
		Residual	7819.562	23	339.981		
		Total	9690.522	24			
1	1	Regression	1455.208	1	1455.208	5.413	.027[b]
		Residual	8333.149	31	268.811		
		Total	9788.357	32			
2	1	Regression	1121.490	1	1121.490	3.985	.055[b]
		Residual	8724.801	31	281.445		
		Total	9846.291	32			
3	1	Regression	1102.018	1	1102.018	3.905	.057[b]
		Residual	8748.355	31	282.205		
		Total	9850.373	32			
4	1	Regression	1326.297	1	1326.297	4.817	.036[b]
		Residual	8534.580	31	275.309		
		Total	9860.877	32			

5	1	Regression	942.626	1	942.626	3.230	.082[b]
		Residual	9047.948	31	291.869		
		Total	9990.574	32			
6	1	Regression	1855.265	1	1855.265	7.176	.012[b]
		Residual	8014.635	31	258.537		
		Total	9869.900	32			
7	1	Regression	1271.746	1	1271.746	4.549	.041[b]
		Residual	8666.295	31	279.558		
		Total	9938.041	32			
8	1	Regression	1062.030	1	1062.030	3.751	.062[b]
		Residual	8777.371	31	283.141		
		Total	9839.400	32			
9	1	Regression	1179.816	1	1179.816	4.124	.051[b]
		Residual	8868.976	31	286.096		
		Total	10048.792	32			
10	1	Regression	1611.689	1	1611.689	5.981	.020[b]
		Residual	8353.162	31	269.457		
		Total	9964.851	32			

a. Dependent Variable: DES - Total Score

b. Predictors: (Constant), CTQ - Emotional Neglect Subscale

Coefficients[a]

Imputation Number	Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	Fraction Missing Info.	Relative Increase Variance	Relative Efficiency
Original data	1	(Constant)	.649	16.985		.038	.970			
		CTQ - Emotional Neglect Subscale	2.230	.951	.439	2.346	.028			
1	1	(Constant)	10.050	12.808		.785	.439			
		CTQ - Emotional Neglect Subscale	1.703	.732	.386	2.327	.027			
2	1	(Constant)	14.182	12.922		1.097	.281			

		CTQ - Emotional Neglect Subscale	1.457	.730	.337	1.996	.055			
3	1	(Constant)	15.476	12.462		1.242	.224			
		CTQ - Emotional Neglect Subscale	1.428	.723	.334	1.976	.057			
4	1	(Constant)	12.650	12.692		.997	.327			
		CTQ - Emotional Neglect Subscale	1.607	.732	.367	2.195	.036			
5	1	(Constant)	18.514	12.403		1.493	.146			
		CTQ - Emotional Neglect Subscale	1.282	.713	.307	1.797	.082			
6	1	(Constant)	6.373	12.548		.508	.615			
		CTQ - Emotional Neglect Subscale	1.917	.716	.434	2.679	.012			
7	1	(Constant)	14.494	11.802		1.228	.229			
		CTQ - Emotional Neglect Subscale	1.456	.683	.358	2.133	.041			
8	1	(Constant)	15.782	12.806		1.232	.227			
		CTQ - Emotional Neglect Subscale	1.393	.719	.329	1.937	.062			
9	1	(Constant)	13.108	13.035		1.006	.322			
		CTQ - Emotional Neglect Subscale	1.520	.748	.343	2.031	.051			

10	1	(Constant)	8.393	12.775		.657	.516			
		CTQ - Emotional Neglect Subscale	1.785	.730	.402	2.446	.020			
Pooled	1	(Constant)	12.902	13.206		.977	.329	.087	.093	.991
		CTQ - Emotional Neglect Subscale	1.555	.751		2.069	.039	.076	.081	.992

a. Dependent Variable: DES - Total Score

ANOVA[a]

Imputation Number	Model		Sum of Squares	df	Mean Square	F	Sig.
Original data	1	Regression	79.470	2	39.735	1.445	.257[b]
		Residual	605.090	22	27.504		
		Total	684.560	24			
1	1	Regression	132.761	2	66.381	1.997	.153[b]
		Residual	997.420	30	33.247		
		Total	1130.182	32			
2	1	Regression	122.300	2	61.150	2.091	.141[b]
		Residual	877.215	30	29.241		
		Total	999.515	32			
3	1	Regression	96.269	2	48.135	1.314	.284[b]
		Residual	1099.246	30	36.642		
		Total	1195.515	32			
4	1	Regression	125.982	2	62.991	1.920	.164[b]
		Residual	984.200	30	32.807		
		Total	1110.182	32			
5	1	Regression	117.202	2	58.601	1.926	.163[b]
		Residual	912.676	30	30.423		
		Total	1029.879	32			
6	1	Regression	135.549	2	67.775	2.109	.139[b]
		Residual	964.087	30	32.136		
		Total	1099.636	32			
7	1	Regression	166.582	2	83.291	2.956	.067[b]
		Residual	845.418	30	28.181		
		Total	1012.000	32			

8	1	Regression	223.357	2	111.678	3.240	.053[b]
		Residual	1034.158	30	34.472		
		Total	1257.515	32			
9	1	Regression	118.728	2	59.364	1.988	.155[b]
		Residual	895.999	30	29.867		
		Total	1014.727	32			
10	1	Regression	161.459	2	80.729	2.482	.101[b]
		Residual	975.875	30	32.529		
		Total	1137.333	32			

a. Dependent Variable: LSHS-R - Total Score

b. Predictors: (Constant), DES - Total Score, CTQ - Emotional Neglect Subscale

Coefficients[a]

Imputation Number	Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	Fraction Missing Info.	Relative Increase Variance	Relative Efficiency
Original data	1	(Constant)	18.165	4.831		3.760	.001			
		CTQ – Emotional Neglect Subscale	.113	.301	.084	.375	.711			
		DES – Total Score	.079	.059	.296	1.325	.199			
1	1	(Constant)	13.988	4.549		3.075	.004			
		CTQ – Emotional Neglect Subscale	.387	.279	.258	1.386	.176			
		DES – Total Score	.050	.063	.147	.793	.434			
2	1	(Constant)	13.934	4.245		3.282	.003			
		CTQ – Emotional Neglect Subscale	.356	.250	.259	1.423	.165			
		DES – Total Score	.052	.058	.164	.903	.374			
3	1	(Constant)	16.953	4.601		3.685	<.001			

		CTQ – Emotional Neglect Subscale	.161	.276	.108	.582	.565			
		DES – Total Score	.080	.065	.229	1.231	.228			
4	1	(Constant)	14.456	4.451		3.248	.003			
		CTQ – Emotional Neglect Subscale	.330	.272	.224	1.214	.234			
		DES – Total Score	.061	.062	.182	.986	.332			
5	1	(Constant)	14.528	4.146		3.504	.001			
		CTQ – Emotional Neglect Subscale	.365	.242	.272	1.509	.142			
		DES – Total Score	.042	.058	.132	.732	.470			
6	1	(Constant)	14.183	4.442		3.193	.003			
		CTQ – Emotional Neglect Subscale	.337	.280	.228	1.202	.239			
		DES – Total Score	.062	.063	.186	.979	.335			
7	1	(Constant)	13.312	3.837		3.469	.002			
		CTQ – Emotional Neglect Subscale	.362	.232	.278	1.558	.130			
		DES – Total Score	.068	.057	.212	1.186	.245			
8	1	(Constant)	11.590	4.577		2.533	.017			
		CTQ – Emotional Neglect Subscale	.609	.266	.402	2.292	.029			

		DES – Total Score	.018	.063	.051	.292	.772			
9	1	(Constant)	13.962	4.280		3.262	.003			
		CTQ – Emotional Neglect Subscale	.376	.257	.267	1.462	.154			
		DES – Total Score	.045	.058	.141	.772	.446			
10	1	(Constant)	13.626	4.469		3.049	.005			
		CTQ – Emotional Neglect Subscale	.380	.277	.253	1.372	.180			
		DES – Total Score	.066	.062	.195	1.056	.300			
Pooled	1	(Constant)	14.053	4.579		3.069	.002	.093	.100	.991
		CTQ – Emotional Neglect Subscale	.366	.287		1.277	.202	.159	.183	.984
		DES – Total Score	.054	.064		.857	.392	.080	.086	.992

a. Dependent Variable: LSHS-R – Total Score

Input:			Test statistic:	Std. Error:	*p*-value:
a	1.555	Sobel test:	0.78136624	0.10746561	0.43458712
b	0.054	Aroian test:	0.71327684	0.11772428	0.47567447
s_a	0.751	Goodman test:	0.87361183	0.0961182	0.38232968
s_b	0.064	Reset all	Calculate		

Coefficients[a]

Imputation Number	Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	Fraction Missing Info.	Relative Increase Variance	Relative Efficiency
Original data	1	(Constant)	16.145	3.472		4.651	<.001			
		CTQ – Physical Neglect Subscale	.505	.279	.318	1.809	.081			
1	1	(Constant)	15.693	3.493		4.493	<.001			
		CTQ – Physical Neglect Subscale	.574	.281	.345	2.045	.049			
2	1	(Constant)	16.041	3.327		4.821	<.001			
		CTQ – Physical Neglect Subscale	.512	.269	.324	1.904	.066			
3	1	(Constant)	16.333	3.609		4.526	<.001			
		CTQ – Physical Neglect Subscale	.539	.289	.318	1.866	.072			
4	1	(Constant)	17.168	3.338		5.144	<.001			
		CTQ – Physical Neglect Subscale	.453	.273	.286	1.660	.107			
5	1	(Constant)	18.374	3.164		5.807	<.001			
		CTQ – Physical Neglect Subscale	.348	.261	.233	1.335	.191			
6	1	(Constant)	15.945	3.418		4.665	<.001			
		CTQ – Physical Neglect Subscale	.543	.277	.332	1.960	.059			
7	1	(Constant)	15.807	3.299		4.791	<.001			
		CTQ – Physical Neglect Subscale	.525	.268	.332	1.958	.059			
8	1	(Constant)	18.772	3.748		5.008	<.001			

		CTQ – Physical Neglect Subscale	.349	.305	.201	1.145	.261			
9	1	(Constant)	16.204	3.401		4.765	<.001			
		CTQ – Physical Neglect Subscale	.493	.274	.308	1.802	.081			
10	1	(Constant)	17.202	3.540		4.859	<.001			
		CTQ – Physical Neglect Subscale	.462	.287	.278	1.611	.117			
Pooled	1	(Constant)	16.754	3.623		4.624	<.001	.102	.111	.990
		CTQ – Physical Neglect Subscale	.480	.290		1.653	.099	.081	.087	.992

a. Dependent Variable: LSHS-R – Total Score

ANOVA[a]

Imputation Number	Model		Sum of Squares	df	Mean Square	F	Sig.
Original data	1	Regression	952.128	1	952.128	2.506	.127[b]
		Residual	8738.393	23	379.930		
		Total	9690.522	24			
1	1	Regression	558.541	1	558.541	1.876	.181[b]
		Residual	9229.816	31	297.736		
		Total	9788.357	32			
2	1	Regression	519.393	1	519.393	1.726	.199[b]
		Residual	9326.898	31	300.868		
		Total	9846.291	32			
3	1	Regression	601.524	1	601.524	2.016	.166[b]
		Residual	9248.849	31	298.350		
		Total	9850.373	32			
4	1	Regression	627.195	1	627.195	2.106	.157[b]
		Residual	9233.681	31	297.861		
		Total	9860.877	32			
5	1	Regression	481.732	1	481.732	1.571	.220[b]
		Residual	9508.842	31	306.737		
		Total	9990.574	32			
6	1	Regression	793.579	1	793.579	2.710	.110[b]

		Residual	9076.321	31	292.785		
		Total	9869.900	32			
7	1	Regression	553.958	1	553.958	1.830	.186[b]
		Residual	9384.083	31	302.712		
		Total	9938.041	32			
8	1	Regression	692.918	1	692.918	2.348	.136[b]
		Residual	9146.482	31	295.048		
		Total	9839.400	32			
9	1	Regression	393.083	1	393.083	1.262	.270[b]
		Residual	9655.709	31	311.474		
		Total	10048.792	32			
10	1	Regression	582.429	1	582.429	1.924	.175[b]
		Residual	9382.422	31	302.659		
		Total	9964.851	32			

a. Dependent Variable: DES - Total Score

b. Predictors: (Constant), CTQ - Physical Neglect Subscale

Coefficients[a]

Imputation Number	Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	Fraction Missing Info.	Relative Increase Variance	Relative Efficiency
Original data	1	(Constant)	16.682	14.959		1.115	.276			
		CTQ – Physical Neglect Subscale	1.880	1.188	.313	1.583	.127			
1	1	(Constant)	25.129	10.634		2.363	.025			
		CTQ – Physical Neglect Subscale	1.170	.854	.239	1.370	.181			
2	1	(Constant)	25.765	10.742		2.399	.023			
		CTQ – Physical Neglect Subscale	1.140	.868	.230	1.314	.199			
3	1	(Constant)	25.003	10.585		2.362	.025			
		CTQ – Physical Neglect Subscale	1.204	.848	.247	1.420	.166			
4	1	(Constant)	25.867	10.044		2.575	.015			

		CTQ – Physical Neglect Subscale	1.192	.822	.252	1.451	.157			
5	1	(Constant)	28.366	9.887		2.869	.007			
		CTQ – Physical Neglect Subscale	1.021	.815	.220	1.253	.220			
6	1	(Constant)	22.717	10.411		2.182	.037			
		CTQ – Physical Neglect Subscale	1.390	.844	.284	1.646	.110			
7	1	(Constant)	25.078	10.650		2.355	.025			
		CTQ – Physical Neglect Subscale	1.172	.866	.236	1.353	.186			
8	1	(Constant)	24.789	10.320		2.402	.022			
		CTQ – Physical Neglect Subscale	1.287	.840	.265	1.532	.136			
9	1	(Constant)	26.997	11.027		2.448	.020			
		CTQ – Physical Neglect Subscale	.996	.887	.198	1.123	.270			
10	1	(Constant)	24.775	10.585		2.341	.026			
		CTQ – Physical Neglect Subscale	1.191	.858	.242	1.387	.175			
Pooled	1	(Constant)	25.449	10.609		2.399	.016	.022	.022	.998
		CTQ – Physical Neglect Subscale	1.176	.859		1.370	.171	.019	.020	.998

a. Dependent Variable: DES – Total Score

ANOVA[a]

Imputation Number	Model		Sum of Squares	df	Mean Square	F	Sig.
Original data	1	Regression	84.431	2	42.216	1.548	.235[b]
		Residual	600.129	22	27.279		
		Total	684.560	24			
1	1	Regression	166.780	2	83.390	2.597	.091[b]

		Residual	963.402	30	32.113		
		Total	1130.182	32			
2	1	Regression	137.704	2	68.852	2.397	.108[b]
		Residual	861.811	30	28.727		
		Total	999.515	32			
3	1	Regression	164.903	2	82.451	2.400	.108[b]
		Residual	1030.613	30	34.354		
		Total	1195.515	32			
4	1	Regression	134.511	2	67.255	2.068	.144[b]
		Residual	975.671	30	32.522		
		Total	1110.182	32			
5	1	Regression	85.342	2	42.671	1.355	.273[b]
		Residual	944.537	30	31.485		
		Total	1029.879	32			
6	1	Regression	164.624	2	82.312	2.641	.088[b]
		Residual	935.012	30	31.167		
		Total	1099.636	32			
7	1	Regression	169.654	2	84.827	3.021	.064[b]
		Residual	842.346	30	28.078		
		Total	1012.000	32			
8	1	Regression	73.794	2	36.897	.935	.404[b]
		Residual	1183.721	30	39.457		
		Total	1257.515	32			
9	1	Regression	127.324	2	63.662	2.152	.134[b]
		Residual	887.403	30	29.580		
		Total	1014.727	32			
10	1	Regression	151.596	2	75.798	2.307	.117[b]
		Residual	985.738	30	32.858		
		Total	1137.333	32			

a. Dependent Variable: LSHS-R - Total Score

b. Predictors: (Constant), DES - Total Score, CTQ - Physical Neglect Subscale

Coefficients[a]

Imputation Number	Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	Fraction Missing Info.	Relative Increase Variance	Relative Efficiency
Original data	1	(Constant)	17.823	4.115		4.331	<.001			
		CTQ - Physical Neglect Subscale	.191	.335	.120	.569	.575			
		DES - Total Score	.078	.056	.295	1.403	.175			
1	1	(Constant)	14.204	3.794		3.744	<.001			
		CTQ - Physical Neglect Subscale	.505	.289	.303	1.746	.091			
		DES - Total Score	.059	.059	.174	1.005	.323			
2	1	(Constant)	14.508	3.614		4.014	<.001			
		CTQ - Physical Neglect Subscale	.444	.276	.281	1.611	.118			
		DES - Total Score	.060	.055	.187	1.072	.292			
3	1	(Constant)	14.604	3.902		3.743	<.001			
		CTQ - Physical Neglect Subscale	.456	.297	.269	1.536	.135			
		DES - Total Score	.069	.061	.198	1.135	.266			
4	1	(Constant)	15.384	3.657		4.207	<.001			
		CTQ - Physical Neglect Subscale	.371	.281	.234	1.322	.196			
		DES - Total Score	.069	.059	.205	1.162	.255			
5	1	(Constant)	16.799	3.564		4.714	<.001			
		CTQ - Physical Neglect Subscale	.291	.268	.195	1.089	.285			

		DES - Total Score	.056	.058	.173	.965	.342			
6	1	(Constant)	14.374	3.648		3.940	<.001			
		CTQ - Physical Neglect Subscale	.447	.287	.273	1.557	.130			
		DES - Total Score	.069	.059	.207	1.180	.247			
7	1	(Constant)	13.831	3.522		3.927	<.001			
		CTQ - Physical Neglect Subscale	.433	.271	.273	1.595	.121			
		DES - Total Score	.079	.055	.247	1.441	.160			
8	1	(Constant)	17.535	4.110		4.266	<.001			
		CTQ - Physical Neglect Subscale	.285	.319	.164	.895	.378			
		DES - Total Score	.050	.066	.140	.760	.453			
9	1	(Constant)	14.672	3.712		3.952	<.001			
		CTQ - Physical Neglect Subscale	.436	.279	.273	1.565	.128			
		DES - Total Score	.057	.055	.179	1.025	.313			
10	1	(Constant)	15.160	3.783		4.007	<.001			
		CTQ - Physical Neglect Subscale	.364	.291	.219	1.250	.221			
		DES - Total Score	.082	.059	.244	1.393	.174			
Pooled	1	(Constant)	15.107	3.935		3.839	<.001	.102	.111	.990
		CTQ - Physical Neglect Subscale	.403	.296		1.362	.173	.067	.071	.993
		DES - Total Score	.065	.060		1.088	.277	.034	.035	.997

a. Dependent Variable: LSHS-R - Total Score

Input:			Test statistic:	Std. Error:	*p*-value:
a	1.176	Sobel test:	0.84952944	0.08997922	0.39558676
b	0.065	Aroian test:	0.73716258	0.1036949	0.46102349
s_a	0.859	Goodman test:	1.03639581	0.0737556	0.30001752
s_b	0.060	Reset all	Calculate		

11. Journal Author Guidelines

Author guidelines for the *Behavioural and Cognitive Psychotherapy* Journal can be accessed here: https://www.cambridge.org/core/journals/behavioural-and-cognitive-psychotherapy/information/author-instructions

Paper Three

Childhood trauma and hearing voices: the role of dissociation and cognitive inhibition: An Executive Summary

Word Count (Excluding title page and references): 2485

Childhood Trauma and Hearing Voices: The Role of Dissociation and Cognitive Inhibition

Target Audience

This summary is written for individuals who report hearing voices, including those with a confirmed clinical diagnosis of a psychosis-spectrum disorder (e.g., psychosis, schizophrenia, schizoaffective disorder, delusional disorder), and those without, but who report hearing voices. This report was developed in consultation with clinical and non-clinical service users, who have reviewed this report and provided feedback on the content and presentation. This research aims to help individuals understand how childhood trauma may contribute to hearing voices.

Overview

This study explores the relationship between childhood trauma, dissociative experiences, and auditory hallucinations, focusing on cognitive inhibition as a mediator, which is crucial for understanding psychosis development, especially after early trauma.

What are 'Auditory Hallucinations'?

Auditory hallucinations, or 'hearing voices,' are a symptom of psychosis, most frequently observed in those diagnosed with schizophrenia. However, the exact pathways linking childhood trauma and hearing voices remains unclear. Dissociation may mediate this process by disrupting the integration of thoughts and memories, leading to voice-hearing.

What is Dissociation?

Dissociation is said to be the "*lack of normal integration of thoughts, feelings, and experiences into the stream of consciousness and memory*" (Bernstein & Putnam, p. 727). In essence, dissociation involves a disconnection between thoughts, identity, consciousness, and memory, potentially leading to issues like hearing voices.

What is 'Cognitive Inhibition?'

Cognitive inhibition is defined as "*the stopping or overriding of a mental process or action, in whole or in part, with or without intention*" (McCleod, 2007, p.5). It refers to the brain's ability to control thoughts and attention, ignoring irrelevant information and focusing necessary information. Deficits in this function are believed to contribute to problems suppressing intrusive thoughts or voices. Research suggests impaired cognitive inhibition in those who have experienced early trauma, making dissociation worse.

Background

Childhood trauma refers to distressing or harmful events/experiences that put a child's life, or their physical, emotional, and psychological wellbeing in danger. These traumas relate to adverse childhood experiences such as emotional, physical, or sexual abuse; parental death/loss; neglect; and bullying (Michel et al., 2022). Recent research suggests around one-third of the general population have experienced childhood trauma (Misiak et al., 2017), with growing research suggesting childhood trauma may increase the chance of individuals experiencing symptoms of psychosis (Read et al., 2004, 2005; van Os et al., 2010).

Recent research has considered whether dissociative processes account for the relationship between early traumatic experiences and symptoms of psychosis (Anketell et al. 2010; Varese et al. 2012). It was Varese et al. (2012) who first tested this hypothesis in a group of individuals with psychosis-spectrum disorders. In line with previous research by Bentall et al. (2012), Varese et al. (2012) found an association between childhood sexual abuse and higher levels of dissociation in participants reporting hallucinations. Also, they found that dissociation mediated the effect between childhood trauma and hallucination-proneness. Additionally, dissociation's impact on 'reality discrimination' was investigated. Overall, these results support existing research suggesting a link between early trauma and later psychosis experiences, suggesting that this link is underpinned by dissociation (Longden et al., 2020; Heriot-Maitland et al., 2022). However, in the study by Varese et al. (2012), they found no evidence to support a relationship between reality discrimination and dissociation, suggesting that other cognitive or mental processes (e.g., cognitive inhibition), may explain the relationship between dissociation and hallucinatory experiences.

Deficits in cognitive inhibition are supported by research investigating dissociation (Giesbrecht et al., 2008). Furthermore, impaired cognitive control is strongly associated with psychosis-spectrum disorder (Ravizza & Salo, 2014; Fett et al., 2019), particularly in relation to positive symptoms such as hallucinations (Thomas et al., 2021; Horne et al., 2022). Recent research has found that difficulties in controlling thoughts and actions are linked to hearing voices (auditory verbal hallucinations, or AVHs) in people with psychosis. Waters et al. (2003, 2006) and Sun et al. (2021) discovered that people with schizophrenia who hear voices often have more trouble with tasks that require stopping or controlling their thoughts. This problem was not found with other symptoms of psychosis. Waters et al. (2003, 2006) also found that those hearing voices performed worse on these tasks than people who didn't hear voices, who performed similarly to people without psychosis. They believe that these difficulties in control are important in causing the experience of hearing voices. Waters et al. (2006) showed that nearly 90% of people currently hearing voices had trouble with these control tasks and were more likely to hear voices than those without these issues. Based on this, Waters et al. (2012) suggested that problems with control might make it harder for people to manage their perceptions. A review by Badcock and Hugdahl (2014) supports the idea that controlling thoughts is key to understanding why people hear voices in psychosis.

Aims

This study had two main goals.

First, we wanted to repeat the findings from Varese et al. (2012) by:

1. Looking at the link between childhood trauma and hearing voices (hallucinations) in people with a psychosis spectrum disorder.

2. Seeing if this link was influenced by dissociative symptoms (feelings of disconnection from reality).

Second was to explore how dissociative symptoms might affect a thought-control process called intentional inhibition, which is thought to be related to hearing voices. We did this by comparing people with different levels of hallucination severity ('mild/moderate' vs. 'severe') on a task measuring intentional inhibition.

To find out if dissociation was directly related to difficulties in thought control, we also planned to compare people who reported high levels of dissociation with those who reported low levels, and then see if there were differences in their ability to control thoughts.

Method

The study used a cross-sectional design, meaning that data was collected at one point in time. The study recruited 33 participants who reported experiencing auditory hallucinations. These individuals were recruited through NHS clinical settings and through social media (e.g., LinkedIn, Facebook, X etc.), all of whom reported hearing voices. Participants completed a series of standardised questionnaires that assessed their history of childhood trauma, current levels of dissociation, and frequency of voice-hearing experiences.

Who could take part?

Eligible participants had to meet the following criteria to take part.

To take part, participants:	Participants could not take part if they:
• Must be aged 18 or over • Either had a confirmed diagnosis of a psychosis-spectrum disorder (e.g., schizophrenia, schizoaffective disorder, or delusional disorder) and reported a history of – or were – hearing voices, or self-reported currently hearing voices for those recruited online • May have been experiencing other conditions (e.g., depression, anxiety) • Were able to provide informed consent • Had good enough mental ability to complete questionnaires and a computerised task	• Were under 18 years old • Could not provide informed consent • Could not complete questionnaires about their experiences or complete a brief computerised task • Could not speak English or would require a translator

• Were fluent in English	

Step 1: A proposal for this research was reviewed and approved by the Staffordshire University Ethics Committee, the NHS Research Ethics Committee (also known as a 'REC' review), and the Health Research Authority (HRA). These panels confirmed the study was safe and ethical.

Step 2: A research poster was shared with a single point of contact (i.e., Clinical Psychologists) in local NHS sites, including an Acute and Urgent Care department of a local mental health hospital, four Community Mental Health Teams (CMHTs), and an Early Intervention Team (EIT). The researcher also joined in multi-disciplinary team meetings to share the aims and purpose of the research with team members, and to answer any questions. The poster was also shared in psychosis-related social media groups.

Step 3: For NHS sites, the single point of contact identified eligible participants and asked them if they would like a participant information sheet (PIS) and whether they would like the principal investigator (Steve Lovatt) to contact them to discuss the research further and answer any questions.

Step 4: Participants completed the study online using a unique ID link.

What did taking part involve?

Participants were asked to complete a demographics questionnaire that asked several questions about themselves. This included:

- Age
- Gender
- Ethnicity
- First language
- English language fluency
- Highest level of education
- Employment status
- Duration of voice-hearing experiences
- Presence of psychosis-spectrum disorder diagnosis

- Type of psychosis-spectrum disorder diagnosis
- Diagnosis duration
- Antipsychotic mediation use

Participants completed the following measures:

1. ***Positive and Negative Symptoms Rating Scale, Hallucinations Subscale (PANSS; Kay, Fiszbein, & Opler, 1987) -*** The PANSS P3 Hallucinations Subscale is a clinician-rated measure used to assess the presence and severity of hallucinatory experiences in the week preceding the data collection session. This subscale comprises 27 items (questions 64-91), although only questions pertaining to auditory hallucinations (i.e., questions 64-82) were administered. Each item is rated on a 7-point scale (1 = 'absent'; 7 = 'extreme'), according to symptom severity.

2. ***The Revised Launay-Slade Hallucinations Scale (LSHS-R; Bentall & Slade, 1985b) -*** The LSHS-R is a widely used self-report measure of hallucination-proneness. The LSHS-R is a 12-item scale containing items measuring three factors, relating to: 1) vivid mental events; 2) hallucinations with a religious theme; and 3) auditory and visual hallucinatory experiences. Participants are asked to rate each item using a 5-point Likert rating (1 = 'certainly does not apply'; 5 = 'certainly applies').

3. ***The Childhood Trauma Questionnaire – Short Form (CTQ-SF; Bernstein et al., 2003)*** - The CTQ-SF consists of 28 items and includes 5 subscales with each subscale containing 5 items. The subscales are Emotional Abuse (EA), Physical Abuse (PA), Sexual Abuse (SA), Emotional Neglect (EN), and Physical Neglect (PN). Additionally, three items are designed to measure Minimisation/Denial (M/D). The five abuse and neglect subscales are scored from 'never true' (a score of 1), to 'very often true' (a score of 5), and the scores of each subscale are summed to provide subscale scores. These subscale scores can also be summed to provide a Total Score, which is representative of overall childhood trauma.

4. ***The Dissociative Experiences Scale (DES; Bernstein & Putnam, 1986)*** - The Dissociative Experiences Scale-Revised (DES-II) is a 28-item self-report scale that measures dissociative experiences in daily life, including depersonalisation, derealisation, amnesia, and absorption. Participants are required to estimate the frequency of dissociative phenomena on a Likert-type scale ranging from 0% ('never') to 100% ('always').

5. ***Stop-Signal Task (SST) -*** Participants completed a simple primary task on a computer as quickly and accurately as possible. The task comprised two sets of 50 trials where arrows displayed on screen pointed either left or right. Participants were instructed to click either the 'j' button on the keyboard if the arrow pointed to the right, or an 'f' key on the keyboard if the arrow pointed to the left. However, participants were told not to respond using either button if a red 'X' appeared immediately after the arrow.

Results

To explore the differences and relationships between various psychological factors, we used several statistical tests:

1. **Mann-Whitney U Tests**: These were used to compare the differences between two groups in terms of symptoms like hallucinations, childhood trauma, dissociation, and cognitive inhibition. This test is useful when the data doesn't follow a normal distribution.

2. **Spearman's Correlations**: This analysis was done to see how childhood trauma, dissociation, and hallucination-proneness are related to each other. It helps us understand if an increase in one factor is associated with an increase or decrease in another.

3. **Mediation Analysis**: We explored whether dissociation (feeling disconnected from reality) could explain the relationship between childhood trauma and hallucination-proneness. This was done using simple regression analyses to assess the direct relationships between each pair of variables, and multiple regression analyses to see how childhood trauma and dissociation together influence hallucination-proneness. The Sobel test helped us check if this indirect relationship was statistically significant.

Key Findings

- **Significant Correlation**: A strong correlation was found between childhood trauma and the severity of hallucinatory experiences.
- **Dissociation Not a Significant Mediator**: Unlike previous research, dissociation did not significantly mediate the relationship between childhood trauma and hallucination-proneness.
- **No Correlation with Cognitive Inhibition**: Performance on cognitive inhibition measures was not significantly related to hallucination severity.
- **Alternative Mechanisms Suggested**: The findings suggest that other factors, such as reality discrimination deficits, cognitive biases, and emotional regulation, may play a more crucial role in the trauma-hallucination pathway than dissociation or cognitive inhibition.
- **Need for Further Research**: Further research is needed to explore alternative cognitive mechanisms using longitudinal studies, due to discrepancies with prior findings.

Implications

- **Link Between Trauma and Hallucinations**: The study confirms a trauma-hallucination link, but dissociation was not a significant mediator.
- **Caution in Interpretation**: Due to limitations such as a small sample size, potential issues with the cognitive inhibition measure, and the correlational design, the clinical implications should be interpreted with caution.
- **Complexity of Psychotic Experiences**: Clinicians should be aware of the complex nature of psychotic symptoms and avoid focusing on a single treatment pathway.
- **Personalised Therapeutic Approaches**: The findings suggest that personalised and comprehensive treatment approaches are important.
- **Need for Further Research**: Larger and more refined studies are needed to clarify the mechanisms and guide therapeutic strategies.

Limitations

- **Underpowered Sample**: The study was significantly underpowered, limiting the strength of its conclusions.

- **Limitations of Cognitive Inhibition Measure**: The Stop-Signal Task (SST) may not fully capture cognitive inhibition relevant to hallucination-proneness, and relying on a single measure could miss subtle differences.
- **Reliance on Self-Reported Diagnoses**: The use of self-reported psychosis-spectrum diagnoses introduces variability and may not accurately reflect clinical reality, particularly without controlling for co-morbid dissociative disorders.
- **Potential Biases in Self-Report Measures**: The use of self-report measures for dissociation, childhood trauma, and hallucinations carries risks of recall and social desirability biases, limiting the accuracy of the findings.
- **Cross-Sectional Design**: The cross-sectional nature of the study prevents drawing causal inferences; longitudinal research is needed to explore how these variables interact over time.
- **Lack of Control for Confounding Variables**: The study did not control for factors like medication status or co-morbid psychiatric conditions, which could affect the results.
- **Limited Generalisability**: The predominantly female, White, and Western sample may limit the generalisability of the findings, underscoring the need for more diverse future research samples.

Recommendations for future research

- **Replicate in Larger, Diverse Samples**: Future studies should aim to replicate these findings with larger and more diverse participant groups.
- **Explore Other Cognitive Processes**: Investigate the role of other cognitive domains, such as attention, memory, and emotion regulation, in mediating the trauma-hallucination link.
- **Impact of Cognitive Deficits**: Examine whether deficits in working memory or attentional control exacerbate trauma's effects on hallucination-proneness and explore if cognitive training could mitigate these effects.
- **Specific Types of Trauma**: Future research should also consider the impact of specific types of childhood trauma (e.g., emotional vs. physical) on different psychotic symptoms, as different traumas may have distinct effects.

Who will this research be shared with?

Participants were advised they could contact the research team to request a copy of this report once completed. This research will also be submitted for publication to a scientific journal, 'Behavioural and Cognitive Psychotherapy'.

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