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Psychosis and Voice-Hearing: Exploring Dissociative Processes and Factors Associated with Compliance with Commanding Voices

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Declaration

I, the author, declare that this work has not been submitted for any other degree at the University of Sheffield or any other institution. This thesis is my own original work and all other sources have been referenced accordingly.

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Lay Summary

Voice-hearing (VH) is prevalent for people with a psychiatric diagnosis of psychosis. Previous research has found that some individuals hear voices that are commanding in nature. However, the factors linked to whether a person complies, or does not comply, with commands are not well understood. Therefore, section one of this thesis aimed to review literature examining variables thought to be related to compliance with commanding voices.

A systematic literature review was completed, where three online databases were searched for relevant studies. In total, 14 papers were included, which considered a range of variables. The quality of included studies was assessed, which highlighted issues with both reliability and validity. Due to methodological differences between studies, it was difficult to directly compare studies and draw firm conclusions. However, there was some evidence that compliance was related to voice-related variables, including recognising the voice, higher ratings of perceived voice power, the presence of consistent unusual beliefs and voice-hearer characteristics, including increased illness severity and stronger beliefs about future compliance.

The current review provides initial information on several variables thought to be related to compliance with commanding voices. However, the current evidence is limited and further research, of high quality, is required to further inform current understanding and clinical practice. It is recommended that clinicians ask clients about their voice-hearing experiences and assess variables associated with compliance (e.g., the presence of consistent unusual beliefs) to support risk assessment and management and inform treatment targets. It is also recommended that psychological interventions address issues of compliance, for example by reducing perceived voice power.

The second section of this thesis consists of the empirical project. This online study aimed to compare participants with psychosis and post-traumatic stress disorder (PTSD) on factors considered to be related to VH, including trauma and dissociation. The relationship between peritraumatic dissociation and VH was also explored. Although peritraumatic dissociation has been linked to trauma-related conditions, including PTSD, it has not been examined in psychosis.

A total of 81 adults participated in this project. Participants were recruited to one of three groups (27 per group) based on whether they had a diagnosis of psychosis, PTSD, or no current mental health diagnosis (excluding anxiety or depression). Recruitment was attempted via local NHS services and social media. However, all participants were recruited through social media (e.g. Facebook). Participants were given a link to the study, where they answered demographic questions and completed questionnaires measuring childhood trauma, dissociation and peritraumatic dissociation. Participants also completed an online signal detection test to support data collection for a separate study.

The psychosis and PTSD groups reported increased childhood trauma, dissociation and peritraumatic dissociation. VH was mediated through childhood trauma, peritraumatic dissociation and dissociation. The findings provide initial evidence that peritraumatic dissociation is relevant to psychosis as well as PTSD. However, due to limitations of this exploratory study, further research using larger samples and clinical populations is required. It is recommended that clinicians routinely screen trauma, dissociation and peritraumatic dissociation in patients with psychosis and PTSD.

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Section One: Literature Review

Factors Associated with Compliance with Commanding Voices in Psychosis: A Systematic Review

Abstract

Objectives

Over the past 30 years, research has been conducted exploring commanding voices (CV) in psychosis. Compliance with commands (e.g. to self-harm or harm-others) can have significant implications for individuals and society. However, factors associated with compliance are not well understood. Therefore, this systematic literature review aimed to explore the latter to update the evidence base and inform clinical practice.

Method

A systematic review of Scopus, Medline and PsycINFO was conducted, following a protocol published at: https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=376113. Studies examining factors associated with compliance with CV were eligible for inclusion. A narrative synthesis was completed and included papers were appraised using a quality appraisal tool.

Results

Overall, 14 studies considering a range of variables were included in the narrative synthesis. Risk of bias for internal and external validity was identified across studies and high levels of methodological heterogeneity limited comparisons across studies. However, there was initial evidence that voice-related variables (e.g. voice recognition, congruent unusual beliefs and voice omnipotence) and voice-hearer characteristics (e.g. illness severity and beliefs about complying in the future) were linked to compliance.

Conclusions

This review offers primary insights into a range of variables associated with compliance. However, a paucity of research remains and further research with increased methodological rigour is required to support firm conclusions to be drawn. It is recommended that clinicians attend to factors associated with compliance in psychological assessments, including risk assessments. Psychological interventions for this population should aim to understand and address issues of compliance (e.g. through reducing voice power).

Practitioner Points

- Due to the paucity of research identified, further research is required to inform current understanding of factors associated with compliance with CV.
- Directly assessing clients CV experience, including command content, beliefs about voices (e.g. perceived omnipotence), past compliance and beliefs about future compliance may support a more comprehensive psychological assessment and formulation of risk.
- When completing psychological assessments (including risk assessments) for clients with CV, clinicians should assess variables associated with compliance and explore protective factors against compliance to inform treatment targets and risk management plans.
- Psychological interventions for people with CV should include a focus on understanding and addressing issues of compliance (e.g. through supporting coping skill development).

Keywords: Psychosis, schizophrenia, command hallucinations, imperative voices, compliance.

Introduction

Psychosis and Commanding Voices

Research indicates approximately 70% of individuals who have received a psychiatric diagnosis of a schizophrenia spectrum condition (SSC) experience auditory verbal hallucinations (AVH, Thomas et al., 2007). Command hallucinations, also known as command voices (CV), involve an individual hearing a voice instructing them what to do (Shawyer et al., 2003). CV content can vary from innocuous instructions (e.g. to stand up) to harmful commands (Birchwood et al., 2014). Harmful commands include the voice-hearer hearing a voice or voices instructing them to harm themselves (e.g. by engaging in self-harm or suicidal behaviours) or others (Birchwood et al., 2014).

Prevalence rates of CV for individuals who experience AVH range from 33% to 74% (Braham et al., 2004; Zisook et al., 1995). However, such experiences may be underreported (Rogers et al., 1990). For example, forensic populations may not disclose experiencing CV to avoid longer detention (Barrowcliff & Haddock, 2006). Rates of CV are disproportionally higher in clinical forensic populations (Braham et al., 2004).

Compliance with CV

Behavioural compliance refers to the extent to which an individual acts on commands expressed by the voice (Braham et al., 2004). Voice-hearers can experience high pressure to abide by CV commands (Birchwood et al., 2000; Birchwood & Chadwick, 1997; Chadwick & Birchwood, 1995), which can cause high levels of distress (Mackinnon et al., 2004). Hersh and Borum (1998) reviewed 11 studies and found compliance rates with CV of between 39% and 88%.

Compliance with dangerous commands can have significant implications for individuals and society, including criminal offences (Braham et al., 2004). Despite the significance of CV for the person and society, it is an under-researched area (Braham et al., 2004). Furthermore, there is limited understanding of the causal processes implicated in compliance with self-harm CV (Hettige et al., 2018).

Various cognitive theories of compliance exist within the literature. The cognitive model of voice-hearing (Birchwood & Chadwick, 1997; Chadwick & Birchwood, 1994) suggests that voice-hearers' beliefs about their voices may lead to behavioural actions, such as compliance. To test this theory, studies have investigated the association between cognitive factors, including beliefs about voices and compliance. In addition, the social rank theory (Allan & Gilbert, 1995; Gilbert & Allan, 1998) proposes that higher rates of compliance with commands are likely when the voice-hearer perceives themselves as inferior to the CV.

Variables Associated with Compliance

Some individuals act on CV commands. However, research suggests a direct relationship does not exist between CV and harm-self or other behaviours (Rudnick, 1999). Chadwick and Birchwood (1994) argued that command content is the 'most important determinant of compliance' (p. 200). However, considerable variability in compliance rates with self-harm or harm-other commands has been observed, indicating that command content may not independently result in compliance (Hersh & Borum, 1998). Thus, there is consensus that in isolation, CV do not result in compliance (Braham et al., 2004). Therefore, past reviews (Braham et al., 2004; Rudnick, 1999) have focused on variables associated with CV and compliance-related outcomes (e.g. dangerous behaviour).

Braham et al. (2004) critically reviewed research published on CV between 1990 and 2000. A further related review of studies published between 1971 and 2005 (Barrowcliff &

Haddock, 2006) explored factors associated with compliance with CV. These reviews indicated a complex relationship between CV and behavioural compliance and found initial evidence that various variables related to CV characteristics may be implicated (Barrowcliff & Haddock, 2006; Braham et al., 2004). These included command content, the presence of a congruent unusual belief, and beliefs about the voices intentions (Barrowcliff & Haddock, 2006; Braham et al., 2004). The latter included perceived voice benevolence 'tendency to support or do good,' and voice malevolence 'tendency to punish or persecute' (Chadwick & Birchwood, 1995).

Past reviews highlighted that research in this field was in its infancy and identified various methodological issues with existing studies. Braham et al. (2004) reported that the included studies were diverse, conducted with heterogeneous populations and small sample sizes, resulting in difficulties drawing robust conclusions. There was also limited study of the association between voice-hearer characteristics (e.g. illness severity) and compliance (Braham et al., 2004). In addition, Barrowcliff and Haddock (2006) concluded that a lack of clarity remained regarding variables associated with compliance with self-harm or harm-other CV. This resulted in a recommendation for further research to be conducted to inform understanding. Furthermore, while these reviews considered study quality, they did not report the use of an appraisal tool to support a consistent assessment of the risk of bias between papers.

The Current Review

The current systematic review focuses on variables associated with compliance with CV. This contemporary review was necessitated as existing related reviews (e.g. Barrowcliff & Haddock, 2006) were dated, had a broader focus on CV and compliance, and identified gaps in understanding, specifically in relation to understanding factors associated with compliance. This review has important implications for updating the literature base, helping understand processes implicated in compliance, informing risk assessments and supporting professionals

to assess risks related to CV. Understanding compliance with CV and supporting prevention is imperative on a clinical and socio-political level as compliance can lead to harmful and illegal behaviours (Braham et al., 2004).

Aim

The current review aimed to summarise and synthesise research findings from studies exploring factors associated with compliance with CV in psychosis. The following research questions were posed: 1) Which variables, such as voice characteristics and beliefs about voices, are associated with compliance with CV? 2) Are personal characteristics of the voice-hearer associated with increased compliance with CV? This review also aimed to determine whether any papers on this topic were published post-2005 and to assess the methodological quality of the research using a quality appraisal tool.

Method

The current systematic review was pre-registered on PROSPERO by the author (trainee clinical psychologist) in November 2022 and can be accessed via the following link: https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=376113. The review was conducted with adherence to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist (Page et al., 2021; see Appendix A).

Search Strategy

In January 2023, the author conducted a comprehensive systematic search of published literature using three electronic databases: Scopus, PsycINFO and Medline. Conducting searches over three databases was considered sufficient to ensure the capture of all relevant publications (Siddaway et al., 2019). The author consulted a librarian at the University of Sheffield on the search strategy to ensure a robust search methodology and enhance results.

Keywords used in related reviews (Barrowcliff & Haddock, 2006; Braham et al., 2004) were considered when determining the search terms. The following search strings were used to complete title, abstract and keyword searches of publications ("hallucination*" OR "voices") AND ("command*" OR "imperative") AND ("compli*"). Truncation was used to expand the search terms to include varied word endings. For example, using *compl** rather than *complying* or *compliance*. Search terms were modified to include Medical Subject Headings (MeSH) and adapted to meet the requirements of different databases. For example, the search of MEDLINE included MeSH terms, but quotation marks were removed when performing the search on PsycINFO. When MeSH terms were available, they were exploded and combined (Appendix B). Manual forward and backward citation searches of reference lists of included papers and relevant literature reviews (Barrowcliff & Haddock, 2006; Braham et al., 2004; Rudnick, 1999) were conducted to aid retrieval of all relevant papers. No further papers were identified using this approach.

Inclusion and Exclusion Criteria

Study selection was underpinned by the predetermined inclusion and exclusion criteria detailed in Table 1, based on the review questions, and set in accordance with the Population, Intervention, Comparator, Outcome and Study design framework (PICOS, Methley et al., 2014). Initially, a diagnosed SSC was specified as an inclusion criterion. However, due to a lack of empirical evidence and many studies including participants with mixed diagnoses, the protocol was amended during the search to include research with people with additional psychiatric diagnoses (e.g. bipolar and borderline personality disorder). Grey literature was not searched for quality assurance reasons, as generally it has not been peer-reviewed (Benzies et al., 2006).

Table 1

Inclusion and Exclusion Criteria Using the PICOS Tool (Methley et al., 2014)

PICOS Domain	Inclusion Criteria	Exclusion Criteria
Population/ Participants	Individuals with current or past experiences of CV in the context of a psychiatric diagnosis (e.g. psychosis, bipolar, borderline personality disorder). No restrictions on age, gender, country of origin or location (e.g. inpatient, outpatient, community, forensic).	Research not focused on individuals with experience of CV.
Intervention/ Exposure	Studies examining variables associated with compliance with CV (e.g. characteristics of voices and/or beliefs about voices). Studies exploring any command type (e.g. harm to self, others and innocuous commands) were eligible.	Papers not relevant to the topic (e.g. do not examine variables associated with compliance with CV).
Comparison/ Control	Studies with or without comparative controls.	No comparison group required.
Outcomes	Studies exploring the relationship between variables and outcomes of compliance with CV. Studies using validated and non-validated measures were eligible.	Studies exploring the effects of interventions designed to treat CV. Papers not relevant to the current topic (e.g. do not explore variables associated with compliance with CV).
Study Design	Empirical studies reporting relevant statistical results. All quantitative study designs were eligible (e.g. case studies, experimental, longitudinal, cross-sectional). Mixed-methods studies providing relevant quantitative data. Studies published and written in English. No restrictions on publication date or location.	Qualitative studies, non-empirical research (e.g., review articles, anecdotal papers, conference papers and book chapters), unpublished literature, studies not published in English and grey literature.

Study Selection

The PRISMA diagram for the search is shown in Figure 1. Searches generated 121 papers (Scopus = 83, Medline = 22, PsycINFO = 16). Papers were exported to the reference manager, Zotero, and duplicates were removed ($n = 37$). The author conducted title and abstract screening of the remaining papers ($n = 84$) to assess eligibility for inclusion. Papers that did

not meet inclusion criteria were excluded (n = 66). A full-text review of shortlisted articles eligible for full-text review (n = 18) was completed. Overall, 14 papers met the inclusion criteria and were eligible for inclusion in the narrative synthesis. Interlibrary requests were made to obtain unavailable papers.

To support the reliability of the study selection process, a second reviewer independently assessed the eligibility of 15% of papers (n = 3) chosen at random during full-text screening. It was agreed that conflicts would be discussed, and any disagreements resolved by consensus. However, this process highlighted 100% consistency between reviewers.

Data Extraction

The author extracted data from the 14 included papers and inputted key information into a table (Table 2). This included details of the author(s), publication year, country, design and sample characteristics, including sample size, participant gender, mean age and primary diagnoses. Outcome measures, including measures of voice-related variables, variables linked to personal characteristics of the voice-hearer, and measures of compliance, were also included. Studies included in related past reviews (Barrowcliff & Haddock, 2006; Braham et al., 2004) were assigned an asterisk when tabulated. For ease of reading, key findings relating to the variables examined, including the relevant statistics, are presented in Table 3. Study investigators were not contacted for unreported data or additional details.

Figure 1

Adapted PRISMA Diagram Illustrating the Systematic Search Process

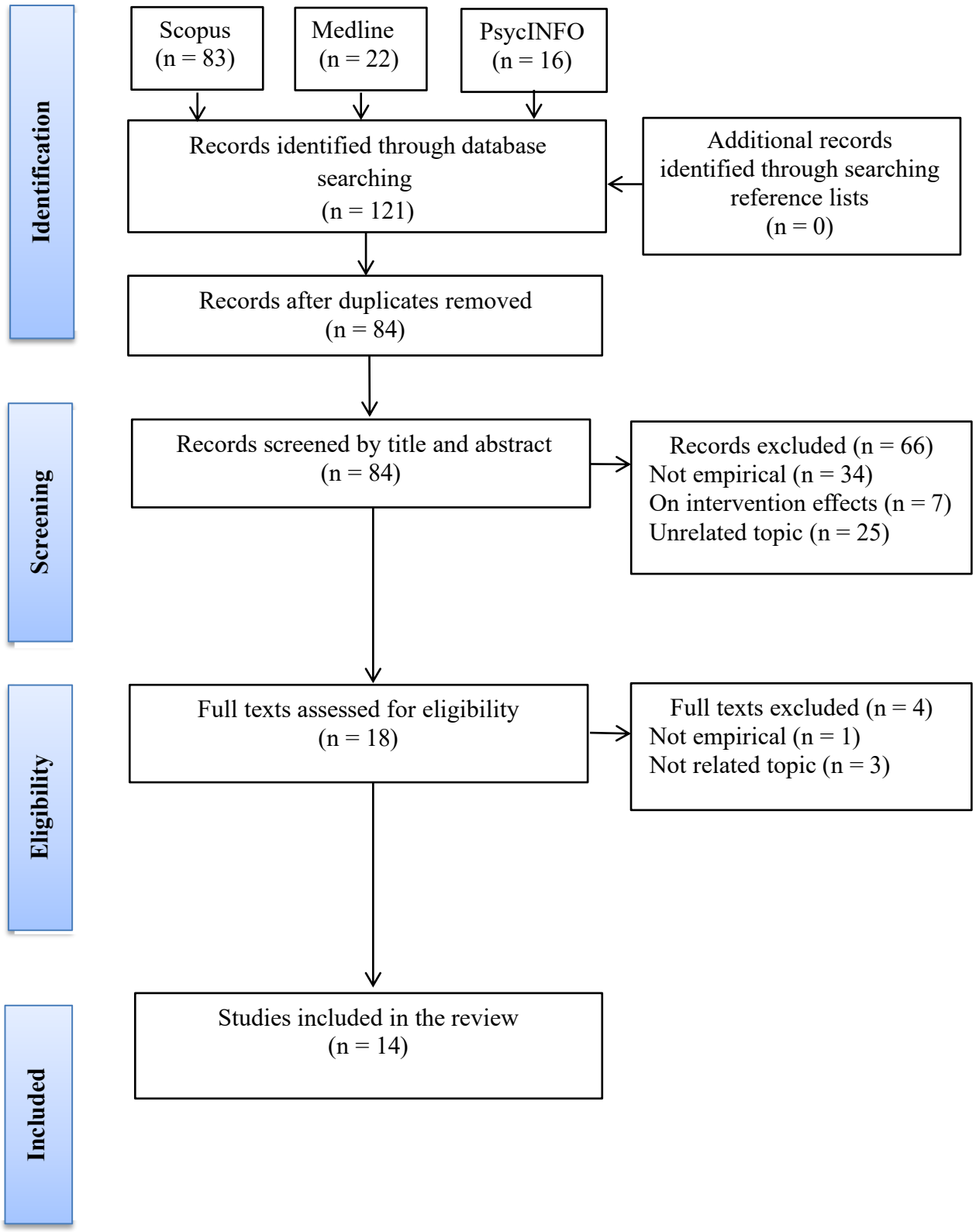

Table 2

Summary of Included Studies (Ordered by Date of Publication and Alphabetically by First Author's Last Name)

Study Characteristics					Sample Characteristics			Outcome Measure(s)		
Author(s) (Year)	Country	Design	Sample	n	Mean Age Years (SD)	Gender (%)	Dx	Measure(s) of Voice-Related Variables	Measure(s) linked to Voice-Hearer Characteristics	Measure(s) of Compliance
Junginger (1990)*	America	COR	INPT & OP	51	NR	NR	Mixed	Dangerousness, congruent unusual beliefs, voice recognition: semi-structured interview.	Not assessed.	Self-reported compliance with most recent CV: 3-point scale (yes, no, unknown).
Junginger (1995)*	America	COR	INPT	93	NR	M = 51 (54.84) F = 42 (45.16)	Mixed	Dangerousness, congruent unusual beliefs, voice recognition: semi-structured interview.	Illness severity & past compliance: semi-structured interview.	Self-reported level of compliance with most recent CV: 3-point scale (none, partial or full).
Beck-Sander et al. (1997)*	England	COR	INPT & OP	35	NR	M = 25 (71.43) F = 10 (28.57)	Mixed	Command content, voice power & omnipotence: semi-structured interview (using protocol). Voice malevolence/ benevolence: BAVQ.	Not assessed.	Self-reported level of compliance over the past year (no/full compliance) with innocuous/severe commands.
Erkwoh et al. (2002)*	Germany	BG	OP	31	44.4	M = 21 (67.74) F = 10 (32.26)	Mixed	Voice recognition, voice reality, semi-structured interview using a questionnaire.	Affect response during voice-hearing: semi-structured interview using a questionnaire.	Self-reported lifetime compliance (complier/ non-complier).

Fox et al. (2004)*	Wales	BG	INPT & OP (forensic & non-forensic)	32	37.20 (9.82)	M = 22 (68.75) F = 10 (31.25)	SZ	Voice content: semi-structured interview. Voice malevolence, benevolence, power: BAVQ. Perceived voice power: CAV.	Perceived social rank (inferiority/ superiority) in relation to others: EBS.	Self-reported compliance (complied/did not comply) with SH/harm-other CV, 3–6 months before last hospital admission.
Lee et al. (2004) *	Singapore	BG	INPT (psychiatric hospital)	100	39.1 (9.7)	M = 50 (50) F = 50 (50)	SZ	Voice content: interview using a semi-structured questionnaire.	SH history: interview using a semi-structured questionnaire.	Self-reported compliance (complied/resisted) SH/harm-other CV in the past 6 months, corroborated by caregiver/records.
Mackinnon et al. (2004) *	Australia	BG	INPT & OP	199	32.7 (10.7)	M= 134 (67.34) F = 65 (32.66)	Mixed	CV characteristics (tone, content, intrusiveness): semi-structured interview using MUPS.	Coping strategies: MUPS.	Self-reported lifetime compliance (complier/ resister).
Shawyer et al. (2008)	Australia	COR	Community & forensic services	75	Community participants 37.1 (10.4) Forensic participants 33.6 (10.4)	M = 56 (74.67) F = 19 (25.33)	Mixed	Dangerousness: four-point rating scale. Malevolence, benevolence, power: BAVQ-R. CV characteristics: structured interview (MUPS & PSYRATS). Delusion congruence: rating scale.	Demographic information & antipsychotic medication use. SUD: SCID-I. Interpersonal dependency: IDI. Parental bonding: PBI. Anger: STAXI.	Self-reported compliance with index CV (most serious): 3-point scale (non/ partial/ full compliance).

Barrowcliff & Haddock (2010)	England	BG	INPT & community	72	CV group 36.7 (11.8)	M = 49 (68.06) F = 23 (31.94)	SZ or SZA	Command content: CHI. Voice social rank: SCS. Voice malevolence: BAVQ.	Positive symptoms: PANSS.	Self-reported compliance (complied/did not comply) with SH/ harm-other/ benign commands in the last 28 days.
Reynolds & Scragg (2010)	England	BG	Forensic services (NHS & private)	32	34.19 (11.81)	M = 32 (100)	Mixed	CV experience: semi-structured interview using MUPS. Perceived CV power: VPDS. Voice social rank: VRS.	Not assessed.	Self-reported lifetime compliance with harm-other commands (compliers/ resisters): MUPS.
Bucci et al. (2013)	England	COR	INPT (acute hospital) & OP	32	37.09 (11.36)	M = 23 (71.87) F = 9 (28.13)	Mixed	CV content: CHI. Voice benevolence, malevolence, omnipotence: BAVQ-R.	Anger, anger reactivity: NAS-PI. Impulsiveness: BIS-11.	Self-reported compliance (yes/no) with harmful (SH, harm-other) & benign commands in the past month: CHI.
Dugré et al., (2018)	Canada	BG	INPT (3 acute hospitals)	82	30.28 (5.99)	M = 28 (34.15) F = 54 (65.85)	Mixed	Voice malevolence: AHS.	CPA: QCE. Anger: NAS. Impulsivity: BIS-11. Illness severity: BPRS. SUD: DSM-III-R checklist. Compliance history: AHS.	Self-reported compliance with SH commands week before admission (compliers/ resisters): AHS.

Dugré & West (2019)	Canada	BG	INPT (3 acute hospitals)	181	30.1 (6.20)	M = 95 (52.49) F = 86 (47.51)	Mixed	Beliefs about voices: AHS. CV intent (neutral/malevolent/ benevolent/both): AHS.	CPA: QCE. Impulsivity: BIS-11. Illness severity: BPRS.	Self-reported lifetime compliance (never, 1-5 times, multiple times) with innocuous/ harm-other/SH commands: AHS.
Salim et al. (2021)	Lebanon	BG	INPT (1 psychiatric hospital)	280	55.89 (11.27)	M= 180 (64.5) F = 99 (35.5)	SZ	CV experience: CHAT. Beliefs about voices (e.g. resistance) BAVQ-R.	Positive & negative symptoms & general psychopathology: PANSS.	SR lifetime compliance (compliant/non-compliant): VCS; corroborated by an informant.

Note. Dx = diagnosis, COR = correlation, BG = between-groups, INPT = inpatients, OP = outpatients, NR = not reported, M = males, F = females, SZ = schizophrenia, SZA = schizoaffective disorder, CPA = childhood physical abuse, SH = self-harm, SUD = substance use disorder, CV = commanding voices. BAVQ = Beliefs about Voices Questionnaire (Chadwick & Birchwood, 1995), CAV = Cognitive Assessment of Voices (Chadwick et al., 1996), EBS = Evaluative Beliefs Scale (Chadwick & Trower, 1993), MUPS = Mental Health Research Unusual Perceptions Schedule (Carter et al., 1995), BAVQ-R = Beliefs About Voices Questionnaire–Revised (Chadwick et al., 2000), PSYRATS = Psychotic Symptoms Rating Scales (Haddock et al., 1999), SCID-I = Structured Clinical Interview for DSM-IV Axis I Disorders (First et al., 1997), IDI = Interpersonal Dependency Inventory (Hirschfeld et al., 1977), PBI = Parental Bonding Instrument (Parker et al., 1979), STAXI-2 = State-Trait Anger Expression Inventory–2 (Spielberger, 1999), CHI = Command Hallucination Interview (Barrowcliff & Haddock, 2006), SCS = Social Comparison Scale (Birchwood et al., 2000), PANSS = Positive and Negative Syndrome Scale (Kay et al., 1987), VPDS = Voice Power Differential Scale (Birchwood et al., 2000), VRS = Voice Rank Scale (Birchwood et al., 2000), NAS-PI = Novaco Anger Scale and Provocation Inventory (Novaco, 2003), BIS–11 = Barratt Impulsiveness Scale-11 (Patton et al., 1995), AHS = Auditory Hallucinations Schedule (Applebaum et al., 2000), QCE = Questionnaire about Childhood Experiences (Monahan et al., 2001), NAS = Novaco Anger Scale (Novaco, 1994), BPRS = Brief Psychiatric Rating Scale (Ventura et al., 1993), DSM-III-R = Diagnostic and Statistical Manual of Mental Disorders, Third Revised Edition checklist (Hudziak et al., 1993), CHAT = Chicago Hallucination Assessment Tool (Kern et al., 2015) and VCS = Voice Compliance Scale (Beck-Sander et al. 1997).

Table 3

Main Study Results– Variables Associated with Compliance (Ordered by Publication Date and Alphabetically by First Author's Surname)

Author(s) (Year)	Key Findings in Relation to the Research Questions	
	Voice-Related Variables	Voice-Hearer Related Variables
Junginger (1990)	Compliance was significantly associated with supportive unusual beliefs (F = 6.95, df = 3, 40, p = .01) and voice recognition (F = 3.97, df = 3, 40, p < .05) but not command dangerousness (p > .05).	
Junginger (1995)	Low-level command dangerousness (F = 13.62, df = 1, 86, p < .001) and voice recognition (F = 6.14, df = 1, 86, p < .02) were significantly associated with compliance (F = 10.27, df = 2, 85, p < .001). Supportive unusual beliefs were not significantly associated with compliance (p > .05).	Past compliance was not significantly associated with compliance (p > .05).
Beck-Sander et al. (1997)	Voice benevolence was significantly related to compliance with innocuous (p = .031, tau-b = .35) and severe (p = .032, tau-b = .40) commands, but not self-harm (p = .29, tau-b = .23) commands. Participants were significantly more likely to resist malevolent voices (p = .003, tau-b = .46). Participants with perceived voice control were significantly less likely to comply with severe (r = -.34; p = .066), innocuous (r =. -42; p = .008) and self-harm (r = -.42; p = .045) commands.	
Erkwoh et al. (2002)	Recognising the voice and perceiving it as real was significantly associated with compliance (p < .05; 95% CI: 1.35 - 95.5).	The voice-hearers' emotional response during the voice-hearing experience was significantly associated with compliance (p < .05; 95% CI: 1.35 - 95.5).
Fox et al. (2004)	Compliers with harm-other (p < .01) and self-harm commands had significantly higher ratings of perceived voice power than non-compliers (p< .02). No significant differences in voice benevolence (probability of X^2, p = .11) and malevolence (probability of X^2, p = .18) between compliers/non-compliers.	Compliers with harm-other commands reported significantly higher perceived superiority in social relationships (p < .01). Compliers with self-harm commands reported significantly higher perceived inferiority in social relationships (p < .01).

Lee et al. (2004)	Participants with violent commands were significantly less likely to comply than those with non-violent commands (*OR* = 17.9, 95% CI: 3.5 - 90.9, *p* < .001).	A history of self-harm was significantly associated with compliance (OR = 28.5, 95% CI: 1.9- 347.9, *p* = .014).
Mackinnon et al. (2004)	Results based on 130 participants with CV. Resisters perceived CV as significantly more intrusive (*OR* = 0.33, *p* = < .01) and less authoritative (*OR* = 2.57, *p* = < .05) than compliers.	Resisters used significantly more coping strategies than compliers (*t*[128] = 2.44; *p* < .05).
Shawyer et al. (2008)	Compliance was significantly associated with congruent unusual beliefs (*OR* per unit increase = 1.74, 95% CI: 1.12 - 2.72, *p* = .014) and positive CV appraisal (*OR* = 16.17, 95% CI: 2.43 - 107.45, *p* = .004). Participants with threatening voices were more likely to comply with omnipotent voices (*OR* = 1.23, 95% CI: 1.02 - 0.56, *p* = .03). Compliance was not significantly associated with command dangerousness (*p* > .05), voice malevolence (*OR* = 1.09, 95% CI: 0.99 – 1.21, *p* = .075) and benevolence (*OR* = 1.02, 95% CI: 0.93 – 1.12, *p* = .717).	Compliance was significantly associated with being older (*OR* = 1.09, 95% CI: 1.02 - 1.17, *p* = .011) and maternal overprotection in childhood (*OR* per unit decrease = 1.10, 95% CI: 1.02 - 1.19, *p* = .018). Participants who were not taking antipsychotic medication at the time of the index CV were significantly more likely to comply (*OR* = 9.09, 95% CI: 2.10 - 39.29, *p* = .003). Trait anger was significantly associated with compliance when the CV was considered threatening (*OR* = 1.17, 95% CI: 1.00 - 1.35, *p* = .04).
Barrowcliff & Haddock (2010)	Higher voice malevolence (*r* = 0.51, *p* = .006) was significantly associated with compliance with the last self-harm command. Greater perceived consequences for non-compliance were found for the compliant group in relation to compliance with the last self-harm (X^2 (1) = 5.82, Fisher's Exact, *p* = .027) and harm-other command (X^2 (1) = 5.0, Fisher's Exact, *p* = .044). Increased ratings of voice social rank were significantly associated with compliance with the last harm-other command (*F*(1,14) = 29.14, *p* < .001).	Increased symptom presentation was significantly associated with compliance with the last self-harm (*F*(1,28) = 5.04, *p* = .033) and harm-other (*F*(1,14) = 6.38, *p* = .025) command.
Reynolds & Scragg (2010)	Compared to resisters, compliers perceived CV as significantly more powerful (*U* = 41, *r* = -0.52, *p* = .003) than themselves and of a higher social rank (*U* = 46.5, *r* = -0.48, *p* = .006).	-
Bucci et al. (2013)	Appraising the voice as powerful was significantly and independently associated with compliance with harmful commands (*OR* = 1.26, 95% CI: 1.02 - 1.64, *p* = .033). Voice benevolence (*r* = .289, *p* = .122) and malevolence (*r* = -.051, *p* =	Increased anger (*r* = .362, *p* = .049), difficulties regulating anger (*r* = .371, *p* = .043), and impulsiveness (r = .529, *p* = .003) were significantly associated with compliance with harmful commands. Impulsivity was

	.789) were not significantly associated with compliance with harmful commands. Voice benevolence was not significantly associated with compliance with benign commands (r = .084, p = .776).	significantly and independently associated with (OR = 1.13, 95% CI: 1.02 - 1.28, p = .012).
Dugré et al. (2018)	No significant differences were found between compliers and resisters on voice malevolence (X^{2} = 1.000, p = 0.317).	Self-harm compliers reported significantly more frequent (U = 499.0, p = .003) and severe (U = 440.5, p = .001) childhood physical abuse (CPA), general symptoms (U = 533.5, p = .011), emotional distress (U = 496.5, p = .004), past compliance (U = 574.0, p = .018), comorbid substance use disorder (SUD, (X^{2} = 6.05, df = 1, p = .014) and were more certain of future compliance (U = 494.0, p = .002). Multivariate analysis found that CPA severity (OR = 5.41, 95% CI: 2.03 - 14.41, p = .001), beliefs about future compliance (OR = 2.96, 95% CI: 1.31-6.72, p = .009), and comorbid SUD (OR = 5.76, 95% CI: 1.54-21.49, p = .009), were significant independent factors associated with compliance with self-harm commands. Significant associations were not found for impulsivity (U = 749, p = .627) or anger and compliance (U = 743, p = .591).
Dugré & West (2019)		The benevolent CV group was significantly more certain of future compliance than the malevolent group (X^{2} = 6.47, df = 3, p = .167). There were no significant differences between groups on impulsivity (X^{2} = 3.75, p = .053). Multivariate analyses of the malevolent group found that CPA frequency (OR = 1.59, 95% CI: 1.01 - 2.52, p = .047), conceptual disorganisation (OR = 2.23, 95% CI: 1.14- 4.40, p = .020), unusual thought content (OR = 1.28, 95% CI: 1.00 -1.62, p = .046) and beliefs about having to obey commands (OR = 1.42, 95% CI: 1.05 - 1.90, p = .021) were significantly and independently associated with compliance.
Salim et al. (2021)		A multivariate analysis found that increased positive symptoms (ORa = 1.090, 95% CI: 1.016 -1.168, p = .016) and general psychopathology (ORa = 1.043, 95% CI: 1.003 - 1.084, p = .035) were significantly associated with compliance. Increased resistance to beliefs about voices (ORa = 0.915, 95% CI: 0.859 - 0.976, p = .007) was significantly associated with non-compliance.

Note. Abbreviations: CI = confidence interval*, df* = degrees of freedom*, OR* = Odds Ratio*, ORa* = Odds Ratio Adjusted.

Quality Assessment

Papers were appraised using the National Institute for Health and Care Excellence (NICE, 2012) quality appraisal checklist for quantitative studies reporting correlations and associations (Appendix C). This tool was used as included studies used observational study designs and reported correlation and association data. A formal assessment of the reliability of this tool has not been undertaken. However, it is based on the validated appraisal step of the Graphical Appraisal Tool for Epidemiological Studies (Jackson et al., 2006), which has good inter-rater reliability (Fitzgerald & Coop, 2011). Alternative tools, such as the Downs and Black checklist (Downs & Black, 1998) and the Critical Appraisals Skills Programme (CASP, 2018) checklists were considered. However, the former applies to intervention studies that were not relevant to the current review, and the latter is limited in the number of designs it can evaluate.

The NICE (2012) quality appraisal tool consists of five sections. Section one assesses the risk of bias in relation to external validity (three items), sections two to four assess internal validity (14 items), and section five is a summary section where an overall rating of internal and external validity is made (two items). Each study was given a rating for each of the 19 items using the following scoring system: ++ (no or minimal risks of bias), + (some sources of bias apparent), - (significant sources of bias), NR (not reported) or NA (not applicable).

To increase methodological rigour, a second reviewer independently assessed a proportion of randomly selected papers (20%, $n = 3$). This process raised some discrepancies, mainly around clarifying scoring criteria. Inconsistencies were discussed in a virtual meeting until 100% consensus was reached. Following this, two further papers were checked for inter-rater reliability, which resulted in 100% consistency for the overall ratings of the papers' internal and external validity.

Data Synthesis

A narrative synthesis was conducted following the Economic and Social Research Council recommendations (Popay et al., 2006). A meta-analysis was not performed due to considerable heterogeneity between studies (e.g. differences in samples and outcome measures), widespread issues with study quality, and studies including the same individuals (Dugré et al., 2018; Dugré & West, 2019).

Results

Summary of Study Characteristics

The narrative synthesis included 14 papers published between 1990 and 2021. Seven papers were published post-2005, following previous related reviews (Braham et al., 2004; Barrowcliff & Haddock, 2006). Details of study characteristics are summarised below and presented in Table 2.

Studies were conducted across a range of countries, with the majority facilitated in England (n = 4), followed by America (n = 2), Australia (n = 2) and Canada (n = 2). One study was conducted in Germany, Singapore, Lebanon and Wales, respectively. Different samples were recruited, including inpatients (n = 5), inpatients and outpatients (n = 4), outpatients (n = 1), forensic and non-forensic inpatients and outpatients (n = 1), community and forensic samples (n = 1), forensic samples (n = 1) and inpatient and community samples (n = 1). All studies were cross-sectional and used a correlational (n = 5) or between-group design (n = 9).

Across the studies, 1295 participants were recruited. However, two studies (Dugré et al., 2018; Dugré & West, 2019) included the same participants and had overlapping samples. For the purposes of narrative synthesis, these participants are considered twice. Most studies (n = 10) recruited participants with mixed psychiatric diagnoses (e.g. SSC and other diagnoses,

including mood and personality disorders). Three studies recruited participants with a diagnosis of schizophrenia. One study recruited participants diagnosed with schizophrenia or schizoaffective disorder.

Sample sizes ranged from 31 to 280 participants (mean = 92.5, median = 73.5). Five studies were conducted with under 50 participants. The review sample included more male (*n* = 766) than female (*n* = 477) participants. One study (Junginger, 1990) did not report participant gender, accounting for 51 participants in the review. Sample mean ages ranged from 30 to 55 years. Three studies did not provide the mean age of participants.

A range of variables associated with compliance with CV were considered across studies. This included voice-related variables including the dangerousness of commands, command content, delusion congruence, voice recognition, voice malevolence and benevolence, power and social rank. Studies also explored factors linked to voice-hearer characteristics, such as illness severity, history of compliance and anger. There was considerable heterogeneity in the measures used to assess the latter.

All studies relied on self-report data to assess compliance with CV. Some studies asked participants about compliance in an interview, and then categorised compliance using a rating scale. Other studies used schedules, such as the MUPS, AHS or CHI. Two studies (Lee et al., 2004; Salim et al., 2021) attempted to corroborate self-reported compliance using patient notes or data from informants. Studies assessed compliance with different command types (e.g. self-harm, harm-others, innocuous) over different timeframes (e.g. from the last command to over the lifetime).

Study Quality

Quality appraisal ratings for the included studies are reported in Table 4. Three items

were not applicable for all studies, as they assessed methodological factors not relevant to the study designs of included papers (e.g. follow-up periods).

The quality of included studies varied, and issues of bias for both internal and external validity were identified. No studies received ratings of minimal risk of bias for both internal and external validity. Methodological strengths across studies included sufficient demographic information, evidence of a strong theoretical rationale for variables examined, and the inclusion of multiple variables in statistical analyses. Studies demonstrating higher quality were given increased weighting in the narrative synthesis. No papers were excluded based on poor quality.

Three papers (Fox et al., 2004; Junginger, 1990; Lee et al., 2004) were considered poor for both internal and external validity. Four studies (Erkwoh et al., 2003; Fox et al., 2004; Junginger, 1990; Lee et al., 2004) were considerably biased on internal validity. Low internal validity ratings were predominantly due to no consideration of, or effort to reduce selection bias, potential confounding variables (e.g. memory difficulties, comorbid substance use) that were not controlled for, insufficient reporting on the reliability and validity of outcome measures, and the use of unvalidated measures.

Various issues of bias in relation to external validity were identified. Many studies used dichotomous measures of compliance (e.g. compliers/resisters), which reduced ecological validity. In addition, most papers did not include a power calculation to determine whether sufficient power was achieved to detect significant results. Studies were considered low in external validity for reasons including the use of small select samples, which were considered underpowered, an absence of clear inclusion and exclusion criteria, and information on recruitment processes. This resulted in difficulties determining whether study samples were representative of the source population.

Table 4

Quality Assessment Scores for the Included Studies

	External Validity							Internal Validity									Summary	
Study	Sample Description	Sample Generalisability	Sampling Bias	Selection Bias	Theoretical Basis for Variables	Contamination Bias	Confounds	Setting Applicability	Outcome Measure Reliability	Outcome Measure Completion	Outcomes Assessed	Assessment of Follow-up Phases	Statistical Power	Variables Analysed	Data Analysis Methods	Statistics Presented	Overall Internal Validity	Overall External Validity
Junginger (1990)	-	-	-	NR	+	N/A	NR	-	+	+	+	N/A N/A	NR	+	+	+	-	-
Junginger (1995)	+	+	-	NR	+	N/A	NR	-	+	+	+	N/A N/A	NR	+	+	+	+	-
Beck-Sander et al. (1997)	+	+	-	NR	+	N/A	NR	+	NR	+	+	N/A N/A	NR	+	+	+	+	-
Erkwoh et al. (2002)	+	+	-	NR	+	N/A	NR	-	NR	+	+	N/A N/A	NR	+	+	+	-	+
Fox et al. (2004)	+	+	-	NR	+	N/A	+	+	NR	+	+	N/A N/A	NR	++	+	+	-	-
Lee et al. (2004)	+	+	.	NR	+	N/A	+	-	-	+	+	N/A N/A	NR	+	+	+	-	-
Mackinnon et al. (2004)	+	+	_	NR	+	N/A	+	-	+	+	+	N/A N/A	NR	+	+	+	+	-
Shawyer et al. (2008)	+	+	+	NR	++	N/A	+	+	+	+	+	N/A N/A	NR	+	+	+	+	+
Barrowcliff & Haddock (2010)	+	+	+	NR	++	N/A	NR	++	+	+	+	N/A N/A	NR	+	+	+	+	+
Reynolds & Scragg (2010)	++	+	+	NR	++	N/A	NR	++	+	+	+	N/A N/A	+	+	+	+	+	+
Bucci et al. (2013)	++	++	+	NR	++	N/A	+	++	+	+	+	N/A N/A	NR	++	+	++	+	+
Dugré et al. (2018)	+	+	+	NR	++	N/A	+	-	+	+	+	N/A N/A	NR	++	+	+	+	+
Dugré & West (2019)	+	+	+	NR	++	N/A	+	-	+	+	+	N/A N/A	NR	++	+	++	+	+
Salim et al. (2021)	+	+	+	NR	+	N/A	+	-	+	+	+	N/A N/A	NR	+	+	+	+	+

Note. ++ = no or minimal risks of bias exist; + = some sources of bias evident; - = significant sources of bias exist; NR = not reported; NA = not applicable.

Study Findings on Variables Related to Compliance with CV

All studies examined variables associated with compliance with CV. Across studies, a range of factors, linked to voice-related variables and personal characteristics of the voice-hearer, were considered. Study results are first summarised for the research question exploring the relationship between voice-related variables (e.g. characteristics of voices and beliefs about voices) and compliance. Secondly, results relating to the second research question, examining the relationship between voice-hearer characteristics and compliance are presented.

Relationship between Voice-Related Variables and Compliance

Command Dangerousness

Three studies explored the associations between dangerousness of commands and compliance. Junginger (1990) and Shawyer et al. (2008) found that command dangerousness (to self or others) was not associated with compliance ($p > .05$). In contrast, Junginger (1995) found that the least dangerous commands were the most likely to be complied with ($F = 13.62$, $df = 1, 86$, $p < .001$).

Command Content

Two studies explored command content as a mediator of compliance with varying outcomes. Lee et al. (2004) found that participants with violent (harm-other) commands were less likely to comply than those with self-harm commands ($OR = 17.9$, 95% CI: 3.5 - 90.9, $p < .001$). Beck-Sander et al. (1997) found that participants with benevolent voices were more likely to comply with innocuous ($p = .031$, tau-b = .35) or severe ($p = .032$, tau-b = .40) but not self-harm ($p = .29$, tau-b = .23) commands.

Delusion Congruence

Three studies assessed the impact of supportive unusual beliefs on compliance. Junginger (1990) found that compliance was significantly associated with congruent delusions (F = 6.95, df = 3, 40, p =.01). Similarly, Shawyer et al. (2008) found that compliance was significantly associated with congruent unusual beliefs (*OR* per unit increase = 1.74, 95% CI: 1.12 - 2.72, p = .014). However, Junginger (1995) did not observe a significant association between supportive unusual beliefs and compliance ($p > .05$). Different findings may have been obtained due to methodological variations between studies. The Shawyer et al. (2008) study was considered methodologically stronger, as a rating scale was introduced to assess delusion congruence.

Voice Recognition and Perceived Voice Reality

Three studies explored the associations between voice recognition and compliance. Across studies, it was consistently identified that participants who recognised the voice were more likely to comply with the voices commands. For example, Junginger (1990) found that compliance was significantly more likely when the voice was recognisable (F = 3.97, df = 3, 40, $p < .05$). Junginger (1995) also found that voice recognition was significantly associated with increased compliance (F = 6.14, df = 1, 86, $p < .02$). Furthermore, Erkwoh et al. (2002) found that compliance was more likely when the voice-hearer recognised the voice and perceived the voice as real ($p < .05$; 95% CI: 1.35 - 95.5).

Voice Benevolence

Three studies explored voice benevolence. Beck-Sander et al. (1997) found that perceived voice benevolence was related to increased compliance with innocuous (p = .031, tau-b = .35) and severe (p = .032, tau-b = .40), but not self-harm commands (p = .29, tau-b =

.23). Bucci et al. (2013) did not replicate these findings, as they did not find an association between voice benevolence and compliance with benign commands (r = .084, p = .776) or harmful (self-harm and harm-other) commands (r = .289, p = .122). However, self-harm and harm-other command types were combined for the analysis, which may account for the inconsistencies in results, as Beck-Sander et al. (1997) analysed self-harm commands separately to severe (harm-other) command types. Fox et al. (2004) also found no significant differences in voice benevolence between compliers and non-compliers with harm-other or self-harm command types (probability of X^2, p = 0.11). However, the absence of significant results for this variable may have been the result of minimal reports of voice benevolence within the sample.

Voice Malevolence

Numerous studies examined the association between voice malevolence and compliance. Beck-Sander et al. (1997) found that participants were significantly more likely to resist malevolent voices (p = .003, tau-b = .46). However, Barrowcliff and Haddock (2010) found that higher ratings of perceived voice malevolence correlated with compliance with the last self-harm command (r = 0.51, p = .006). In contrast, using a between-groups design, Dugré et al. (2018) did not find significant differences in voice malevolence between compliers and non-compliers (X^2 = 1.000, p = 0.317). Similarly, Fox et al. (2004) found no significant differences in voice malevolence between compliers/non-compliers (probability of X^2, p = .18). In addition, Shawyer et al. (2008) did not find a significant association between voice malevolence and compliance (OR = 1.09, 95% CI: 0.99 – 1.21, p = .075). Bucci et al. (2013) also obtained this result when the command type was specified (r = -.051, p = .789). However, power calculations were not reported for these studies, therefore it is unclear whether sufficient power was achieved to detect meaningful significant differences.

Voice Omnipotence

Five studies explored the relationship between voice omnipotence and compliance. A range of assessment methods were used to explore omnipotence, including perceived voice power and control. Beck-Sander et al. (1997) found that participants with perceived voice control were significantly less likely to comply with severe (r = -.34; p = .066), innocuous (r =. -42; p = .008) and self-harm (r = -.42; p = .045) commands. In addition, Shawyer et al. (2008) found initial evidence that participants with threatening voices were more likely to comply with omnipotent voices (*OR* = 1.23, 95% CI: 1.02 -0 .56, p = 0.03).

The relationship between voice omnipotence and compliance with different command types was also considered. Fox et al. (2004) found that compliers with harm-other (p < .01) and self-harm commands (p < .02) rated CV as more powerful than non-compliers. Similarly, Reynolds and Scragg (2010) found that compliers with harm-other commands perceived the voice as more powerful than resisters (U = 41, r = -0.52, p = .003). Moreover, Bucci et al. (2013) found that voice omnipotence was significantly and independently associated with compliance with harmful commands (*OR* = 1.26, 95% CI: 1.02 - 1.64, p = .033).

Social Rank

Two studies explored the association between perceived voice social rank and compliance. Reynolds and Scragg (2010) found that compliers with harm-other commands rated the CV as a higher social rank than themselves, compared to resisters (U = 46.5, r = -0.48, p = .006). Similarly, Barrowcliff and Haddock (2010) found that higher ratings of voice social rank were associated with increased compliance with the last harm-other command (F (1,14) = 29.14, p < .001).

Additional Findings

Additional findings regarding possible factors associated with acting on CV in the included studies relate to the nature of voices and beliefs about voices. Mackinnon et al. (2004) found that non-compliers rated commanding voices as more intrusive ($OR = 2.57$, $p < .05$) but less authoritative in tone ($OR = 2.57$, $p < .05$) than compliers. A further study by Salim et al. (2021) identified that higher resistance to beliefs about voices was significantly associated with non-compliance ($ORa = 0.915$, 95% CI: 0.859 - 0.976, $p = .007$).

Relationship between Voice-Hearer Characteristics and Compliance

Illness Severity

Four studies explored the relationship between illness severity and compliance. Salim et al. (2021) found that compliance was significantly associated with increased positive symptoms ($ORa = 1.090$, 95% CI: 1.016 - 1.168, $p = .016$) and general psychopathology ($ORa = 1.043$, 95% CI: 1.003 - 1.084, $p = .035$). When explored in relation to different command types, Barrowcliff and Haddock (2010) identified that heightened symptom presentation was associated with increased compliance with the last self-harm ($F(1,28) = 5.04$, $p = .033$) and harm-other ($F(1,14) = 6.38$, $p = .025$) command. Similarly, Dugré et al. (2018) found that self-harm compliers had increased general symptoms ($U = 533.5$, $p = .011$) and emotional distress ($U = 496.5$, $p = .004$) compared to non-compliers. In addition, Dugré and West (2019) found that increased psychotic symptoms, including conceptual disorganisation ($OR = 2.23$, 95% CI: 1.14 - 4.40, $p = .020$) and unusual thought content ($OR = 1.28$, 95% CI: 1.00 - 1.62, $p = .046$) were significantly and independently associated with compliance frequency for participants with malevolent voices.

Anger

Four studies explored the relationship between anger and compliance. Erkwoh et al. (2002) found that experiencing anger in response to CV correlated with compliance ($p < .05$; 95% CI: 1.35 - 95.5). In addition, Shawyer et al. (2008) found that trait anger was associated with compliance when voices were perceived as threatening ($OR = 1.17$, 95% CI: 1.00 - 1.35, $p = .04$). When explored for different command types, Bucci et al. (2013) found that increased anger ($r = .362$, $p = .049$) and difficulties regulating anger ($r = .371$, $p = .043$) were associated with compliance with harmful commands. In contrast, Dugré et al. (2018) did not identify significant associations between anger and compliance with self-harm commands ($U = 743$, $p = .591$). However, different assessment tools were used between studies to assess anger.

Impulsivity

Three studies assessed the relationship between impulsivity and compliance using the BIS-11 (Patton & Stanford, 1995). The BIS-11 is a 30-item questionnaire, used to assess motor and cognitive impulsiveness, as well as general attentional impulsivity. Using this measure, Bucci et al. (2013) found that impulsivity was associated with compliance with harmful commands ($r = .529$, $p = .003$). However, Dugré et al. (2018) did not observe significant differences between self-harm compliers and non-compliers on the BIS-11 ($U = 749$, $p = .627$). Dugré and West (2019) also observed no significant differences between groups on impulsivity ($X^2 = 3.75$, $p = .053$).

Past Compliance

Two studies explored the relationship between past compliance and current compliance with CV. Junginger (1995) found that past compliance was not associated with compliance ($p > .05$). However, Dugré et al. (2018) found that self-harm compliers had an increased history

of compliance compared to non-compliers (U = 574.0, p = .018). Different results may have been obtained due to methodological differences, with outcomes in the latter study grouped based on the command type.

Beliefs about Future Compliance

Two studies explore the relationship between beliefs about future compliance and compliance. Dugré et al. (2018) found that compliers with self-harm commands rated their likelihood of complying in the future higher than non-compliers (*OR* = 2.96, 95% CI: 1.31 - 6.72, p = .009). When explored in relation to voice intent, Dugré and West (2019) found that participants with benevolent CV were significantly more certain of future compliance than participants with malevolent voices (X^2 = 6.47, df = 3, p = .167).

Childhood Physical Abuse (CPA)

Two studies considered the association between CPA and compliance with CV, using the QCE (Monahan et al., 2001). This 12-item measure was used to assess the frequency and severity of participants' experiences of CPA, perpetrated by parents, before the age of 18. Using this measure, Dugré et al. (2018) found that self-harm compliers reported more frequent (U = 499.0, p = .003) and severe (U = 440.5, p = .001) CPA than non-compliers. When considered in relation to voice intent, Dugré and West (2019) found that CPA frequency (*OR* = 1.59, 95% CI: 1.01 - 2.52, p = .047) was significantly and independently associated with compliance with malevolent voices. Caution is required when interpreting these findings due to overlapping samples.

Additional Findings

There was an initial exploration of the relationship between some additional voice-hearer characteristics and compliance in the included studies. Shawyer et al. (2008) found that

being older (*OR* = 1.09, 95% CI: 1.02 - 1.17, *p* = .011) and experiencing low maternal control in childhood (*OR* = 1.10, 95% CI: 1.02 - 1.19, *p* = .018) increased the likelihood of compliance. They also found that participants who were not taking antipsychotic medication at the time of the index CV were significantly more likely to comply (*OR* = 9.09, 95% CI: 2.10 - 39.29, *p* = .003). In addition, Lee et al. (2004) found that a history of self-harm (*p* = .014) correlated with an increased likelihood of compliance. Dugré & West (2019) found that increased beliefs about having to obey CV commands were significantly and independently associated with frequency of compliance (*OR* = 1.42, 95% CI: 1.05 - 1.90, *p* = .021).

There was a tentative finding by Fox et al. (2004) that compliance was related to social status, as harm-other CV compliers reported increased feelings of superiority in social relationships compared to non-compliers ($p < .01$), and self-harm compliers had higher perceived inferiority ($p < .01$). In addition, Dugré et al. (2018) found that compliers with self-harm commands were more likely to have comorbid substance use disorder ($X^2 = 6.05$, $df = 1$, $p = .014$). They also found that this variable was a significant independent factor associated with compliance with self-harm commands (*OR* = 5.76, 95% CI: 1.54 - 21.49, *p* = .009). Mackinnon et al. (2004) found that resisters reported using significantly more coping strategies than compliers ($t[128] = 2.44$; $p < .05$).

Discussion

Summary of Findings

The aims of this review were to explore variables associated with CV compliance. The following research questions were posed: 1) What voice-related variables are associated with compliance with CV? 2) Are characteristics of the voice-hearer associated with increased compliance? The review also aimed to determine if any papers exploring variables associated

with compliance with CV were published post-2005 and assess the methodological quality of the research.

Overall, 14 papers met the inclusion criteria and were included in the narrative synthesis. Included papers were published between 1990 and 2021, with seven papers published post-2005. All studies examined variables associated with compliance with CV. Like previous related reviews, quality appraisal of included papers identified significant bias, relating to both internal and external validity. Consequently, caution should be applied when interpreting the conclusions drawn.

The results highlighted that command content appeared to influence compliance and compliance outcomes differed based on command typologies. There was consistent preliminary evidence that recognising the voice and perceiving it as real increased compliance. It is considered that participants may be more likely to comply with familiar voices that appear real, as people are increasingly likely to trust voices they recognise (Braham et al., 2004). The combined results suggest that reduced subjective voice control and high voice omnipotence are associated with compliance for self-harm and harm-other command types, and that compliance may be particularly likely with omnipotent voices which are perceived as threatening. Such findings provide further evidence in support of the cognitive model (Chadwick & Birchwood, 1994) of voice-hearing.

There was some evidence that congruent delusions increase compliance. This appears logical, as supportive unusual beliefs may further corroborate the CV content and provide further support for the client's worldview. In line with social rank theory (Allan & Gilbert, 1995; Birchwood et al., 2002), there was tentative evidence that perceiving the voice of a higher social rank increased compliance, but the evidence base was limited. Due to inconsistent results between studies, the relationship between command dangerousness, voice benevolence and

malevolence, and compliance with CV remains unclear, and prevent robust conclusions from being drawn. It was identified that compliance may be more likely when voices are considered more intrusive, but the evidence base is limited.

Studies also explored the relationship between compliance and variables linked to personal characteristics of the voice-hearer. There was substantial evidence linking illness severity to compliance with self-harm and harm-other commands. The results provide initial evidence to suggest that people with increased levels of anger and anger reactivity may be more likely to comply with commands, particularly with harm-other commands. There is tentative initial evidence that stronger beliefs about future compliance may increase compliance with self-harm commands, and that participants with benevolent voices may be more certain of future compliance, irrespective of command type. There was early evidence of an association between CPA and compliance with self-harm commands and malevolent voices, irrespective of command type. This is consistent with research indicating that CPA may lead to submissive behaviours in interpersonal relationships (Celik & Odaci, 2012). This relational dynamic may also apply to the voice-hearers' relationships with CV.

The link between anger and compliance with self-harm commands was unable to be determined from the available results and requires further exploration. Due to inconsistent results, it is also unclear whether impulsivity is a consistent correlate of compliance. The results indicate that compliance with self-harm commands may be more likely for individuals who have previously complied. However, no firm conclusions could be drawn due to limited research and heterogeneous methodologies.

There was some evidence that being older, previous self-harm, comorbid substance use disorder, and beliefs around having to comply may increase compliance. Furthermore, there was initial evidence that self-harm compliers had fewer coping skills than resisters. However,

there was a paucity of research to provide further evidence for these findings. There is early evidence that social status in relation to others is linked to compliance, where harm-other CV compliers may have increased feelings of superiority in social relationships than non-compliers, and self-harm compliers have higher feelings of social inferiority than non-compliers. In summary, the findings of this review highlight a complex interaction between CV and compliance, and that compliance may be influenced by a range of variables.

Strengths and Limitations of the Current Review

Strengths of this review include that a review protocol was pre-registered in line with best practice guidance. In addition, PRISMA guidelines were followed (see Appendix A). The author searched three databases to support the retrieval of relevant papers, with no specified earliest publication date. A librarian was consulted to support a robust search strategy. Forward and backward citation searches of reference lists of included papers increased the likelihood that all relevant papers were identified. A high level of inter-rater reliability was obtained when a sample of papers were checked against inclusion criteria during the screening phase, reducing the risk of bias (e.g. due to human error). The quality appraisal of papers was completed using an appraisal tool and verified by a second independent reviewer, increasing the reliability and methodological integrity of the review.

A comprehensive synthesis of the literature and direct comparison of individual study findings was challenging due to significant methodological disparities between papers, which limited overall interpretations of the data. Methodological differences included heterogeneity in command type, the variables explored, sample sizes, demographic characteristics and timeframes relating to compliance. Some of the included studies considered compliance outcomes for different command types, and others did not discriminate between command type (e.g. self-harm or harm-other). Studies were conducted in various countries and settings (e.g.

community, inpatient, forensic), hindering the ability to draw definitive conclusions. Grey literature and papers not published in English were not included. This may have led to publication and language bias, and the potential exclusion of relevant papers.

Research Limitations

Research exploring factors associated with compliance with CV remains limited, as highlighted by the 14 papers eligible for inclusion in this review. Eight studies were published 15 or more years ago, bringing into question the ecological validity of the findings. All studies were cross-sectional; thus, causation between the variables examined and compliance could not be determined. Quality appraisal of studies identified various methodological issues, including small sample sizes, an absence of power calculations, reliance on self-report data and dichotomous measures of compliance which reduced ecological validity. Retrospective data collection on compliance was common, potentially introducing recall bias. Furthermore, studies were conducted with a range of populations (e.g. inpatients, outpatients, forensic and community), limiting the generalisability of the findings. Studies did not examine whether there were gender differences in the outcomes observed.

Future research should aim to address the methodological limitations of past research through reporting power calculations, using larger samples, and corroborating self-report data. Implementation of continuous compliance measures may support more nuanced understandings, with increased clinical utility in informing risk assessments. The use of prospective studies (e.g. longitudinal or time series designs) with community, inpatient and forensic populations is required to help inform the current understanding of compliance across populations and inform intervention efforts. If higher-quality studies with increased methodological rigour become available, a replication of the current review may be useful alongside conducting a meta-analysis of findings across the variables examined.

Clinical Implications

The current review findings have a range of clinical implications for professionals, including clinical and forensic psychologists, who work with this population. It is recommended that clinicians ask clients about their CV experience, including command content, historical compliance, beliefs about voices (e.g. perceived omnipotence), perceived voice intent, and thoughts around future compliance during assessments (including risk assessments). Exploration of protective factors, including effective coping skills and beliefs, for example around their ability not to comply with commands is also recommended. Eliciting this information may enhance the psychological formulation of risk, inform treatment targets, aid prevention and help manage risk of future compliance. Addressing comorbid substance use disorder is recommended to support client well-being and reduce risks linked to compliance.

Psychological interventions for this population may benefit from integrating a focus on understanding and addressing compliance, for example through supporting coping skill development. Interventions such as cognitive therapy for command hallucinations (Birchwood et al., 2018), which aim to reduce voice power and increase the voice-hearers' perceived sense of control, may help reduce future risk of compliance.

Directions for Future Research

Given the paucity of research identified, further study is required to increase current understanding of the processes implicated in whether or not a person acts on CV. Furthermore, several gaps in the literature have been identified which warrant consideration. Variables associated with command compliance for child, intellectual disability and deaf populations are required to help inform risk assessments and tailor interventions. Qualitative research alongside this would also be useful to obtain a rich understanding of service users' perspectives on

compliance with CV and inform service planning and delivery. Further research conducted in the UK is indicated and would support the generalisability of results to local populations.

As suggested in previous research (e.g. Dugré et al., 2018), it would be useful for future research to explore other possible variables related to compliance, including other types of childhood abuse (e.g. sexual). Research exploring possible gender differences in outcomes of compliance would also be informative for risk assessment and treatment approaches. Existing research has focused on participants who have accessed services, therefore research conducted with community samples with experience of CV who have not accessed services is required. As suggested by Dugré and West (2019), future research using ecological momentary assessment would be useful to further understand the dynamic relationships between variables such as beliefs about voices, command type and compliance. More sophisticated mediation analyses to test proposed mediation models are also advised.

Conclusions

In conclusion, the current review highlighted a developing literature exploring factors associated with compliance with CV. However, the evidence base remains limited. Furthermore, there were significant difficulties integrating the findings due to methodological differences between studies. The research reviewed indicated a complex and dynamic relationship between compliance and both voice-related variables (e.g. voice recognition, congruent unusual beliefs and voice omnipotence) and variables related to personal characteristics of the voice-hearer (e.g. illness severity and beliefs about future compliance). Quality appraisal raised issues with validity and reliability across included studies. Therefore, the results should be interpreted with caution. Further research which addresses the methodological shortcomings of previous research is warranted to help understand variables related to compliance with CV, support risk assessments and enhance therapies.

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Appendix A

PRISMA 2020 Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	Page 1
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	Page 2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	Pages 4-7
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	Pages 6&7
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	Page 8&9
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	Page 7&8
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	Page 7&8
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	Page 8,9 & 10
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	Page 10
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	Page 10
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	Page10
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	Page 19
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	n/a

Section and Topic	Item #	Checklist item	Location where item is reported
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	n/a
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	n/a
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	Page 10
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	Page 20
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	n/a
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	n/a
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	n/a
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	n/a
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	Page 11
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	n/a
Study characteristics	17	Cite each included study and present its characteristics.	Page 12-15
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	Page 23
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	Page 16-18
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	Page 20-22
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	n/a
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	n/a
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	n/a
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	n/a

Section and Topic	Item #	Checklist item	Location where item is reported
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	Page 16-18
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	Page 31-33
	23b	Discuss any limitations of the evidence included in the review.	Page 34&35
	23c	Discuss any limitations of the review processes used.	Page 34
	23d	Discuss implications of the results for practice, policy, and future research.	Page 36
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	Page 7
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	Page 7
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	Page 8
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	n/a
Competing interests	26	Declare any competing interests of review authors.	n/a
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	n/a

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71

For more information, visit: http://www.prisma-statement.org/

Appendix B

PICO Search Framework

PICO Domain	Search Criteria	Search Terms Used
Population	Individuals with psychosis or a schizophrenia spectrum condition who hear voices	'Hallucination*' OR 'voices'
	AND	
Intervention/ Exposure	Command hallucinations	'Command*' OR 'imperative'
	AND	
Control	N/A	N/A
	AND	
Outcome	Factors related to compliance with command hallucinations.	'Compl*'

Appendix C

GATE Quality Appraisal Tool

Quality Appraisal - GATE

There are 5 sections of the revised GATE. Section 1 seeks to assess the key population criteria for determining the study's external validity – that is, the extent to which the findings of a study are generalisable beyond the confines of the study to the study's source population.

Sections 2 to 4 assess the key criteria for determining the study's internal validity – that is, making sure that the study has been carried out carefully, and that the identified associations are valid and are not due to some other (often unidentified) factor.

Checklist items are worded so that 1 of 5 responses is possible:

++	Indicates that for that particular aspect of study design, the study has been designed or conducted in such a way as to minimise the risk of bias.
+	Indicates that either the answer to the checklist question is not clear from the way the study is reported, or that the study may not have addressed all potential sources of bias for that particular aspect of study design.
–	Should be reserved for those aspects of the study design in which significant sources of bias may persist.
Not reported (NR)	Should be reserved for those aspects in which the study under review fails to report how they have (or might have) been considered.
Not applicable (NA)	Should be reserved for those study design aspects that are not applicable given the study design under review (for example, allocation concealment would not be applicable for case–control studies).

In addition, the reviewer is requested to complete in detail the comments section of the quality appraisal form so that the grade awarded for each study aspect is as transparent as possible.

Each study is then awarded an overall study quality grading for internal validity (IV) and a separate one for external validity (EV):

• ++ All or most of the checklist criteria have been fulfilled, where they have not been fulfilled the conclusions are very unlikely to alter.

• + Some of the checklist criteria have been fulfilled, where they have not been fulfilled, or not adequately described, the conclusions are unlikely to alter.

• – Few or no checklist criteria have been fulfilled and the conclusions are likely or very likely to alter.

Study identification: Include full citation details	

Study design: • Refer to the glossary of study designs (appendix D) and the algorithm for classifying experimental and observational study designs (appendix E) to best describe the paper's underpinning study design		
Guidance topic:		
Assessed by:		
Section 1: Population		
1.1 Is the source population or source area well described? • Was the country (e.g. developed or non-developed, type of health care system), setting (primary schools, community centres etc), location (urban, rural), population demographics etc adequately described?	++ + − NR NA	Comments:
1.2 Is the eligible population or area representative of the source population or area? • Was the recruitment of individuals, clusters or areas well defined (e.g. advertisement, birth register)? • Was the eligible population representative of the source? Were important groups underrepresented?	++ + − NR NA	Comments:
1.3 Do the selected participants or areas represent the eligible population or area? • Was the method of selection of participants from the	++ + − NR NA	Comments:

eligible population well described? • What % of selected individuals or clusters agreed to participate? Were there any sources of bias? • Were the inclusion or exclusion criteria explicit and appropriate?		
Section 2: Method of selection of exposure (or comparison) group		
2.1 Selection of exposure (and comparison) group. How was selection bias minimised? • How was selection bias minimised?	++ + − NR NA	Comments:
2.2 Was the selection of explanatory variables based on a sound theoretical basis? • How sound was the theoretical basis for selecting the explanatory variables?	++ + − NR NA	Comments:
2.3 Was the contamination acceptably low? • Did any in the comparison group receive the exposure? • If so, was it sufficient to cause important bias?	++ + − NR NA	Comments:
2.4 How well were likely confounding factors identified and controlled? • Were there likely to be other confounding factors not considered or appropriately adjusted for? • Was this sufficient to cause important bias?	++ + − NR NA	Comments:
2.5 Is the setting applicable to the UK? • Did the setting differ significantly from the UK?	++ + − NR	Comments:

	NA	
Section 3: Outcomes		
3.1 Were the outcome measures and procedures reliable? • Were outcome measures subjective or objective (e.g. biochemically validated nicotine levels ++ vs self-reported smoking −)? • How reliable were outcome measures (e.g. inter- or intra-rater reliability scores)? • Was there any indication that measures had been validated (e.g. validated against a gold standard measure or assessed for content validity)?	++ + − NR NA	Comments:
3.2 Were the outcome measurements complete? • Were all or most of the study participants who met the defined study outcome definitions likely to have been identified?	++ + − NR NA	Comments:
3.3 Were all the important outcomes assessed? • Were all the important benefits and harms assessed? • Was it possible to determine the overall balance of benefits and harms of the intervention versus comparison?	++ + − NR NA	Comments:
3.4 Was there a similar follow-up time in exposure and comparison groups? • If groups are followed for different lengths of time, then more events are likely	++ + − NR NA	Comments:

to occur in the group followed-up for longer distorting the comparison. • Analyses can be adjusted to allow for differences in length of follow-up (e.g. using person-years).		
3.5 Was follow-up time meaningful? • Was follow-up long enough to assess long-term benefits and harms? • Was it too long, e.g. participants lost to follow-up?	++ + − NR NA	Comments:
Section 4: Analyses		
4.1 Was the study sufficiently powered to detect an intervention effect (if one exists)? • A power of 0.8 (i.e. it is likely to see an effect of a given size if one exists, 80% of the time) is the conventionally accepted standard. • Is a power calculation presented? If not, what is the expected effect size? Is the sample size adequate?	++ + − NR NA	Comments:
4.2 Were multiple explanatory variables considered in the analyses? • Were there sufficient explanatory variables considered in the analysis?	++ + − NR NA	Comments:
4.3 Were the analytical methods appropriate? • Were important differences in follow-up time and likely confounders adjusted for?	++ + − NR NA	Comments:

4.6 Was the precision of association given or calculable? Is association meaningful? • Were confidence intervals or p values for effect estimates given or possible to calculate? • Were CIs wide or were they sufficiently precise to aid decision-making? If precision is lacking, is this because the study is under-powered?	++ + − NR NA	Comments:
Section 5: Summary		
5.1 Are the study results internally valid (i.e. unbiased)? • How well did the study minimise sources of bias (i.e. adjusting for potential confounders)? • Were there significant flaws in the study design?	++ + −	Comments:
5.2 Are the findings generalisable to the source population (i.e. externally valid)? • Are there sufficient details given about the study to determine if the findings are generalisable to the source population? • Consider: participants, interventions and comparisons, outcomes, resource and policy implications.	++ + −	Comments:

Section Two: Empirical Study

An Experimental Study Exploring Dissociative Processes in the Pathway from Trauma to Voice-Hearing

Abstract

Objectives

This online study aimed to compare participants with psychosis and participants with a psychiatric diagnosis of post-traumatic stress disorder (PTSD) on factors thought to be linked to voice-hearing (VH), including trauma and dissociation. It also aimed to examine the relationship between peritraumatic dissociation and VH. Although this construct has been linked to trauma-related conditions, including PTSD, it has not been studied in psychosis.

Methods

A between-groups design was used. Participants (n = 81) were recruited to a psychosis, PTSD or control group (27 per group). All participants were obtained via social media; however, recruitment was also attempted via local NHS services. Participants received a link to the study and completed questionnaires measuring hallucination proneness, childhood trauma, dissociation and peritraumatic dissociation. Participants also completed an online signal detection test to support data collection for a separate study. Between group differences were analysed using ANCOVAs, controlling for age. Associations between childhood trauma, dissociation, peritraumatic dissociation and VH were examined using regression and a serial mediation model.

Results

The psychosis and PTSD groups reported significantly increased childhood trauma, dissociation, and peritraumatic dissociation. Support was found for a two-stage mediational pathway, with peritraumatic dissociation leading to dissociation mediating between childhood trauma and hallucination proneness.

Conclusions

The findings provide preliminary evidence that peritraumatic dissociation is relevant to psychosis as well as PTSD. It is recommended that clinicians routinely screen trauma, dissociation and peritraumatic dissociation in patients with a psychiatric diagnosis of psychosis and PTSD. Research using larger samples and clinical populations is recommended.

Practitioner Points

- The findings suggest that dissociation and peritraumatic dissociation are common psychological mechanisms implicated in both PTSD and psychosis.
- Peritraumatic dissociation has been understudied in psychosis. Therefore, further research, including with clinical populations and larger samples, is required to inform understanding.
- Clinicians should routinely screen patients with psychiatric diagnoses of psychosis and PTSD for trauma, dissociation and peritraumatic dissociation.
- Where identified, trauma, dissociation and peritraumatic dissociation should be attended to in the assessment and formulation of psychological distress.
- Research evaluating the effectiveness of existing trauma-based therapies for addressing peritraumatic dissociation is indicated to inform current practice.

Keywords: Schizophrenia, psychosis, post-traumatic stress disorder, trauma, voice hearing, hallucinations, dissociation, peritraumatic dissociation.

Introduction

Voice-hearing (VH) refers to an auditory-verbal hallucinatory experience where an individual hears a voice or voices when an appropriate external stimulus is not present (Shinn et al., 2020). VH is widely conceptualised as a form of psychosis, where psychosis is defined as a loss of contact with reality (Shinn et al., 2020).

VH is considered to exist on a continuum in the general population, with estimates suggesting that approximately one in 10 people in the adult population hear voices (Beaven et al., 2011). VH is a feature of psychiatric diagnoses, including sometimes post-traumatic stress disorder (PTSD) and dissociative disorders (Shinn et al., 2020). However, it is most often associated with schizophrenia (Alderson-Day et al., 2021).

In the Diagnostic and Statistical Manual of Mental Disorders 5th Edition (DSM-5, American Psychiatric Association, 2013), hallucinations are a core diagnostic criterion for schizophrenia spectrum conditions (SSC), including schizophrenia, schizophreniform, schizoaffective, delusional and brief psychotic disorders. The estimated prevalence of VH in SSC is between 60 and 80% (Lim et al., 2016). VH can cause psychological distress, negatively affect wellbeing, and occupational and social functioning (McCarthy-Jones, 2012; Morrison et al., 2004).

A medicalised conceptualisation of VH as a biological disorder is contested by some authors (e.g., Cooke, 2017). Alternative theories include that VH may have cultural, personal and relational importance in the voice-hearers life (Higgs, 2020). There has also been a shift towards focusing on the role of social factors, including trauma, in the aetiology of VH (Higgs, 2020). In accordance with the BPS's Division of Clinical Psychology (2015) guidelines on language in relation to functional psychiatric diagnosis, and to promote a trauma-informed

approach, the language ‘voice hearing’ and ‘people diagnosed with schizophrenia’ rather than ‘people with schizophrenia’ are used throughout this paper.

Trauma and VH

A wealth of research has demonstrated a link between trauma and VH (Hardy, 2017). A meta-analysis by Varese et al. (2012) illustrated a strong relationship between early childhood adversity and risk of psychosis in epidemiological patient vs control and longitudinal studies. Research has also found that people who have experienced childhood sexual abuse are especially likely to hear voices (Bentall et al., 2012; Read et al., 2003; Shevlin et al., 2015; Sitko et al., 2014; Varese et al., 2012; Wickham & Bentall, 2016).

Dissociation is common in trauma related conditions, including psychosis (Černis et al., 2022). Dissociation is considered a complex and persistent psychological trauma response (Dalenberg et al., 2012), which results in a ‘lack of normal integration of thoughts, feelings and experiences into the stream of consciousness and memory’ (Bernstein & Putnam, 1986, p.727). However, definitions vary and there is a lack of conceptual clarity (Černis et al., 2021).

Research indicates voice-hearers have increased experiences of dissociation. Varese et al. (2012) found that voice-hearers reported higher levels of dissociation, on the Dissociative Experiences Scale (DES, Bernstein & Putnam, 1986), than non-voice-hearers. Meta-analyses have also provided evidence of a strong link between VH and dissociation (Longden et al., 2020; Pilton et al., 2015). Importantly, several studies have shown that dissociation mediates the relationship between childhood trauma and VH (Moskowitz et al., 2009; Pilton et al., 2015). For example, Varese et al. (2012) measured childhood trauma and dissociation in a sample of patients with psychosis, with and without auditory verbal hallucinations, as well as healthy controls. They also measured source monitoring deficits, an impaired ability to discriminate

between self-generated thoughts and external stimuli, which has been associated with VH in many studies (Brookwell et al., 2013). VH patients showed high levels of dissociation and impaired source monitoring, but only dissociation mediated between childhood trauma and VH. This finding was interpreted as showing that VH in psychosis was the result of two causal factors acting together – trauma-related dissociation and impaired source monitoring.

Psychosis and PTSD

Psychosis is highly comorbid with PTSD, and there is significant diagnostic and clinical overlap between conditions (Hamner et al., 2000; Qassem et al., 2021). For example, approximately a quarter of people diagnosed with psychosis also meet diagnostic criteria for PTSD (Mueser et al., 2010; Neria et al., 2002). Furthermore, both diagnoses are related to trauma (Bebbington et al; 2011, Bentall et al., 2012; Sareen, 2014). Past trauma is a diagnostic criterion for PTSD (National Institute for Health and Care Excellence, 2020), and childhood trauma, including prolonged interpersonal trauma, is considered important in the aetiology of complex PTSD (CPTSD), a more recent diagnostic subcategory of PTSD (Giourou et al., 2018). In the International Classification of Diseases 11th revision (ICD-11, World Health Organisation, WHO, 2022), CPTSD differs from PTSD, as in addition to experiencing three sets of symptoms consistent with those required for a PTSD diagnosis (re-experiencing, sense of threat and avoidance), three further symptoms clusters relating to disturbances in self-organisation (DSO), including difficulties with emotion regulation, interpersonal difficulties and negative self-concept, are required (Brewin et al., 2017). Dissociation is also considered important in the development of PTSD (Carlson et al., 2012; Wolf et al., 2012) and past reviews (Pilton et al., 2015) have indicated a link between VH and dissociation across PTSD and psychosis diagnoses.

Despite these similarities, distinct differences in VH have sometimes been reported between the two conditions. VH in psychosis is theorised to be produced internally through memories, thoughts and self-talk, but perceived as externally generated and unfamiliar by the voice-hearer (Bentall et al., 2014). Brewin and Patel (2010) argue that people diagnosed with PTSD experience 'auditory pseudo-hallucinations' (critical internal voices recognised as self-generated cognitions). These experiences may be recognised as self-generated as PTSD patients do not have the source monitoring deficits found in VH patients with a diagnosis of psychosis (Brookwell et al., 2013). However, authors have noted the paucity of data comparing psychosis and PTSD patients and argue that VH is likely to be homogeneous across diagnoses (McCarthy-Jones & Longden, 2015).

Research on dissociation has increased in recent years, and there has been a focus on peritraumatic dissociation. Psychological peritraumatic dissociation is defined as changes in 'sense of self, time, place and meaning, which confer a sense of unreality to the event as it is occurring' (Marmar et al., 2004, p.146). Somatoform peritraumatic dissociation relates to the body and refers to full or partial loss of perception, including paralysis, disturbances to vision or coordination, and loss of sensation (Massazza et al. 2021; Nijenhuis et al., 2004).

In the PTSD literature, associations between peritraumatic reactions, including peritraumatic dissociation, and PTSD have been explored. Using the Peritraumatic Dissociative Experiences Questionnaire (PDEQ; Marmar et al., 1997) and Somatoform Peritraumatic Dissociation Questionnaire (SDQ-P; Nijenhuis & van der Hart, 1998), Hagenaars et al. (2007) found both forms of peritraumatic dissociation correlated with PTSD at six months. Furthermore, meta-analyses indicate that people who experience psychological peritraumatic dissociation are more likely to develop PTSD (Breh & Seidler, 2007; Lensvelt-Mulders et al., 2008; Ozer et al., 2003).

It is plausible that peritraumatic dissociation may also be important in the aetiology of VH in psychosis. Furthermore, possible explanations for the commonalities and differences in experiences between PTSD/CPTSD and psychosis might lie in the dissociative responses experienced. However, peritraumatic dissociation has not been explored in a psychosis population, and it is unclear how different dissociative components (e.g. types of peritraumatic dissociation) are related to each condition. Distinguishing the underlying processes between conditions is important to inform psychological theory and support the development of effective psychological interventions.

Aims

As McCarthy-Jones and Longden (2015) note, there is a paucity of data comparing psychosis and PTSD patients. This report is part of a two-part study conducted with another trainee clinical psychologist, which compares participants with psychosis and PTSD on factors considered important in AVHs. The present report focuses on trauma and dissociation measures, which are expected to show similar results for the two groups. The parallel report (by a fellow trainee clinical psychologist) focuses on source monitoring, which is hypothesised to be abnormal, based on Varese et al.'s (2012) findings.

Hypotheses

The primary hypothesis was that the psychosis and PTSD groups would report higher levels of dissociation on the DES than the control group. A secondary hypothesis was that increased ACE scores would correlate with higher levels of dissociation, and dissociation would mediate the relationship between ACEs and VH. Peritraumatic dissociation was also measured. As there was no data for this construct for psychosis samples, the approach taken

was exploratory. However, it was tentatively proposed that peritraumatic dissociation scores would be elevated in the PTSD and psychosis group and correlate with dissociation scores.

Method

Design

This study used a cross-sectional design. Participation involved the completion of various automated self-report questionnaires (including measures of VH, PTSD, dissociation and peritraumatic dissociation; see measures section) online through the data collection platform, Qualtrics. A signal detection test (SDT), established on the Gorilla experiment builder platform (www.gorilla.sc), was also embedded into Qualtrics to support recruitment for the parallel study. Data were analysed quantitatively, using a between-subjects design, to explore differences in outcomes between the three groups (psychosis, PTSD and control).

Aspects of the project, primarily data collection, were completed with a fellow trainee clinical psychologist. Information on shared and distinct aspects of the projects is detailed in Appendix A.

Ethical Approval and Considerations

Ethical approval was received from South Central-Hampshire B Research Ethics Committee (Project ID 311110; see Appendix B). Given the nature of the research, participants were likely to have experienced adversity. Therefore, the study had potential to evoke distress, as participation involved considering past trauma, VH and dissociative experiences. Participants were informed of this prior to participation to ensure informed consent was obtained.

Participants were signposted to support services via the information sheet and debrief form. Contact information for support services, including out of hours services (e.g. Samaritans), was embedded throughout the study. Participants were encouraged to contact the researchers if required, and to seek support from their mental health team and/or corresponding duty team where applicable. The information sheet detailed that participation was voluntary, and participants could withdraw up to two weeks after completing the study without any adverse consequences.

Considering the accessibility of outcome measures for participants, questionnaires with less items were used where possible to reduce potential burden and fatigue and support completion of the study. This was important as cognitive difficulties are highly prevalent for people with psychosis (Reichenberg, 2022).

All participants were invited to enter a prize draw to win one of two £50 Amazon vouchers as gratuity for their time. The monetary value of the vouchers was deemed appropriate and not considered to coerce participation (BPS, 2021). Participants who opted to enter the draw and/or receive a copy of the study findings provided their name and email address. The voucher data was recorded in a separate password protected file and deleted upon completion of the prize draw to preserve anonymity.

Study data was stored in encrypted password protected files, only the researchers and their supervisors could access this. The information sheet advised participants that if the study results were published, their information would be kept confidential, and their data would remain anonymous and unidentifiable.

Patient and Public Involvement (PPI)

Following ethical approval, PPI work was undertaken. This included consultation with two people from a Hearing Voices Network, who met inclusion criteria for the study. A brief presentation was delivered, which provided an overview of the research. Feedback was sought in relation to recruitment, proposed measures and procedures for the study, and clarity of the information and debrief sheet. It was considered that the planned procedures and measures were likely to be acceptable to participants. However, a key area of feedback was the use of diagnostic language in the study, how this may be received by potential participants and hinder recruitment. To address this, language such as 'hallucinations' was amended to 'hearing voices', and a disclaimer added to participant facing materials to explain the rationale for the use of medicalised language and acknowledge that this may not fit some people's experiences. PPI also highlighted challenges with recruitment in this field, and approaches including advertising via third sector organisations were discussed.

Scoping work was conducted with an Early Intervention service, Community Mental Health Team and Specialist Psychotherapy Service, in South Yorkshire, around the feasibility of recruiting clinical groups from these services. All three services reported working with service users who met inclusion criteria and expressed an intention to support recruitment. All participants were invited to opt in to receive a copy of the research findings. It was proposed that study findings could be disseminated to relevant services upon completion.

Sample Size Calculations

Primary Analysis

A *priori* power analysis was calculated using G*Power to determine the minimum sample size necessary to find an effect. Bonferroni correcting for two comparisons (between

psychosis and control group and PTSD and control group), the analysis was conducted assuming a one-tailed alpha of 0.025 and a power of 0.80. Varese et al. (2012) observed scores on the DES of 42.59 (SD = 11.03) for VH participants with a diagnosed SSC and 23.93 (SD = 14.93) for controls, yielding an effect size of d = 1.42. If this was replicated in the current study, nine participants would be required per group. Conservatively, and because of the sample size requirements of the related project, the researchers aimed to recruit 75 participants (25 per group) to detect a large effect size of 0.8 (Cohen, 1992) between groups.

Secondary/ Exploratory Analysis

To the authors knowledge, peritraumatic dissociation has not been explored for individuals with a diagnosed SSC. Additionally, Massazza et al.'s (2021) research describing the factor structure of the SDQ-P and PDEQ measures (used in this study to compare scores between groups) did not provide information on differences in scores between individuals diagnosed with PTSD and controls. Therefore, as the investigation of peritraumatic dissociation was exploratory, it was not possible or appropriate to carry out formal power calculations. Instead, any observed differences will be used to generate hypotheses and information about required sample sizes for future research.

Inclusion/Exclusion Criteria

The psychosis group required a psychiatric diagnosis of SSC (e.g. schizophrenia, schizoaffective disorder, delusional disorder, schizophreniform or brief psychotic disorder). Inclusion criteria were also current or past experiences of VH, and no comorbid (C)PTSD diagnosis. The PTSD group required a diagnosis of PTSD or CPTSD and no comorbid experiences of psychosis (e.g. VH experiences). The control group was required to have no current mental health diagnosis, excluding common conditions (e.g. anxiety or depression).

Participants were UK residents, aged over 18, who could read and write in English and identify a past traumatic experience. To support the completion of the study, participants required access to a laptop or computer, headphones (to enable completion of the SDT) and a stable internet connection.

Individuals who did not meet the inclusion criteria were unable to participate. This included people who were unable to provide informed consent and individuals sectioned under the Mental Health Act (1983, updated in 2007). People with hearing difficulties were unable to participate, as this may have confounded the SDT results. The inclusion and exclusion criteria were emphasised on study advertisements for the psychosis (Appendix D), PTSD (Appendix E) and control group (Appendix F), and the participant information sheet (Appendix G). Experience of VH and PTSD was further screened in the study.

Recruitment

The author (a trainee clinical psychologist) and a fellow trainee clinical psychologist facilitated recruitment, using opportunity sampling methods, between August 2022 and February 2023. The researchers aimed to recruit participants to the psychosis and PTSD groups via relevant mental health services and social media, and to use social media to recruit to the control group.

The researchers discussed and advertised the study with an Early Intervention service, Community Mental Health Team and Specialist Psychotherapy Service who expressed interest in supporting recruitment (see Appendix C). The study was promoted through circulating study information via email, discussing the project and recruitment at team meetings, and liaising with clinicians in these services for referrals. Clinicians were asked to identify suitable

participants and, with service user consent, share their contact details with the researchers so they could be contacted regarding potential participation.

The researchers regularly contacted services to determine whether eligible participants were identified. However, no participants were obtained from services. Therefore, social media was used to recruit individuals with appropriate clinical diagnoses and the control group.

The project was advertised on social media via platforms (e.g. Facebook and Twitter). The researchers posted adverts in UK based support groups on Facebook for people diagnosed with psychosis (see Appendix D) or PTSD (see Appendix E). The control group was recruited by circulating adverts on Facebook webpages (see Appendix F). Ethical approval was granted for online recruitment.

Potential participants from social media, interested in participating, were invited to contact the researchers. At this stage, they were provided with further information about the study. The researchers answered any questions and ensured inclusion criteria were met. Participants were assigned a participant number to ensure their data remained anonymous and provided with a link to Qualtrics which hosted the project.

Measures

Demographic Questionnaire

Participants completed a demographic questionnaire where they provided their age, gender, ethnicity, educational and employment status (Appendix H). This was important to identify and control for potential covariates.

International Trauma Screening Questionnaire (ITQ, Cloitre et al., 2018)

The ITQ measure (Appendix I) was used to screen for PTSD and CPTSD symptoms in accordance with the ICD-11 (WHO, 2022). Participants were asked 'to identify an experience that troubles you most' and provide a brief description of this experience. The following prompt was given. 'Examples may include bullying, death of a loved one, physical assault, childhood neglect, being in an accident, witnessing or experiencing domestic violence, experiencing a natural disaster, experience of illness (e.g. COVID), medical procedures, job loss and relationship breakdowns. Participants selected when the experience occurred from the following options: six to 12 months ago, one to five months ago, five to 10 years ago, 10 to 20 years ago or over 20 years ago. Subsequently, participants answered 18 questions about the specified experience over the past month using a five-point Likert scale from 0 (not at all) to 4 (extremely). An example item is: 'Feeling jumpy or easily startled.'

This measure was freely available and is considered valid and reliable (Cloitre et al., 2018). Diagnostic algorithms were used to determine whether participants were likely to meet criteria for PTSD/CPTSD. To calculate ITQ total scores, PTSD and DSO total scores were summed in line with scoring criteria provided by Cloitre et al. (2018). For full scoring information, see Appendix I.

ACEs Questionnaire (Felitti et al., 1998)

The ACEs questionnaire was used to measure traumatic experiences endured by participants before the age of 18 (Appendix J). This 10-item retrospective measure assessed 10 types of childhood trauma, including parental alcoholism, domestic violence, family member imprisonment, parental mental health problems, parental separation, physical, sexual and verbal abuse, and emotional and physical neglect. Participants provided *'yes'* or *'no'* answers

to each item. *'Yes'* responses received one point each. Item responses were totalled to provide an overall score. Higher scores indicate increased ACEs. This measure is widely used globally with clinical and non-clinical samples, and considered valid and reliable (Kazeem, 2015).

DES (Bernstein & Putnam, 1986)

The DES measure (Appendix K) was used to assess dissociative experiences in participants' daily lives. Using a visual analogue scale, participants were required to state a percentage, from zero (never) to 100 (always), of how often they had the described experience for the 28 items presented. Scores increased in 10% increments. An example item is: 'Some people find that they have no memory for some important events in their lives.' Participants scores on individual items were combined to provide a total score. Item number 27, which relates to VH, was removed before the final score was calculated. The DES is not a diagnostic measure, however higher scores indicate higher levels of dissociation. This measure has good validity (Bernstein & Putman, 1986), reliability (α=.97, Dubester et al., 1995) and is freely available for research purposes.

Revised Launay-Slade Hallucination Scale (LSHS-R; Bentall & Slade, 1985a)

The LSHS-R (Appendix L) was administered as a measure of participants' predisposition to hallucinations. The LSHS-R consists of 12 items. Participants rated how much each item was applicable to them using a five-point Likert scale, from 0 (certainly does not apply to me) to 4 (certainly applies to me). An example item is: 'No matter how hard I try to concentrate unrelated thoughts always creep into my mind.' Participants scores from individual items were combined to produce an overall score. Participants could score between zero and 48. Higher scores indicated a greater predisposition towards experiencing

hallucinations. The LSHS-R has good validity and reliability (Waters et al., 2003) and a Cronbach's alpha coefficient of 0.90 (Fonseca-Pedrero et al., 2010).

SDQ-P (Nijenhuis & van der Hart, 1998)

The SDQ-P (Appendix M) was used to assess participants' experiences of peritraumatic somatoform dissociation (e.g. strange experiences in their body) during an index trauma. The SDQ-P consists of 11 items. Participants retrospectively rated their responses to these items on a Likert scale, from 1 (not at all) to 5 (extremely). An example item is: 'It felt as if my body, or parts of it, were paralysed.' Participants gave a *'yes'* or *'no'* response to state whether the experience may have been attributable to a physical cause (e.g. being restrained, due to a health condition). Participants were prompted to answer questions based on the experience identified for the ITQ. Total scores could fall between 11 and 55. Higher scores indicated higher levels of somatoform peritraumatic dissociation. The author of this unpublished measure granted permission for its use in this research. This measure has excellent internal reliability (α=. 83, Massazza et al., 2021). Information was not available comparing traumatised and non-traumatised samples on this measure.

PDEQ (Marmar et al., 1997)

The PDEQ (Appendix N) was used to assess participants' experiences of peritraumatic dissociation (e.g. depersonalisation, changes in sense of time and derealisation) at the time of a previous traumatic event. The PDEQ consisted of 10 items which participants retrospectively rated on a five-point Likert scale, the degree to which they experienced dissociation during and immediately after a traumatic event, from 1 (not at all) to 5 (extremely true). Participants were prompted to answer the questions based on the experience they identified when completing the ITQ. An example item is: 'My sense of time changed. Things seemed to be happening in slow

motion.' Total scores could fall between 10 and 50; higher scores indicate higher levels of peritraumatic dissociation. Scores over 15 indicate significant peritraumatic dissociation. This measure was freely available to use and has excellent internal reliability (α=. 87, Massazza et al., 2021).

SDT (based on Barkus et al., 2007)

Participants completed an online SDT to support data collection for a colleague's thesis project. This task was facilitated through the platform Gorilla, which was embedded within the Qualtrics link. The SDT, developed by Bentall and Slade (1985b) and modified by Barkus et al. (2007), was used. Using headphones, participants listened to a series of bursts of white noise, each lasting 3.5 seconds, at a level which was not unpleasant. There were 70 trials in total. On some trials, there was a voice saying 'who', which was either easy (12 trials) or difficult (25 trials) to hear above the noise. Following each trial, participants were required to press '1' on their keyboard if they perceived a voice was present, and '2' if they did not believe a voice was present. Further information on this measure and scoring instructions can be found in Appendix O. Completion time for the SDT was under five minutes.

Procedure

Participants accessed the study remotely using a personal laptop or computer via the Qualtrics link. This platform hosted study materials, the online test battery of questionnaires and SDT. Upon opening the link, participants were presented with an online information sheet (Appendix G) and invited to contact the researchers with any questions. Participants could commence the study after providing written consent via an online consent form (Appendix P) and entering their participant number.

Participants were presented with five demographic questions before completing measures relating to trauma, VH, PTSD, dissociation and peritraumatic dissociation (see measures section). The measures were completed in the following order: ITQ, ACEs questionnaire, DES, LSHS-R, SDQ-P and PDEQ. Participants were then instructed to click a button which directed them to the SDT. Written instructions for this task were presented on screen. Participants were subsequently presented with a debrief sheet (Appendix Q). This included signposting to support services, including the Samaritans, local crisis teams and emergency services, if participants required additional support. Following this, participants were invited to securely exit the study. Completion time was approximately 20 minutes.

Data Analysis Strategy

Data analysis was conducted using the Statistical Package for the Social Sciences (SPSS; version 28). Group differences on demographic and clinical variables were assessed. When categorical data was presented, Pearson's chi-square analysis was used. For continuous data, a one-way analysis of variance (ANOVA) was used. Histograms did not show any marked variation of scores from normal distribution; thus transformation of the data was not required, and parametric tests were used for the analyses. There was no missing data as the force response option was applied in Qualtrics.

Univariate analysis of covariance (ANCOVA) tests, controlling for age (because the controls were younger than the two clinical groups; see below), were conducted to determine the main effects of group (psychosis, PTSD or control) on total scores on the dissociation (DES) and peritraumatic dissociation (PDEQ and SDQ-P) measures. Post hoc analysis, using pairwise comparisons, was performed to assess for significant differences in scores between groups. Bonferroni correction was applied to allow for multiple tests.

A linear regression was conducted to examine variables associated with VH, using total scores on the LSHS-R as the dependent variable. Variables included in the model were total scores on the ACEs, DES, PDEQ and SDQ-P; with age controlled for. Subsequently, an exploratory bootstrapped serial mediation model (model 6, Hayes, 2017) of VH, controlling for age, was tested using the PROCESS macro add-on for SPSS (version 4.3; Hayes, 2023). This analysis was repeated, with PTSD as the outcome variable. Bootstrapping is recommended for examining the significance of indirect effects in mediation analyses, as it provides bias-corrected confidence intervals (Hayes, 2017).

Results

Participants

Overall, 81 participants completed the study and were included in the final dataset (psychosis group, *n* = 27, PTSD group, *n* = 27, control group, *n* = 27). Table 1 provides a summary of demographic information for the three groups and analyses of groups differences on demographic variables (see Appendix R for related demographic SPSS output).

As illustrated in Table 1, the sample predominantly consisted of females (71.1%, *n* = 59). In total, 20 (24.1%) participants identified as male and two (2.4%) identified as gender neutral. A chi-squared test found no significant gender differences between groups. The mean sample age was 35.9 years (*SD* = 11.2, Range = 20–70 years). A one-way ANOVA found a significant difference in the mean age of participants between groups. Post-hoc analysis, using Bonferroni correction, identified significant differences between the control group and psychosis and PTSD groups. The control group had a younger mean age. Most participants were white (84%, *n* = 68). 16% of the sample were non-white (*n* = 13). There were no significant differences in ethnicity between groups.

Regarding the highest level of education, 44.4% of participants (n = 36) were university graduates, 43.3% (n = 35) had a postgraduate degree, and 12.3% (n = 10) reported school education. A significant difference in education between groups was identified using a chi-squared test. More of the psychosis group reported school was their highest level of education (29.6%), compared to the PTSD (3.7%) and control group (12.3%). Furthermore, substantially less participants in the psychosis group reported postgraduate education (18.5%), compared to the PTSD (51.9%) and control group (59.3%). Overall, 70.4% of participants were employed (n = 57) and 29.6% (n = 24) were unemployed. A significant difference in employment status was found between groups using a chi-squared test. Rates of unemployment were highest in the psychosis group (66.7%). In contrast, there was no reported unemployment in the control group and 22.2% in the PTSD group.

Table 1

Summary of Demographic Variables per Group and Overall Sample and Tests of Group Differences

Demographic Variables	Psychosis Group (n = 27)	PTSD Group (n = 27)	Control Group (n = 27)	Overall/ Combined (n = 81)	
	n (%)	n (%)	n (%)	n (%)	Group Differences
Gender					
Male	8 (29.6)	5 (18.5)	7 (25.9)	20 (24.7)	X^2 (4, 81) = 5.344, p = .254
Female	17 (63.0)	22 (81.5)	20 (74.1)	59 (72.8)	
Non-Binary	2 (7.4)			2 (2.5)	
Age (years)					
Mean	41.56	37.37	28.74	35.89	F (2, 78) = 11.591, p <.001
(SD)	*(12.25)*	*(10.90)*	*(5.43)*	*(11.22)*	Control vs psychosis (p
Range	20–70	23–59	24–54	20–70	<.001) and PTSD (p <.001)
Ethnicity					
White	23 (85.2)	21 (77.8)	24 (88.9)	68 (84)	X^2 (2, 81) = 1.283, p = .527

Non-white	4 (14.8)	6 (22.2)	3 (11.1)	13 (16)	
Education Level					
School	8 (29.6)	1 (3.7)	1 (3.7)	10 (12.3)	X^2 (4, 81) = 16.352, p = .003
University					
Graduate	14 (51.9)	12 (44.4)	10 (37)	36 (44.4)	
Postgraduate	5 (18.5)	14 (51.9)	16 (59.3)	35 (43.3)	
Employment Status					
Employed	9 (33.3)	21 (77.8)	27 (100)	57 (70.4)	X^2 (2, 81) = 29.842, p <.001
Not employed	18 (66.7)	6 (22.2)	-	24 (29.6)	

Note. SD = standard deviation.

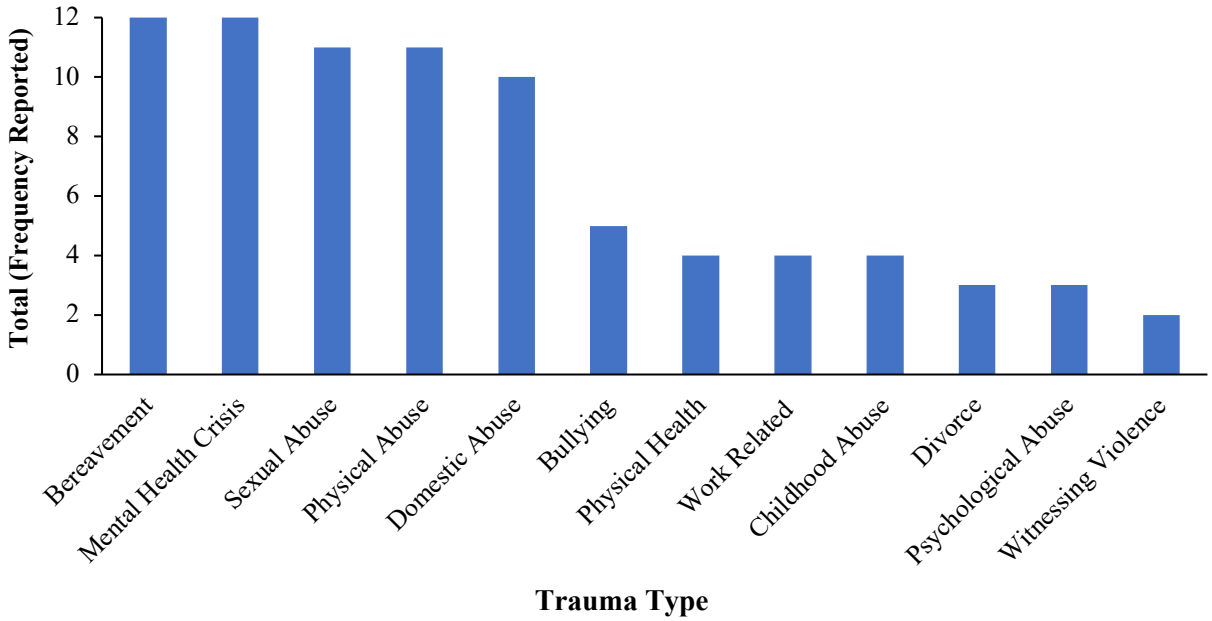
Clinical Variables

Participants' scores on clinical variables are provided in Table 2 (see Appendix S for SPSS output). As illustrated in Table 2, a one-way ANCOVA of VH using the LSHS-R data, with age as a covariate, was significant. Bonferroni corrected comparisons between the groups found a significant difference between the control group and the psychosis and PTSD groups. Mean scores on the LSHS-R were significantly higher for the psychosis group (mean = 15.15, SD =3.26) and PTSD group (mean = 10.56, SD = 4.48) compared to the control group (mean = 5.44, SD = 5.23). The psychosis group scored significantly higher than the PTSD group.

All participants reported a traumatic experience on the ITQ. The researchers categorised this data, which is visually represented in Figure 1. As illustrated, trauma related to bereavement (n = 12) and mental health crises (n = 12) were most prevalent, followed by sexual (n = 11), physical (n = 11) and domestic abuse (n = 10). Participants also reported traumatic experiences related to physical health (n = 4), the workplace (n = 4), bullying (n = 5), child abuse (n = 4), divorce (n = 3), psychological abuse, divorce (n = 3) and witnessing violence (n = 2).

Figure 1

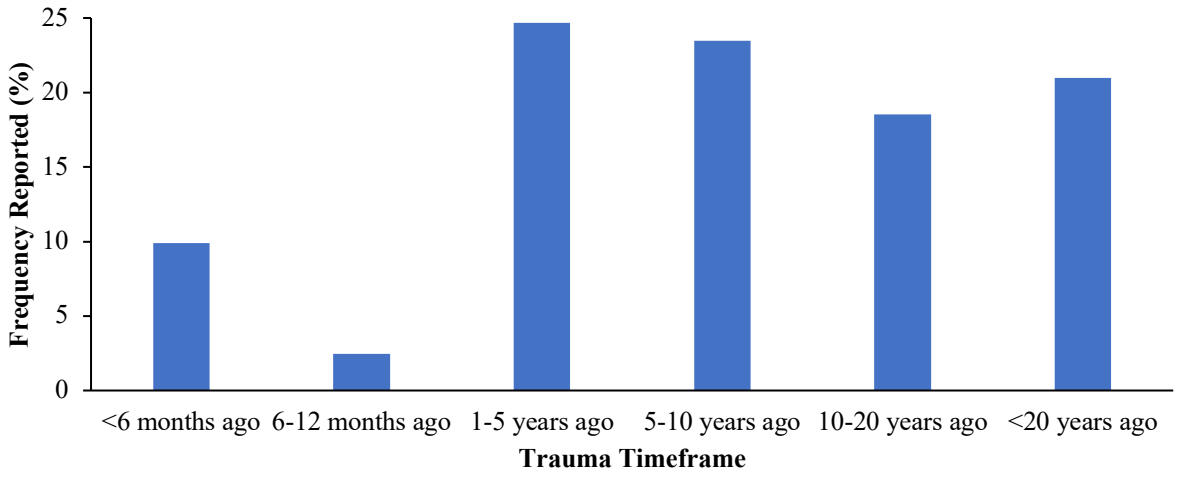
Bar Chart Illustrating Frequency of Index Trauma Types Reported by Participants



Participants also self-reported when the index trauma had occurred. As shown in Figure 2, most participants (24.7%) reported the traumatic event occurred one to five years ago, followed by five to 10 years ago (23.5%), over 20 years ago (21%) and between 10 and 20 years ago (18.5%). Only 9.8% reported it had occurred within the last six months, and 2.5% reported it had taken place in the last six to 12 months.

Figure 2

Visual illustration of Index Trauma Timeframe for Overall Sample



ITQ diagnostic outcomes were analysed to screen for PTSD. A significant difference in ITQ diagnostic outcomes between groups was identified using a chi-squared test. Most of the PTSD group (88.9%) met diagnostic criteria; 18.5% (*n* = 5) for PTSD and 70.4% (*n* = 19) for CPTSD. Three participants (11.1%) did not meet criteria. Over half of the psychosis group (55.5%) met criteria; 7.4% (*n* = 2) for PTSD and 48.1% (*n* = 13) for CPTSD. One control group participant met PTSD criteria.

A one-way ANCOVA on the ACE data, with age as a covariate, was significant. Bonferroni corrected comparisons between groups found a significant difference between the control group and the psychosis and PTSD groups. Age was not a significant covariate. Mean ACE scores were significantly higher for the psychosis (mean = 3.74, SD = 2.44) and PTSD group (mean = 4.37, SD = 2.76) compared to the control group (mean = 1.67, SD = 1.71). The difference between the psychosis and PTSD groups was not significant.

Table 2

Summary of Participant Scores on Clinical Variables

Clinical Variables/ Outcome Measures	Psychosis Group (*n* = 27)	PTSD Group (*n* = 27)	Control Group (*n* = 27)	
Clinical Variables	*n* (%)	*n* (%)	*n* (%)	Group Differences
ITQ Dx Outcome				X^2 (2, 81) = 39.809, p <.001
Dx Criteria Not Met	12 (44.4)	3 (11.1)	26 (96.3)	
Dx Criteria Met	15 (55.5)	24 (88.9)	1 (3.7)	
Met PTSD criteria	2 (7.4)	5 (18.5)	1 (3.7)	
Met CPTSD criteria	13 (48.1)	19 (70.4)	-	
LSHS-R				
Mean Total Score	15.15	10.56	5.44	F (2,77) = 28.501, p < .001.
(SD)	(3.26)	(4.48)	(5.23)	Controls vs psychosis (p < .001)

				and PTSD ($p < .001$). Psychosis vs PTSD ($p < .001$).
ACEs				
Mean Total Score (SD)	3.74 (2.44)	4.37 (2.76)	1.67 (1.71)	F (2,77) = 7.890, $p < .001$. Controls vs psychosis, ($p = .020$) and PTSD, ($p < .001$). Psychosis vs PTSD ($p = .982$).
DES				
Mean Total Score (SD)	31.99 (11.15)	31.89 (12.53)	20.22 (11.72)	F (2,77) = 4.981, $p < .009$. Controls vs psychosis ($p = .034$) and PTSD ($p = .012$.). Psychosis vs PTSD ($p = 1.00$).
SDQ-P				
Mean Total Score (SD)	29.07 (11.04)	28.59 (9.11)	17.26 (6.57)	F (2, 77) = 10.917, $p < .001$. Control vs psychosis ($p < .001$) and PTSD ($p < .001$). Psychosis vs PTSD ($p = 1.00$).
PDEQ				
Mean Total Score (SD)	33.59 (11.43)	34.41 (10.26)	18.44 (9.26)	F (2, 77) = 14.481, $p < .001$. Controls vs psychosis ($p < .001$) and PTSD ($p < .001$). Psychosis vs PTSD ($p = 1.00$).

Note: Dx = diagnostic.

Primary Hypothesis – Dissociation

It was hypothesised that participants in the psychosis and PTSD groups would report higher levels of dissociation (on the DES) than the control group. A one-way ANCOVA on the DES data, with age as a covariate, was significant. Age was not a significant covariate. Bonferroni corrected comparisons between groups found a significant difference between the control group and both the psychosis and PTSD groups. Mean scores on the DES were significantly higher for the psychosis (mean = 31.99, SD = 11.15) and PTSD group (mean = 31.89, SD = 12.53) compared to the control group (mean = 20.22, SD = 11.72). The difference between the psychosis and PTSD group was not significant.

Exploratory Hypothesis – Peritraumatic Dissociation

SDQ-P and PDEQ

Tentatively, it was hypothesised that both participants in the psychosis and PTSD groups would report increased peritraumatic dissociation compared to controls. A one-way ANCOVA on the SDQ-P data, with age as a covariate, was significant. Age was not a significant covariate. Bonferroni corrected comparisons between groups found a significant difference between the control group and both the psychosis and PTSD group. Mean scores on the SDQ-P were significantly higher for the psychosis (mean = 29.07, SD = 11.04) and PTSD group (mean = 28.59, SD = 9.11) compared to the control group (mean = 17.26, SD = 6.57). The difference between the psychosis and PTSD group was not significant.

A one-way ANCOVA on the PDEQ data, with age as a covariate, was significant. Age was not a significant covariate. Bonferroni corrected comparisons between the groups found a significant difference between the control group and both the psychosis and PTSD group. Mean scores on the PDEQ were significantly higher for the psychosis (mean = 33.59, SD = 11.43) and PTSD group (mean = 34.41, SD = 10.26) compared to the control group (mean = 18.44, SD = 9.26). The difference between the psychosis and PTSD groups was not significant.

Associations Between Trauma, Dissociation and Peritraumatic Dissociation

It was hypothesised that ACEs would correlate with peritraumatic dissociation, peritraumatic dissociation would be associated with dissociation, and measures of dissociation would mediate between ACEs and VH. Linear regression was used to examine variables associated with VH, using LSHS-R total scores as the outcome. Variables were entered in blocks in a stepwise manner to enable the unique contribution of each variable to be assessed

and determine which variables were the most significantly associated with VH. Age was included as a covariate.

ACE total scores were entered at step one. The initial model was significant (F [2, 78] = 5.678, p = .005) and accounted for 10.5% of the variance in LSHS-R total scores (adjusted R-Squared = .105). The results showed a significant effect of ACE total scores on VH (β = .254, t = 2.353, p = .021). SDQ and PDEQ scores were added at stage two. The second model was also significant (F [4, 76] = 5.783, p < .001) and accounted for 19% of the variance (adjusted R-Squared = .193). When the SDQ and PDEQ were added, total scores on the ACE were no longer associated with total scores on the LSHS-R. PDEQ total scores were significantly associated with VH (β = .387, t = 2.365, p = .021), but not SDQ-P total scores. Total scores on the DES were entered at stage three. The final model was significant (F [5, 75] = 6.805, p < .001) and accounted for 27% of the variance (adjusted R-Squared = .266). In this model, total scores on the PDEQ were no longer significantly associated with total scores on the LSHS-R, but total scores on the DES were (β = .315, t = 2.930, p = .004). Total scores on the ACE and SDQ did not significantly contribute. The final model, with the added variables, was best able to explain the variance in the DV. (See Appendix T for supplementary output).

This analysis identified PDEQ and SDQ measures were very highly correlated (-.77). To create a summary score for the two peritraumatic dissociation scales (PDEQ and SDQ), principal components analysis was used. A single component was extracted (eigenvalue = 1.777, accounting for 88.8% of the variance). This summary score was used for subsequent analysis.

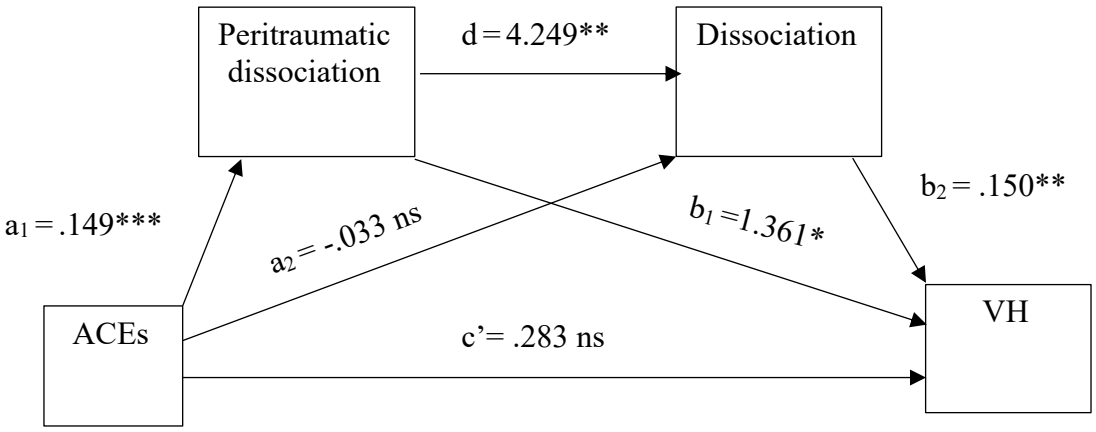
Mediation Model of VH

Subsequently, a serial mediation model of VH was tested. The independent variable was childhood trauma (ACEs), the dependent variable was VH (LSHS-R), and the two mediators were peritraumatic dissociation (using the principal component of the two peritraumatic dissociation measures) and dissociation (DES). Age was entered as a covariate. Figure 3 shows the regression coefficients for each component of the serial mediation model.

In the final model, the direct effect of ACEs on VH (c') was not significant (B = .283, SE = .243; 95% CI: -.199 - .767), the indirect effects of ACEs on VH through peritraumatic dissociation (a_i*b_i) was not significant (B = .203, SE = .124, 95% CI: -.015 - .468), and the indirect path via DES (a_2 *b_2) scores was non-significant (B = -.005, SE = .078, 95% CI: -.160-.153). However, the indirect effects of ACEs on VH through peritraumatic dissociation and dissociation in series (a_1*d*b_2) were significant as hypothesised (B = .095, SE = .054; 95% CI: .015 - .223). For full statistical output, see Appendix U.

Figure 3

Diagrammatic Illustration of the Serial Mediation Model of VH



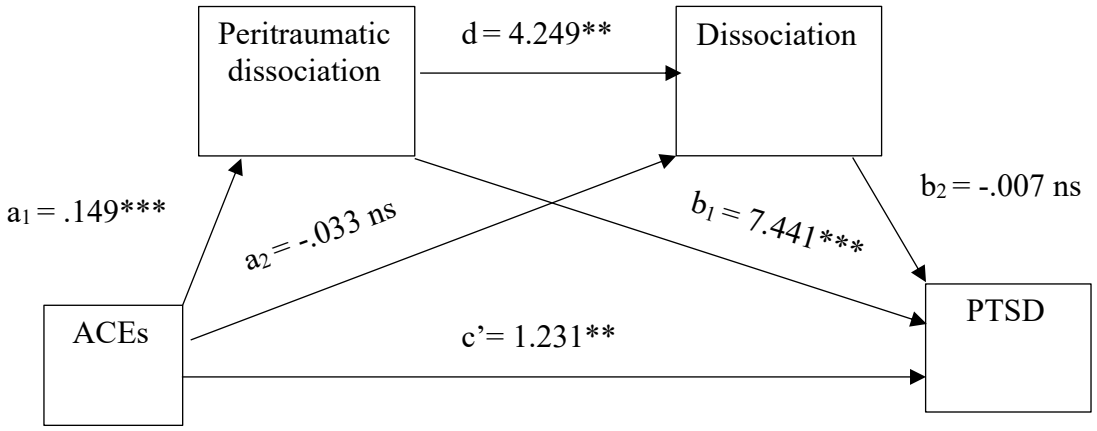
Note. Abbreviations: a_1, a_2, b_1, b_2, d = correlation coefficients per mediator reflecting indirect effect paths, c'= correlation coefficient of direct effects, ns = non-significant. p = <.001***, p = <0.01**, p = < 0.05*.

Supplementary Analyses - Mediation Model of CPTSD

The serial mediation model (model 6) was replicated with PTSD (ITQ total scores) as the outcome variable. A diagrammatic representation of the serial mediation model is presented in Figure 4, including the regression coefficients for each pathway. In the final model, the direct effect of ACEs on complex trauma (c') was significant (B = 1.231, SE = .452; 95% CI: .332 – 2.131). The indirect effects of ACEs on PTSD through peritraumatic dissociation (a_i*b_i) were significant (B = 1.112, SE = .370, 95% CI: .435 - 1.888). The indirect path via DES (a_2 *b_2) scores was non-significant (B = .001, SE = .043, 95% CI: -.097-.093) and the indirect effects of ACEs on PTSD through peritraumatic dissociation and dissociation in series (a_1*d*b_2) was non-significant (B = -.005, SE = .062; 95% CI: -.127 - .127). Therefore, there is evidence of partial serial mediation of PTSD through ACEs and peritraumatic dissociation. For full statistical output, see Appendix V.

Figure 4

Diagrammatic Illustration of the Serial Mediation Model of Complex Trauma



Note. Abbreviations: a_1, a_2, b_1, b_2, d = correlation coefficients per mediator reflecting indirect effect paths, c'= correlation coefficient of direct effects, ns = non-significant. *p* = <.001***, *p* = <0.01**, *p* = < 0.05*.

Sensitivity Analysis

As discussed, one participant in the control group met criteria for a PTSD diagnosis on the ITQ, and three participants in the PTSD group did not meet criteria for a PTSD diagnosis. Therefore, sensitivity analyses were conducted to assess whether this influenced the findings on the clinical variables (LSHS, ACE, DES, PDEQ and SDQ). Significance levels remained unchanged across all measures upon removing data for these four participants.

Discussion

Summary of Findings

This study aimed to use quantitative research methods to compare a psychosis, PTSD, and control group on factors considered important in VH. It also aimed to explore peritraumatic dissociation in psychosis. The psychosis and PTSD group reported higher levels of ACEs, dissociation, and peritraumatic dissociation. No significant differences between the psychosis and PTSD group were observed on measures of ACEs, dissociation and peritraumatic dissociation.

The study findings support the hypothesis that psychosis and PTSD groups would report increased dissociative experiences. This is consistent with research findings that dissociation (measured using the DES), is higher in psychosis (Ghoreishi & Shajari, 2014) and PTSD (Özdemir et al., 2015) than control groups. The findings also support the secondary hypothesis that peritraumatic dissociation would be higher in the PSTD and psychosis groups.

The results of the regression analysis, with VH as the outcome, provided preliminary evidence of mediation in line with the proposed hypothesis, whereby ACEs were associated with peritraumatic dissociation, peritraumatic dissociation scores correlated with dissociation scores, and dissociation mediated the relationship between ACEs and VH. The incremental

inclusion of measures of childhood trauma, dissociation and peritraumatic dissociation significantly improved the power of the model. SDQ-P scores were not significantly associated with VH in the model. However, this may have been due to a high level of collinearity with the PDEQ measure.

These findings were further supported by a mediation analysis, which provided evidence of the serial mediation of ACEs on VH through both peritraumatic dissociation and dissociation. While causality cannot be inferred from the mediation analysis, the findings are consistent with a causal model. When this model was replicated using PTSD as the outcome variable, there was evidence of partial serial mediation of the pathway from ACEs to PTSD through peritraumatic dissociation. As this study was largely exploratory, the results should be interpreted with caution.

The results of the regression analysis are consistent with research demonstrating a link between dissociation and VH (Longden et al., 2020; Pilton et al., 2015). They are also in accordance with studies showing that dissociation mediates the relationship between childhood trauma and VH (Moskowitz et al., 2009; Pilton et al., 2015; Varese et al., 2012).

Previous research has found PTSD comorbidity rates of approximately 25% in psychosis samples (Mueser et al., 2010; Neria et al., 2002). However, comorbidity rates were much higher in the current study, as over half the psychosis group also met screening criteria for PTSD. This discrepancy may have been due to the use of a self-report screening measure, as opposed to formal diagnostic PTSD assessment.

Average DES scores are generally higher for people diagnosed with PTSD than psychosis (Lyssenko et al., 2018). The current study may not have had the power to detect subtle differences between groups. With more balanced groups, a difference may have been observed.

Taken together, the current findings indicate that peritraumatic dissociation and dissociation alone do not lead to VH in psychosis, suggesting other variables are implicated. This is in line with theories that VH in psychosis may be the result of causal factors, including trauma-related dissociation and impaired source monitoring, acting together (Varese et al, 2012).

Strengths and Limitations

The project had some obvious strengths and demonstrated that research can be conducted online with this population, and social media is a viable option for recruitment. The required sample size, based on a power calculation, was achieved. Validated measures were used to test the hypotheses, and the outcome measures were specifically chosen to minimise participant burden. PPI consultation was sought, and suggested changes were implemented. Sensitivity analyses were conducted, increasing the reliability of the results.

Research limitations include that recruitment via social media may have resulted in a biased sample of the target population, limiting the generalisability of the results to wider psychosis populations. Despite the researchers' best efforts, no participants were recruited from local NHS mental health services. The services approached faced various challenges, including difficulties with staffing and organisational pressures. These factors and wider challenges facing the NHS may have contributed to the significant difficulties with this recruitment.

Participants self-reported a diagnosis of psychosis or PTSD/CPTSD, and diagnoses were not confirmed via psychiatric interview, reducing methodological rigour. Details of comorbid diagnoses were not recorded, however co-occurring conditions, including substance use disorders, are common in psychosis (Kavanagh et al., 2004) and may have influenced scores on dissociation measures. Information on whether participants had received trauma therapy was not obtained and may have confounded the results. Self-report measures were

used, introducing self-report bias. The LSHS-R may be capturing broader elements of hallucinatory experiences; thus it may not be specific to voice-hearing. Retrospective measures of peritraumatic dissociation may have led to recall bias and reduced internal validity. This may have been problematic for participants who recalled peritraumatic responses to traumatic experiences that occurred a long time ago. Incentive bias was introduced as participants could enter a prize draw for a monetary voucher.

Significant differences between groups on variables including education and employment may have confounded the results. While efforts were made to support sample diversity (e.g. by recruiting across various social media pages), participants were largely white females. Due to the online nature of the study, individuals without access to the required technology were unable to participate. This prevents the generalisability of the findings to this cohort and is important as psychosis populations have an increased risk of digital exclusion (Spanakis et al., 2021).

Theoretical and Clinical Implications

This novel research has important theoretical implications. The findings suggest that peritraumatic dissociation is related to psychosis as well as PTSD and inform current understanding of psychological processes implicated in PTSD and psychosis. On a theoretical level, the findings indicate individuals are unlikely to dissociate unless they have experienced peritraumatic dissociation. The results support a trauma-informed conceptualisation of VH. The second serial mediation analysis suggests individuals are more likely to develop PTSD if they have experienced increased/more severe childhood trauma. It also illustrates individuals who dissociated at the time of the trauma were more likely to develop PTSD.

Educating clinicians on dissociation and peritraumatic dissociation is indicated, particularly as the role of dissociation in mental health conditions is often under-recognised

(Černis et al., 2021). It is recommended that clinicians routinely screen for trauma, dissociation and peritraumatic dissociation in patients with psychosis and PTSD. Direct assessment of peritraumatic dissociation (e.g. using the PDEQ), may help identify trauma responses. When peritraumatic dissociation is identified, it warrants consideration in the assessment and formulation of psychological distress. Early intervention following trauma may help mitigate longer-term mental health consequences (e.g. dissociation and VH).

Directions for Future Research

As this was a preliminary, exploratory study exploring peritraumatic dissociation in psychosis, further research is imperative to further inform current understanding. Replication of this research is required with clinical populations (e.g. community, inpatient, outpatient and forensic groups), using face-to-face assessments and larger, better matched samples (e.g. on age, education and employment) to determine whether similar findings are obtained. The use of larger samples may help determine whether subtle differences are observed between PTSD and psychosis groups on dissociation and peritraumatic dissociation measures. Future research comparing groups on peritraumatic dissociation for specific trauma types (e.g. physical and sexual assault) is warranted.

Current interventions for trauma symptoms include trauma focused cognitive behavioural therapy (CBT-TF; Ehlers & Clarke, 2000) and eye movement desensitisation and reprocessing therapy (EMDR; Shapiro, 2001). Randomised clinical trials have shown that EMDR is effective for patients with psychosis and PTSD (Van den Berg et al., 2015). However, based on the current findings, research exploring the effectiveness of existing trauma-based therapies for addressing peritraumatic dissociation is indicated. This is important to determine whether adaptations are required and inform clinical practice.

Conclusion

In conclusion, the current project found preliminary evidence that peritraumatic dissociation is important in psychosis as well as PTSD, and the findings support a trauma-informed conceptualisation of VH. Significantly higher levels of dissociation and peritraumatic dissociation were identified for the psychosis and PTSD groups. There was evidence of serial mediation of VH through childhood trauma, peritraumatic dissociation and dissociation. As research exploring peritraumatic dissociation in psychosis is novel, further research using larger samples and clinical populations is needed to determine whether similar findings are observed. It is recommended that trauma, dissociation and peritraumatic dissociation are routinely screened for in patients with psychosis and PTSD and addressed using trauma-based interventions.

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Appendix A

Shared and Distinct Aspects of the Project

Researchers LH and EK completed a collaborative project where data was collected jointly but analysed separately based on different research aims. Difference outcome measures were of interest to each researcher.

The shared components of the project included:

1. The same participants and dataset were used across the two projects. However, different outcome measures were analysed to meet the aims of the individual projects.
2. Measures for both projects were collected during recruitment.
3. Ethics application for the project was shared between researchers.

The individual projects have distinct aims, hypotheses, and proposed analyses:

Aims/hypotheses of the project by LH:
The primary hypothesis was that both the psychosis and PTSD groups will report higher levels of dissociation on the DES than the control group. A secondary hypothesis was that ACEs would correlate with dissociation, and that dissociation would mediate the relationship between ACEs and VH. Peritraumatic dissociation was also measured. As there was no data for this construct for psychosis samples, the approach taken was exploratory, but it was tentatively proposed that peritraumatic dissociation scores would be elevated in the PTSD and psychosis group and correlate with dissociation scores.

Aims/ hypotheses of project by EK:
Emily tested alternative hypotheses, exploring the role of source monitoring in the development of voice-hearing in psychosis, as research has suggested that hallucinations may also arise from source monitoring difficulties. It was hypothesised that individuals with psychosis, not PTSD, will show an abnormal bias (but not sensitivity) on a source monitoring task; the source monitoring of people with PTSD will be normal. It was also hypothesised that ACES would predict hallucination level, but not source monitoring ability.

Appendix B

Ethics Application and Approval Letter

Ymchwil Iechyd a Gofal Cymru
Health and Care Research Wales

NHS
Health Research Authority

Professor Richard Bentall
Department of Psychology
University of Sheffield
Cathedral Court, 1 Vicar Lane, Sheffield
S1 2LT

Email: approvals@hra.nhs.uk
HCRW.approvals@wales.nhs.uk

26 July 2022

Dear Professor Bentall

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

Study title:	**Psychosis and PTSD - Investigating Source Monitoring, Dissociation and Peritraumatic Dissociation: A Pilot Study**
IRAS project ID:	**311110**
Protocol number:	**175378**
REC reference:	**22/SC/0166**
Sponsor	**University of Sheffield**

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 towards the 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 Ireland and 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.

List of Documents

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

Document	*Version*	*Date*
Copies of materials calling attention of potential participants to the research [Initial advert to services for recruitment purposes]	1	26 April 2022
Copies of materials calling attention of potential participants to the research [Control group advert (can be used for social media advertising)]	2	07 June 2022
Copies of materials calling attention of potential participants to the research [Schizophrenia group advert (may be used for social media recruitment if needed)]	2	07 June 2022
Copies of materials calling attention of potential participants to the research [PTSD group advert (can be used for social media advertising if needed)]	2	07 June 2022
Evidence of Sponsor insurance or indemnity (non NHS Sponsors only) [Insurance]	1	07 June 2022
IRAS Application Form [IRAS_Form_05052022]		05 May 2022
Non-validated questionnaire [Demographic questionnaire]	1	26 April 2022
Organisation Information Document [Organisational Information Document]	1	20 July 2022
Other [Insurance information - liability]	1	07 June 2022
Other [Response to REC]		
Other [Revised A12 and A13 sections]		
Other [Debrief Form]	1	26 April 2022
Other [Insurance information - liability]	1	04 May 2022
Participant consent form [Consent]	2	07 June 2022
Participant information sheet (PIS) [Information sheet]	3	21 July 2022
Participant information sheet (PIS) [Participant Information Sheet - Healthy Control]	2	21 July 2022
Research protocol or project proposal [Project proposal]	2	07 June 2022
Schedule of Events or SoECAT [schedule of events V1]	1	20 July 2022
Summary CV for Chief Investigator (CI) [CV CI]	1	21 April 2022
Summary CV for student [Emily Kruger CV]	1	26 April 2022
Summary CV for student [Laura Hall CV]	1	26 April 2022
Validated questionnaire [Dissociative Experiences Scale]	2	07 June 2022
Validated questionnaire [Adverse Childhood Experiences Questionnaire]	2	07 June 2022
Validated questionnaire [Peritraumatic Dissociation Questionnaire]	2	07 June 2022
Validated questionnaire [International Trauma Questionnaire]	2	07 June 2022
Validated questionnaire [Somatoform Dissociation Questionnaire]	2	07 June 2022
Validated questionnaire [Launay-Slade Hallucination Scale]	2	07 June 2022
Validated questionnaire [Signal Detection Test Description]	2	07 June 2022

IRAS project ID	311110

Information to support study set up

The below provides all parties with information to support the arranging and confirming of capacity and capability with participating NHS organisations 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 to confirmation of capacity and capability	Agreement to be used	Funding arrangements	Oversight expectations	HR Good Practice Resource Pack expectations
There is only one participating NHS organisation therefore there is only one site type.	Research activities should not commence at participating NHS organisations in England or Wales prior to their formal confirmation of capacity and capability to deliver the study.	An Organisation Information Document has been submitted and the sponsor is not requesting and does not expect any other agreement to be used with participating NHS organisations of this type.	The sponsor has detailed its proposals with respect to whether any study funding will be provided to participating NHS organisations of this type in the relevant Organisational Information Document. This should be read in conjunction with the relevant Schedule of Events/SoECAT which details the cost implications of the study for participating NHS organisations.	In line with HRA/HCRW expectations a Principal Investigator should be appointed at participating NHS organisations of this type.	No Honorary Research Contracts, Letters of Access or pre-engagement checks are expected for local staff employed by the participating NHS organisations. Where arrangements are not already in place, research staff not employed by the NHS host organisation undertaking any of the research activities listed in the research application would be expected to obtain a Letter of Access based on standard DBS checks and occupational health clearance.

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 they do not intend to apply for inclusion on the NIHRCRN Portfolio.

Appendix C

Study Advertisement for Services

The University Of Sheffield.

Can you help with **psychology research recruitment?**

Do you work with people with a diagnosis of **PTSD** or a **Schizophrenia Spectrum Condition**?

**Please note, the language used may appear academic. We recognise that language such as diagnostic criteria may not always feel acceptable. However, this is for the purpose of academic study and because the research aims to inform academics. **

In our roles as Trainee Clinical Psychologists, we are looking to recruit participants with either of the above diagnoses to take part in an online based study. We aim to understand some of the similarities and differences between mental health diagnoses. Participation will take approximately 20-30 minutes and will involve completing several questionnaires and an audio-based computer task. All participants will have the chance to enter a prize draw to win one of two £50 Amazon vouchers.

Next steps:

- We are looking for clients who meet criteria for a diagnosis of PTSD OR Schizophrenia Spectrum Condition, as these will form 2 separate groups within our research.
- We have attached two separate recruitment posters, to specify the criteria for PTSD and Schizophrenia Spectrum Condition groups.
- If you are working with someone you feel is appropriate and would be willing to participate, please email the researchers using the details on the recruitment posters attached, and we will send further information.

We are happy to answer any questions regarding this research, and we thank you for taking the time to consider supporting us with this.

This project is supervised by Professor Richard Bentall. This project has been granted ethical approval from the South Central-Hampshire B Research Ethics Committee.

Appendix D

Study Advertisement for the Psychosis Group

Research Participation Opportunity

The University Of Sheffield.

Would you like to be involved in research to help inform mental health care? Do you have experience of hearing voices?

Participants can enter a **prize draw** to win a **£50 Amazon voucher!**

**Please note, the language used may appear academic. We recognise that language such as diagnostic criteria may not always feel acceptable. However, this is for the purpose of academic study and because the research aims to inform academics. **

It is common for people to have unusual experiences, e.g, hearing things that others cannot, or feeling disconnected from our thoughts, feelings, and emotions. These experiences can be reported by individuals of different ages and backgrounds and can be linked to different mental health experiences.

Research has found that traumatic life experiences can be linked to future mental health problems such as hearing voices or feeling disconnected from thoughts, feelings, and emotions. This can mean people find it difficult to know what is real and what is not. We also know that people's automatic responses at the time of a trauma can influence future mental health experiences.

This online anonymous study therefore aims to understand the similarities and differences between mental health diagnoses. Participation will take approximately 20-30 minutes and involves completing several questionnaires and an audio-based computer task. **All participants will have the chance to enter a prize draw to win one of two £50 Amazon vouchers.**

Can you help?

You are eligible to participate if all the following apply to you:

- You have a diagnosis of Schizophrenia, Schizoaffective Disorder, Delusional Disorder, Schizophreniform Disorder or Brief Psychotic Disorder
- Currently hear voices.
- No diagnosis of PTSD
- Able to identify a past traumatic experience.
- Aged over 18 years.
- Can read and write in English.
- Can provide consent.
- Not on a mental health section
- Live in the UK

Due to the nature of the task, Individuals with a hearing impairment will not be able to participate, or those without a laptop/computer or internet access

Please contact Emily Kruger (Trainee Clinical Psychologist) on ekruger1@sheffield.ac.uk OR Laura Hall (Trainee Clinical Psychologist) on lhall8@sheffield.ac.uk to set up an initial virtual meeting. This will allow the researchers to discuss the study in more detail before providing you with a link to the study. Professor Richard Bentall supervises this project. The South Central-Hampshire B Research Ethics Committee has granted ethical approval for this project.

Appendix E

Study Advertisement for the PTSD Group

The University Of Sheffield.

Research Participation Opportunity

Would you like to be involved in research to help inform mental health care? Do you have a diagnosis of PTSD or Complex PTSD?

Participants can enter a **prize draw** to win a **£50 Amazon voucher!**

**Please note, the language used may appear academic. We recognise that language such as diagnostic criteria may not always feel acceptable. However, this is for the purpose of academic study and because the research aims to inform academics. **

It is common for people to have unusual experiences e.g. hearing things that others cannot, or feeling disconnected from our thoughts, feelings, and emotions. These experiences can be reported by individuals of different ages and backgrounds and can be linked to different mental health experiences.

Research has found that traumatic life experiences can be linked to future mental health problems such as hearing voices or feeling disconnected from thoughts, feelings, and emotions. This can mean that people can find it difficult to know what is real and what is not. We also know that people's automatic responses at the time of a trauma can influence future mental health experiences.

This online anonymous study therefore aims to understand some of the similarities and differences between mental health diagnoses. Participation will take approximately 20-30 minutes and will involve completing several questionnaires and an audio-based computer task. **All participants will have the chance to enter a prize draw to win one of two £50 Amazon vouchers.**

Can you help?

You are eligible to take part if all the following apply to you:

- You have a diagnosis of PTSD or Complex PTSD
- Are aged over 18.
- Able to read and write in English.
- No history of hallucinations (hearing voices)
- Able to identify a past traumatic experience.
- Not currently on a mental health section
- Can provide consent to participate.
- Live in the UK

Due to the nature of the task, Individuals with a hearing impairment will not be able to participate or those without a laptop/computer or internet access

If you are unsure about any of these, please contact the researchers below for clarification

Before participation, please contact Emily Kruger (Trainee Clinical Psychologist) on ekruger1@sheffield.ac.uk OR Laura Hall (Trainee Clinical Psychologist) on lhall8@sheffield.ac.uk to set up an initial virtual meeting. This meeting will allow the researchers to discuss the study in more detail, before providing you with a link to participate. This project is supervised by Professor Richard Bentall. This project has been granted ethical approval from the South Central-Hampshire B Research Ethics Committee.

Appendix F

Study Advertisement for the Control Group

The University Of Sheffield.

Research Participation Opportunity

Would you like to be involved in research to help inform mental health care?

Participants can enter a **prize draw** to win a **£50 Amazon voucher!**

It is common for people to have unusual experiences e.g. hearing things that others cannot, or feeling disconnected from our thoughts, feelings, and emotions. These experiences can be reported by individuals of different ages and backgrounds and can be linked to different mental health experiences.

Research has found that traumatic life experiences can be linked to future mental health problems such as hearing voices or feeling disconnected from thoughts, feelings, and emotions. This can mean that people can find it difficult to know what is real and what is not. We also know that people's automatic responses at the time of a trauma can influence future mental health experiences.

This online anonymous study therefore aims to understand some of the similarities and differences between mental health diagnoses. Participation will take approximately 20-30 minutes and will involve completing several questionnaires and an audio-based computer task.

All participants will have the chance to enter a prize draw to win one of two £50 Amazon vouchers.

Can you help?

You are eligible to take part if all the following apply to you:

- No current mental health diagnoses (you can still take part if you have been diagnosed with Anxiety or Depression)
- Aged over 18 years.
- Can provide consent.
- Live in the UK
- Able to read and write in English.
- Able to identify a past traumatic experience.

Due to the nature of the task, Individuals with a hearing impairment will not be able to participate, or those without a laptop/computer or internet access

Before participation, please contact Emily Kruger (Trainee Clinical Psychologist) on ekruger1@sheffield.ac.uk OR Laura Hall (Trainee Clinical Psychologist) on lhall8@sheffield.ac.uk to set up an initial virtual meeting. This meeting will allow the researchers to discuss the study in more detail, before providing you with a link to participate. This project is supervised by Professor Richard Bentall.

This project has been granted ethical approval from the South Central-Hampshire B Research Ethics Committee.

Appendix G

Participant Information Sheet

What factors are linked to Psychosis and PTSD?

Lead Investigators: Emily Kruger & Laura Hall
Research Supervisor: Professor Richard Bentall

Thank you for taking the time to read this information sheet. We are both Trainee Clinical Psychologists currently training at the University of Sheffield and are conducting our thesis projects. We would like to invite you to take part in this research study. This information sheet explains why the research is being done and what it entails, so you can decide if you would like to take part. If you would like to ask some further questions, please get in contact with either of us using the contact details at the end of this sheet. As an incentive, there will also be the opportunity to be entered into a prize draw to win one of two £50 Amazon vouchers.

What is the purpose of this study?

It is common for people to have unusual experiences e.g. hearing things that others cannot, or feeling disconnected from our thoughts, feelings, and emotions. These experiences can be reported by individuals of different ages and backgrounds and can be linked to different mental health experiences.

Research has found that traumatic life experiences can be linked to future mental health problems such as hearing voices or feeling disconnected from thoughts, feelings, and emotions. This can mean that people can find it difficult to know what is real and what is not. We also know that people's automatic responses at the time of a trauma can influence future mental health experiences. This study aims to investigate this further to help inform patient care in mental health services.

Why have I been invited to take part?

This research may be of interest to you due to your experiences. To help with this study, we would like you to complete a variety of online-based questionnaires and a short computer task which involving listening to audio clips. Questionnaires will involve answering statements about your mental health experiences. Around 75 people will take part in this study including 50 people with mental health conditions and 25 people with no history of complex mental health issues (other than common conditions such as depression and anxiety). This will allow us to compare people's experiences.

If you are diagnosed with PTSD or complex PTSD, you must be:

1. Aged 18 or over.
2. Able to read and write in English.
3. Have a clinical diagnosis of PTSD or complex PTSD.

4. Have no history of hallucinations (such as hearing voices)
5. Able to identify a past traumatic experience.
6. Live in the UK
7. Able to provide consent.

If you are diagnosed with a schizophrenia spectrum disorder, you must be:

1. Aged 18 or over.
2. Able to read and write in English.
3. Have a clinical diagnosis of a schizophrenia spectrum condition (e.g. schizophrenia, schizophreniform disorder, schizoaffective disorder, delusional disorder, brief psychotic disorder).
4. Currently experience hallucinations (e.g. hear voices)
5. Able to identify a past traumatic experience.
6. Live in the UK
7. Able to provide consent.

If you do not have the above diagnosis, you must:

1. Not have a current mental health diagnosis (you can still take part if you have been diagnosed with anxiety or depression)
2. Be aged over 18 years.
3. Can provide consent.
4. Live in the UK
5. Able to read and write in English.
6. Able to identify a past traumatic experience.

Due to the nature of the task, Individuals with a hearing impairment will not be able to participate or those without a laptop/computer or internet access

Do I have to take part?

It is not compulsory to participate in this research. You do not have to take part in the study, and there will be no negative consequences if this is your decision. If you commence the study and no longer wish to participate you can also discontinue by exiting the study, without providing a reason why.

What will happen if I decide to take part?

Before starting the study, you will be asked to sign a consent form online. You will then be asked to complete the questionnaires and the computer-based task, which will take you no longer than 45 minutes in total. Some of the questionnaires will ask you about experiences such as hearing voices, traumatic events, and daily life experiences. Some people in the study will be asked about their responses at the time of a trauma, such as feelings of being disconnected.

What will I need to take part?

To take part, you will need access to a laptop or a computer, a stable internet connection and a pair of headphones to plug into the laptop. The researchers may be able to support with this if you complete the study face to face.

Are there any disadvantages from taking part?

We do not anticipate there to be any significant risks involved in participating in the study. Some people might find the questionnaires tiring therefore we ask that you take regular breaks. If you feel upset during or after completing the questionnaires, we have outlined some support options. You can also talk to your clinical team about this, your GP or support services if difficulties arise. If you feel that you need extra support during or after this research study, please contact your care coordinator, the crisis team within your local area on 08081968281, your GP, or the Samaritans on 116 123. In an emergency, you can also telephone 999.

If you become distressed during the study, reminders to move away from the screen and reach out for support will be made clear before starting the questionnaires and during.

What are the possible benefits?

Although there are no direct benefits of taking part in the study, you will be entered into a prize draw to win one of two £50 Amazon vouchers. In addition, some people do find the questions quite interesting. The information you share could also improve future psychological support for people accessing mental health services.

Will my information be kept confidential?

I consent to the researchers filing my consent form within a site file, which will be password protected on a secure server. The information you provide will be kept confidential and will only be accessed by the research team. We would only need to break confidentiality if we were concerned about your safety, as we have a duty of care. Your information will remain anonymous, and you will not be identifiable within this research. Data kept for the prize draw of the Amazon vouchers is separate from the research data.

What will happen to my data and the results of the study?

All data will be anonymised, and you will be assignment a number. Data will be stored on the University of Sheffield's online system which is secure, and password protected. The results of this study will form part of a Clinical Psychology Doctoral thesis. We aim to publish the results in a journal. Your data will remain anonymised if it is published. The questionnaire and audio task response data will be deposited in ORDA (online research data) which is the University of Sheffield's data repository. This is so it can be used for future research and learning.

General Data Protection Regulations:

In this research study we will use information from you. We will only use information that we need for the research study. We will let very few people know your name or contact details, and only if they really need it for this study. Everyone involved in this study will keep your data safe and secure. We will also follow all privacy rules. At the end of the study we will save

some of the data in case we need to check it and for future research. We will make sure no-one can work out who you are from the reports we write.

The information pack tells you more about this.

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 or to check your records to make sure that the research is being done properly. 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 code 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 can stop being part of the study at any time, without giving a reason, but we will keep information about you that we already have.
- 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 see or 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/
- our leaflet available from **www.hra.nhs.uk/patientdataandresearch**
- by asking one of the research team
- by sending an email to either ekruger1@sheffield.ac.uk or lhall8@sheffield.ac.uk

What if I wish to complain about the research?

If you would like to make a complaint about the research, if the first instance you can contact the lead researchers via email (e.kruger1@sheffield.ac.uk, lhall8@sheffield.ac.uk). Alternatively, you can contact the supervisor of the study via email (r.bentall@sheffield.ac.uk).

If you do not feel that your complaint has been handled to your satisfaction following this, you can contact the Head of the Psychology Department, Gillian Hardy (g.hardy@sheffield.ac.uk).

She can be contacted at the following address: Department of Psychology, University of Sheffield, Cathedral Court, 1 Vicar Lane, Sheffield, S1 2LT.

Who has ethically reviewed the study?

The South Central-Hampshire B Research Ethics Committee has given a favourable opinion of the current study.

Further information and contact details

Lead Researchers

Name: Emily Kruger & Laura Hall
Address: Department of Psychology, University of Sheffield, Cathedral Court, 1 Vicar Lane, Sheffield, S1 2LT
Email: e.kruger1@sheffield.ac.uk or lhall8@sheffield.ac.uk
Telephone: Please leave a message with research officer Amrit Sinha on 0114 2226650 and Emily or Laura will return your call.

Research Supervisor

Name: Professor Richard Bentall
Address: Department of Psychology, University of Sheffield, Cathedral Court, 1 Vicar Lane, Sheffield, S1 2LT. Email: r.bentall@sheffield.ac.uk

Appendix H

Participant Demographic Questionnaire

Age:

Gender (please tick):

Male ☐

Female ☐

Transgender ☐

Gender neutral ☐

Other (please state): _____

Ethnicity – which ethnicity do you most identify with? (please select from drop down list):

White

- English, Welsh, Scottish, Northern Irish or British
- Irish
- Gypsy or Irish Traveller
- Other White background

- **Mixed or Multiple ethnic groups**

- White and Black Caribbean
- White and Black African
- White and Asian
- Any other Mixed or Multiple ethnic background

Asian or Asian British

- Indian
- Pakistani
- Bangladeshi

- Chinese
- Any other Asian background

Black, African, Caribbean or Black British

- African
- Caribbean
- Any other Black, African or Caribbean background

Other Ethnic Group

- Arab
- Any other ethnic group

Other

Please describe: _____

What is your highest level of education?

☐ some high school	☐ some college or university	☐ some postgraduate school
☐ high school graduate	☐ college/university graduate	☐ postgraduate degree

Are you currently employed?

☐ full-time ☐ part-time ☐ not at all ☐ retired ☐ Disabled/Sick leave

Appendix I

International Trauma Questionnaire (ITQ)

Instructions: Please identify the experience that troubles you most and answer the questions in relation to this experience.

Brief description of the experience _____

When did the experience occur? (circle one)

a. less than 6 months ago
b. 6 to 12 months ago
c. 1 to 5 years ago
d. 5 to 10 years ago
e. 10 to 20 years ago
f. more than 20 years ago

Below are a number of problems that people sometimes report in response to traumatic or stressful life events. Please read each item carefully, then circle one of the numbers to the right to indicate how much you have been bothered by that problem in the past month.

	Not at all	*A little bit*	*Moderately*	*Quite a bit*	*Extremely*
P1. Having upsetting dreams that replay part of the experience or are clearly related to the experience?	0	1	2	3	4
P2. Having powerful images or memories that sometimes come into your mind in which you feel the experience is happening again in the here and now?	0	1	2	3	4
P3. Avoiding internal reminders of the experience (for example, thoughts, feelings, or physical sensations)?	0	1	2	3	4
P4. Avoiding external reminders of the experience (for example, people, places, conversations, objects, activities, or situations)?	0	1	2	3	4
P5. Being "super-alert", watchful, or on guard?	0	1	2	3	4
P6. Feeling jumpy or easily startled?	0	1	2	3	4

In the past month have the above problems:

P7. Affected your relationships or social life?	0	1	2	3	4
P8. Affected your work or ability to work?	0	1	2	3	4
P9. Affected any other important part of your life such as parenting, or school or college work, or other important activities?	0	1	2	3	4

Cloitre et al. (2018) *Acta Psychiatrica Scandinavica.* DOI: 10.1111/acps.12956

Appendix J

Adverse Childhood Experiences (ACEs) Questionnaire

Prior to your 18th birthday:

1. Did a parent or other adult in the household often or very often…
   Swear at you, insult you, put you down, or humiliate you? or
   Act in a way that made you afraid that you might be physically hurt?
   ◯ Yes ◯ No

2. Did a parent or other adult in the household often or very often… Push, grab, slap, or throw something at you? or ever hit you so hard that you had marks or were injured?
   ◯ Yes ◯ No

3. Did an adult or person at least 5 years older than you ever…
   Touch or fondle you or have you touch their body in a sexual way? or
   Attempt or actually have oral or anal intercourse with you?
   ◯ Yes ◯ No

4. Did you often or very often feel that …
   No one in your family loved you or thought you were important or special? or
   Your family didn't look out for each other, feel close to each other, or support each other? ◯
   ◯ Yes ◯ No

5. Did you often or very often feel that …
   You didn't have enough to eat, had to wear dirty clothes, and had no one to protect you? or
   Your parents were too drunk or high to take care of you or take you to the doctor if you needed it?
   ◯ Yes ◯ No

6. Was a biological parent ever lost to you through divorced, abandonment, or other reason?
   ◯ Yes ◯ No

7. Was your mother or stepmother:
   Often or very often pushed, grabbed, slapped, or had something thrown at her? or
   Sometimes, often, or very often kicked, bitten, hit with a fist, or hit with something hard? or
   ever repeatedly hit over at least a few minutes or threatened with a gun or knife?
   ◯ Yes ◯ No

8. Did you live with anyone who was a problem drinker or alcoholic or who used street drugs?
   ◯ Yes ◯ No

9. Was a household member depressed or mentally ill? or
   Did a household member attempt suicide?

   ◯ Yes ◯ No

10. Did a household member go to prison?

    ◯ Yes ◯ No

Scoring - Participants gave *'yes'* or *'no'* answers to each item. *'Yes'* responses received one point each. Item responses were totalled to provide an overall score. Higher scores indicate increased ACEs.

Appendix K

Dissociative Experiences Scale (DES)

Identifier		Date	

This questionnaire consists of twenty-eight questions about experiences that you may have in your daily life. We are interested in how often you have these experiences. It is important, however, that your answers show how often these experiences happen to you when you are not under the influence of alcohol or drugs. To answer the questions, please determine to what degree the experience described in the question applies to you and select the number to show what percentage of the time you have the experience. 100% means 'always', 0% means 'never' with 10% increments in between. This assessment is not intended to be a diagnosis. If you are concerned about your results in any way, please speak with a qualified health professional.

Never 0% | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% Always

1	Some people have the experience of driving a car and suddenly realizing that they don't remember what has happened during all or part of the trip. Select a number to show what percentage of the time this happens to you	0%
2	Some people find that sometimes they are listening to someone talk and they suddenly realize that they did not hear all or part of what was said. Select a number to show what percentage of the time this happens to you	0%
3	Some people have the experience of finding themselves in a place and having no idea how they got there. Select a number to show what percentage of the time this happens to you	0%
4	Some people have the experience of finding themselves dressed in clothes that they don't remember putting on. Select a number to show what percentage of the time this happens to you	0%
5	Some people have the experience of finding new things among their belongings that they do not remember buying. Select a number to show what percentage of the time this happens to you	0%
6	Some people sometimes find that they are approached by people that they do not know who call them by another name or insist that they have met them before. Select a number to show what percentage of the time this happens to you	0%

Serenity Programme™ - www.serene.me.uk - Dissociative Experiences Scales (DES)

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

Serenity Programme™ - www.serene.me.uk - Dissociative Experiences Scales (DES)

18	Some people sometimes find that they become so involved in a fantasy or daydream that it feels as though it were really happening to them. Select a number to show what percentage of the time this happens to you	0%
19	Some people find that they are sometimes able to ignore pain. Select a number to show what percentage of the time this happens to you	0%
20	Some people find that they sometimes sit staring off into space, thinking of nothing, and are not aware of the passage of time. Select a number to show what percentage of the time this happens to you	0%
21	Some people sometimes find that when they are alone they talk out loud to themselves. Select a number to show what percentage of the time this happens to you	0%
22	Some people find that in one situation they may act so differently compared with another situation that they feel almost as if they were different people. Select a number to show what percentage of the time this happens to you	0%
23	Some people sometimes find that in certain situations they are able to do things with amazing ease and spontaneity that would usually be difficult for them (for example, sports, work, social situations, etc.). Select a number to show what percentage of the time this happens to you	0%
24	Some people sometimes find that they cannot remember whether they have done something or have just thought about doing that thing (for example, not knowing whether they have just mailed a letter or have just thought about mailing it). Select a number to show what percentage of the time this happens to you	0%
25	Some people find evidence that they have done things that they do not remember doing. Select a number to show what percentage of the time this happens to you	0%
26	Some people sometimes find writings, drawings, or notes among their belongings that they must have done but cannot remember doing. Select a number to show what percentage of the time this happens to you	0%
27	Some people find that they sometimes hear voices inside their head that tell them to do things or comment on things that they are doing. Select a number to show what percentage of the time this happens to you	0%
28	Some people sometimes feel as if they are looking at the world through a fog so that people or objects appear far away or unclear. Select a number to show what percentage of the time this happens to you	0%

Scoring -Participants scores on individual items were combined to provide a total score. In the current study, item number 27 which relates to voice hearing was removed before the final score was determined.

Appendix L

Launay-Slade Hallucination Scale- Revised (LSHS-R)

1. No matter how hard I try to concentrate, unrelated thoughts always creep into my mind

2. In my daydreams I can hear the sound of a tune almost as clearly as if I were actually listening to it

3. Sometimes my thoughts seem as real as actual events in my life

4. Sometimes a passing thought will seem so real that it frightens me

5. The sounds I hear in my daydreams are generally clear and distinct

6. The people in my daydreams seem so true to life that sometimes I think they are

7. I often hear a voice speaking my thoughts aloud

8. In the past, I have had the experience of hearing a person's voice and then found that no-one was there

9. On occasions, I have seen a person's face in front of me when no-one was in fact there

10. I have heard the voice of the Devil

11. In the past, I have heard the voice of God speaking to me

12. I have been troubled by hearing voices in my head

Scoring: Participants rate how much each item is applicable to them using a five-point Likert scale between 0 (certainly does not apply to me) and 5 (certainly applies to me). Scores from individual items were combined to produce an overall score. Participants could score between zero and 48. Higher scores indicated a greater predisposition towards experiencing hallucinations.

Appendix M

Somatoform Dissociation Questionnaire – Peritraumatic (SDQ-P)

Instructions: Please answer the questions in this list by circling the answer that best described your experiences and reactions during and / or immediately after the major event. If a physical cause is known, you can indicate that by circling 'yes'. If not known, they you circle 'no.'

The possible answers you can give are:
During (a part of) the major event and / or immediately after, this phenomenon occurred to me:

1 = not at all
2 = a little bit
3 = to a considerable extent
4 = a lot
5 = extremely

During (a part of) the major event and / or immediately after	This applied to me					Physical cause known?	
1. It felt as if my body, or parts of it, was paralyzed	1	2	3	4	5	Yes	No
2. My visual field was smaller than usual (it felt as if I was looking through a tunnel or could just see a section of an area)	1	2	3	4	5	Yes	No
3. It felt as if my body, or parts of it, disappeared	1	2	3	4	5	Yes	No
4. I felt temporarily paralyzed or stiff	1	2	3	4	5	Yes	No
5. It felt as if my body, or parts of it, were numb	1	2	3	4	5	Yes	No
6. My sense of taste diminished or was absent	1	2	3	4	5	Yes	No
7. I crouched and automatically did not move – it was involuntary and not because I was physically restrained	1	2	3	4	5	Yes	No
8. I felt like I had to vomit	1	2	3	4	5	Yes	No
9. I made goal directed movements that I did not control myself (*e.g.* trying to grab something)	1	2	3	4	5	Yes	No
10. I did not physically manage to eat and drink, although food and drinks were available and not forbidden	1	2	3	4	5	Yes	No
11. I completely lost my appetite and thirst while I was hungry or thirsty before	1	2	3	4	5	Yes	No

Scoring: Scores for each item were summed. Total scores could fall between eleven and 55. Higher scores indicated a higher levels of somatoform peritraumatic dissociation.

Appendix N

Peritraumatic Dissociative Experiences Questionnaire (PDEQ)

Please complete the items below by circling the number that best describes the experiences you had had during and immediately after the critical incident. If an item does not apply to your experience, please circle "not at all true".

		Not at all true	Slightly true	Somewhat true	Very true	Extremely true
1	I had moments of losing track of what was going on. I "blanked out" or "spaced out" or in some way felt that I was not part of what was going on.	1	2	3	4	5
2	I found that I was on "automatic pilot". I ended up doing things that I later realized I hadn't actively decided to do.	1	2	3	4	5
3	My sense of time changed. Things seemed to be happening in slow motion.	1	2	3	4	5
4	What was happening seemed unreal to me, like I was in a dream, or watching a movie or play.	1	2	3	4	5
5	I felt as though I were spectator watching what was happening to me, as if I were floating above the scene or observing it as an outsider.	1	2	3	4	5
6	There were moments when my sense of my own body seemed distorted or changed. I felt disconnected from my own body, or it was unusually large or small.	1	2	3	4	5
7	I felt as though things that were actually happening to others were happening to me — like I was in danger when I really wasn't.	1	2	3	4	5
8	I was surprised to find afterwards that a lot of things happened at the time that I was not aware of, especially things I ordinarily would have noticed.	1	2	3	4	5
9	I felt confused; That is, there were moments when I had difficulty making sense of what was happening.	1	2	3	4	5
10	I felt disoriented; that is, there were moments when I felt uncertain about where I was or what time it was.	1	2	3	4	5

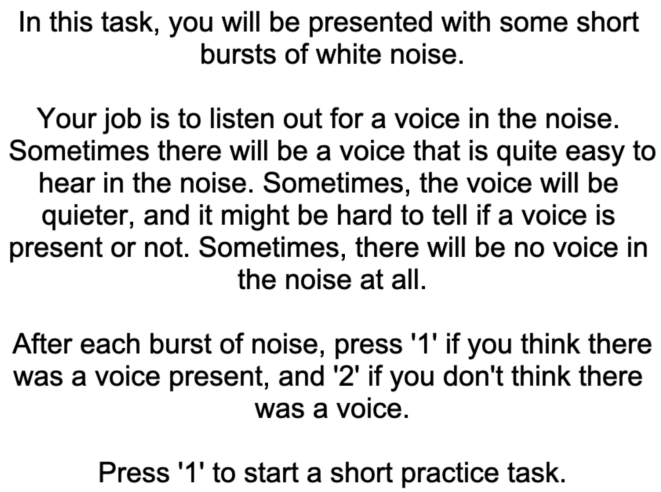
Scoring: Participants scores for each item were summed. Participants scores could fall between ten and fifty and higher scores indicate higher levels of peritraumatic dissociation. Score over 15 indicate significant peritraumatic dissociation.

Appendix O

Signal Detection Test (SDT)

Participants listen on headphones and hear a series of bursts of white noise at a level that is not unpleasant, each lasting 3.5 seconds. There are 70 trials in total and, on some of the trials there is a voice saying “Who’ which is either difficult (25 trials) or easy (12 trials) to hear above the noise. Afterwards, each trial, participants have 3 seconds to press a key on their computer keyboard to indicate whether the voice was present. An image of the instruction screen is shown in Figure 1.

Figure 1: Screenshot of instruction screen



Appendix P

Participant Consent Form

What factors are linked to Psychosis and PTSD?

Please tick the appropriate boxes	**Yes**	**No**
Taking Part in the Project:		
I have read and understood the project information sheet, or the project has been fully explained to me (if you answer no to this question, please do not proceed with the consent form until you are fully aware of what your participation in the project will mean).	☐	☐
I have been given the opportunity to ask questions about the project.	☐	☐
I agree to take part in the project. I understand that taking part in the project will include completing questionnaires, completing a task involving listening to audio clips on the computer, answering questions about experiences of hallucinations, PTSD, and experiences at the time of a past traumatic event.	☐	☐
I understand that taking part is voluntary and that I can withdraw from the study up to two weeks after completing the study. I do not have to give any reasons for why I no longer want to take part and there will be no adverse consequences if I choose to withdraw.	☐	☐
How my information will be used during and after the project:		
I understand that my personal details such as name, phone number, address and email address will not be revealed to people outside of the project.	☐	☐
I understand and agree that my words may be quoted in publications, reports, web pages, and other research outputs. I understand that I will not be named in these outputs.	☐	☐
I understand and agree that other authorised researchers will have access to this data only if they agree to preserve the confidentiality of the information as requested in this form. All data will remain anonymised.	☐	☐
I understand and agree that other authorised researchers may use my data in publications, reports, web pages, and other research outputs, only if they agree to preserve the confidentiality of the information as requested in this form.	☐	☐
I give permission for the questionnaire and audio task response data that I provide to be deposited in ORDA (online research data) which is the University of Sheffield's data repository. This is so it can be used for future research and learning.	☐	☐
I consent to the researchers sending me a letter or email outlining the findings of the study.	☐	☐
I consent to the researchers filing my consent form within a site file, which will be password protected on a secure server.	☐	☐
I agree for the researchers to use my data for future research.	☐	☐
So that the information you provide can be used legally by the researchers:		
I agree to assign the copyright I hold in any materials generated as part of this project to The University of Sheffield.	☐	☐

Name of participant [printed] Signature Date
Name of researcher [printed] Signature Date

Project contact details for further information: Lead investigators: Emily Kruger e.kruger1@sheffield.ac.uk & Laura Hall lhall8@sheffield.ac.uk (Trainee Clinical Psychologists). Address: University of Sheffield, Department of Psychology, Floor F, Cathedral Court,1 Vicar Lane, Sheffield S1 2LT. Researcher Supervisor - Professor Richard Bentall (r.bentall@sheffield.ac.uk).

Appendix Q

Participant Debrief Sheet

The University Of Sheffield.

Debrief Form: What factors are linked to Psychosis and PTSD?

Lead Investigators: Emily Kruger & Laura Hall
Research Supervisor: Professor Richard Bentall

Dear Participant,

Thank you again for participating in this research as part of our doctoral thesis. Previous research has found that traumatic life experiences can be linked to future mental health problems such as hearing voices or feeling disconnected from thoughts, feelings, and emotions. This could also mean that people find it difficult to know what is real and what is not. We also know that people's automatic responses at the time of a trauma can influence future mental health experiences. This study aimed to investigate this further to help inform patient care in mental health services.

We hope that you found this study interesting to complete, and we have appreciated your contributions to this research field. All your data will be kept securely in a password protected file that only the research team will have access to. None of your details will be identifiable in the write up of the research. If you have any questions about the study, please contact us using the details provided at the end of this debrief sheet. In due course, you will receive a letter or email with a summary of the study findings.

If you feel affected by participation in this study, we encourage that you contact us regarding this. However, you may wish to call your clinical team or the crisis service within the NHS trust you are in. You may also wish to contact the Samaritans by telephone on 116 123 or your GP for further support.

Thank you for your time.
Kindest regards,

Researchers - Emily Kruger & Laura Hall
Address: Department of Psychology, University of Sheffield, Cathedral Court, 1 Vicar Lane, Sheffield, S1 2LT
Email: e.kruger1@sheffield.ac.uk, lhall8@sheffield.ac.uk
Telephone: Please leave a message with research officer Amrit Sinha on 0114 2226650 and Emily or Laura will return your call.

Research Supervisor - Professor Richard Bentall
Address: Department of Psychology, University of Sheffield, Cathedral Court, 1 Vicar Lane, Sheffield, S1 2LT. Email: r.bentall@sheffield.ac.uk

Appendix R

Between Group Comparisons on Demographic Variables (SPSS Output)

Age

ANOVA

Age

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2305.852	2	1152.926	11.591	<.001
Within Groups	7758.148	78	99.463		
Total	10064.000	80			

ANOVA Effect Sizes[a]

		Point Estimate	95% Confidence Interval Lower	Upper
Age	Eta-squared	.229	.075	.365
	Epsilon-squared	.209	.051	.348
	Omega-squared Fixed-effect	.207	.050	.345
	Omega-squared Random-effect	.116	.026	.209

a. Eta-squared and Epsilon-squared are estimated based on the fixed-effect model.

Multiple Comparisons

Dependent Variable: Age

Bonferroni

(I) Participant Group	(J) Participant Group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
Healthy	Schizophrenia	-12.815*	2.714	<.001	-19.46	-6.17
	PTSD	-8.630*	2.714	.006	-15.27	-1.99
Schizophrenia	Healthy	12.815*	2.714	<.001	6.17	19.46
	PTSD	4.185	2.714	.381	-2.46	10.83
PTSD	Healthy	8.630*	2.714	.006	1.99	15.27
	Schizophrenia	-4.185	2.714	.381	-10.83	2.46

*. The mean difference is significant at the 0.05 level.

Gender

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	5.344[a]	4	.254
Likelihood Ratio	5.769	4	.217
Linear-by-Linear Association	.239	1	.625
N of Valid Cases	81		

a. 3 cells (33.3%) have expected count less than 5. The minimum expected count is .67.

Ethnicity

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	1.283[a]	2	.527
Likelihood Ratio	1.266	2	.531
Linear-by-Linear Association	1.222	1	.269
N of Valid Cases	81		

a. 3 cells (50.0%) have expected count less than 5. The minimum expected count is 4.33.

Education

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	16.352[a]	4	.003
Likelihood Ratio	16.601	4	.002
Linear-by-Linear Association	.159	1	.690
N of Valid Cases	81		

a. 3 cells (33.3%) have expected count less than 5. The minimum expected count is 3.33.

Employment

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	29.842[a]	2	<.001
Likelihood Ratio	35.470	2	<.001
Linear-by-Linear Association	3.158	1	.076
N of Valid Cases	81		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.00.

Appendix S

ANCOVA Outputs Controlling for Age

ACES

Tests of Between-Subjects Effects

Dependent Variable: ACE total

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	108.154[a]	3	36.051	6.465	<.001
Intercept	55.429	1	55.429	9.939	.002
Age	.080	1	.080	.014	.905
Group	88.003	2	44.001	7.890	<.001
Error	429.402	77	5.577		
Total	1398.000	81			
Corrected Total	537.556	80			

a. R Squared = .201 (Adjusted R Squared = .170)

Pairwise Comparisons

Dependent Variable: ACE total

(I) Participant Group	(J) Participant Group	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b] Lower Bound	Upper Bound
Healthy	Schizophrenia	-2.033*	.729	.020	-3.817	-.249
	PTSD	-2.676*	.683	<.001	-4.348	-1.004
Schizophrenia	Healthy	2.033*	.729	.020	.249	3.817
	PTSD	-.643	.652	.982	-2.240	.954
PTSD	Healthy	2.676*	.683	<.001	1.004	4.348
	Schizophrenia	.643	.652	.982	-.954	2.240

Based on estimated marginal means.

*. The mean difference is significant at the 0.05 level.

b. Adjustment for multiple comparisons: Bonferroni.

LSHS-R

Tests of Between-Subjects Effects

Dependent Variable: LSHS-R Total

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1287.179[a]	3	429.060	22.114	<.001
Intercept	800.530	1	800.530	41.260	<.001
Age	14.784	1	14.784	.762	.385
Group	1105.969	2	552.984	28.501	<.001
Error	1493.957	77	19.402		
Total	11513.000	81			
Corrected Total	2781.136	80			

a. R Squared = .463 (Adjusted R Squared = .442)

Pairwise Comparisons

Dependent Variable: LSHS-R Total

(I) Participant Group	(J) Participant Group	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b] Lower Bound	Upper Bound
Healthy	Schizophrenia	-10.263*	1.359	<.001	-13.590	-6.936
	PTSD	-5.488*	1.274	<.001	-8.606	-2.369
Schizophrenia	Healthy	10.263*	1.359	<.001	6.936	13.590
	PTSD	4.775*	1.217	<.001	1.797	7.754
PTSD	Healthy	5.488*	1.274	<.001	2.369	8.606
	Schizophrenia	-4.775*	1.217	<.001	-7.754	-1.797

Based on estimated marginal means

*. The mean difference is significant at the 0.05 level.

b. Adjustment for multiple comparisons: Bonferroni.

DES

Descriptive Statistics

Dependent Variable: DES Total

Participant Group	Mean	Std. Deviation	N
Healthy	20.22	11.723	27
Schizophrenia	31.99	11.155	27
PTSD	31.89	12.531	27
Total	28.03	12.925	81

Tests of Between-Subjects Effects

Dependent Variable: DES Total

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2740.570[a]	3	913.523	6.621	<.001
Intercept	2560.722	1	2560.722	18.560	<.001
Age	267.346	1	267.346	1.938	.168
Group	1374.491	2	687.245	4.981	.009
Error	10623.666	77	137.970		
Total	77021.811	81			
Corrected Total	13364.236	80			

a. R Squared = .205 (Adjusted R Squared = .174)

Pairwise Comparisons

Dependent Variable: DES Total

(I) Participant Group	(J) Participant Group	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b] Lower Bound	Upper Bound
Healthy	Schizophrenia	-9.391*	3.625	.034	-18.262	-.519
	PTSD	-10.072*	3.398	.012	-18.387	-1.756
Schizophrenia	Healthy	9.391*	3.625	.034	.519	18.262
	PTSD	-.681	3.245	1.000	-8.623	7.261
PTSD	Healthy	10.072*	3.398	.012	1.756	18.387
	Schizophrenia	.681	3.245	1.000	-7.261	8.623

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

PDEQ

Descriptive Statistics

Dependent Variable: PDEQ Total

Participant Group	Mean	Std. Deviation	N
Healthy	18.44	9.263	27
Schizophrenia	33.59	11.430	27
PTSD	34.41	10.259	27
Total	28.81	12.614	81

Tests of Between-Subjects Effects

Dependent Variable: PDEQ Total

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	4419.506[a]	3	1473.169	13.652	<.001
Intercept	3729.956	1	3729.956	34.567	<.001
Age	54.988	1	54.988	.510	.477
Group	3125.062	2	1562.531	14.481	<.001
Error	8308.716	77	107.905		
Total	79982.000	81			
Corrected Total	12728.222	80			

a. R Squared = .347 (Adjusted R Squared = .322)

Pairwise Comparisons

Dependent Variable: PDEQ Total

(I) Participant Group	(J) Participant Group	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b] Lower Bound	Upper Bound
Healthy	Schizophrenia	-14.069*	3.206	<.001	-21.915	-6.223
	PTSD	-15.236*	3.005	<.001	-22.590	-7.883
Schizophrenia	Healthy	14.069*	3.206	<.001	6.223	21.915
	PTSD	-1.167	2.870	1.000	-8.191	5.857
PTSD	Healthy	15.236*	3.005	<.001	7.883	22.590
	Schizophrenia	1.167	2.870	1.000	-5.857	8.191

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

SDQ-P

Descriptive Statistics

Dependent Variable: SDQ Total

Participant Group	Mean	Std. Deviation	N
Healthy	17.26	6.567	27
Schizophrenia	29.07	11.038	27
PTSD	28.59	9.112	27
Total	24.98	10.525	81

Tests of Between-Subjects Effects

Dependent Variable: SDQ Total

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2418.515[a]	3	806.172	9.634	<.001
Intercept	3269.339	1	3269.339	39.069	<.001
Age	4.120	1	4.120	.049	.825
Group	1827.049	2	913.524	10.917	<.001
Error	6443.436	77	83.681		
Total	59387.000	81			
Corrected Total	8861.951	80			

a. R Squared = .273 (Adjusted R Squared = .245)

Pairwise Comparisons

Dependent Variable: SDQ Total

(I) Participant Group	(J) Participant Group	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b] Lower Bound	Upper Bound
Healthy	Schizophrenia	-11.520*	2.823	<.001	-18.429	-4.610
	PTSD	-11.134*	2.646	<.001	-17.611	-4.658
Schizophrenia	Healthy	11.520*	2.823	<.001	4.610	18.429
	PTSD	.385	2.527	1.000	-5.800	6.570
PTSD	Healthy	11.134*	2.646	<.001	4.658	17.611
	Schizophrenia	-.385	2.527	1.000	-6.570	5.800

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Appendix T

Regression Outputs

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.356[a]	.127	.105	5.579	.127	5.678	2	78	.005
2	.483[b]	.233	.193	5.297	.106	5.266	2	76	.007
3	.559[c]	.312	.266	5.051	.079	8.585	1	75	.004

a. Predictors: (Constant), Age, ACE total

b. Predictors: (Constant), Age, ACE total, SDQ Total, PDEQ Total

c. Predictors: (Constant), Age, ACE total, SDQ Total, PDEQ Total, DES Total

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	353.460	2	176.730	5.678	.005[b]
	Residual	2427.675	78	31.124		
	Total	2781.136	80			
2	Regression	648.924	4	162.231	5.783	.000[c]
	Residual	2132.212	76	28.055		
	Total	2781.136	80			
3	Regression	867.923	5	173.585	6.805	.000[d]
	Residual	1913.213	75	25.510		
	Total	2781.136	80			

a. Dependent Variable: LSHS-R Total

b. Predictors: (Constant), Age, ACE total

c. Predictors: (Constant), Age, ACE total, SDQ Total, PDEQ Total

d. Predictors: (Constant), Age, ACE total, SDQ Total, PDEQ Total, DES Total

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.613	2.129		2.167	.033
	ACE total	.577	.245	.254	2.353	.021
	Age	.108	.057	.206	1.912	.060
2	(Constant)	2.436	2.202		1.106	.272
	ACE total	.290	.254	.127	1.140	.258
	Age	.060	.056	.114	1.070	.288
	SDQ Total	-.014	.091	-.026	-.159	.874
	PDEQ Total	.181	.077	.387	2.365	.021
3	(Constant)	1.141	2.145		.532	.596
	ACE total	.292	.242	.128	1.205	.232
	Age	.025	.055	.047	.456	.650
	SDQ Total	-.020	.087	-.036	-.230	.818
	PDEQ Total	.134	.075	.287	1.794	.077
	DES Total	.144	.049	.315	2.930	.004

a. Dependent Variable: LSHS-R Total

Appendix U

Serial Mediation Model of Voice-Hearing Output

```
**************************************************************************
Model  : 6
    Y  : LSHStot
    X  : ACEtot
   M1  : Peritra
   M2  : DESSC

Covariates:
 Age

Sample
Size:  81

**************************************************************************
OUTCOME VARIABLE:
 Peritra

Model Summary
          R       R-sq        MSE          F        df1        df2          p
      .4881      .2382      .7813    12.1951     2.0000    78.0000      .0000

Model
              coeff         se          t          p       LLCI       ULCI
constant    -1.2268      .3373    -3.6373      .0005    -1.8984     -.5553
ACEtot        .1494      .0389     3.8458      .0002      .0721      .2268
Age           .0206      .0090     2.2951      .0244      .0027      .0385

**************************************************************************
OUTCOME VARIABLE:
 DESSC

Model Summary
          R       R-sq        MSE          F        df1        df2          p
      .4456      .1986   139.0941     6.3602     3.0000    77.0000      .0007

Model
              coeff         se          t          p       LLCI       ULCI
constant    19.0281     4.8671     3.9095      .0002     9.3363    28.7198
ACEtot       -.0326      .5655     -.0577      .9542    -1.1587     1.0935
Peritra      4.2488     1.5107     2.8124      .0062     1.2405     7.2571
Age           .2539      .1238     2.0507      .0437      .0074      .5004

**************************************************************************
```

```
**************************************************************************
OUTCOME VARIABLE:
 LSHStot

Model Summary
          R       R-sq        MSE          F        df1        df2          p
      .5484      .3007    25.5891     8.1711     4.0000    76.0000      .0000

Model
              coeff         se          t          p       LLCI       ULCI
constant     4.2155     2.2854     1.8445      .0690     -.3363     8.7673
ACEtot        .2834      .2426     1.1684      .2463     -.1997      .7665
Peritra      1.3612      .6805     2.0004      .0490      .0060     2.7164
DESSC         .1496      .0489     3.0616      .0030      .0523      .2470
Age           .0292      .0545      .5356      .5938     -.0794      .1378


****************** DIRECT AND INDIRECT EFFECTS OF X ON Y *****************

Direct effect of X on Y
     Effect         se          t          p       LLCI       ULCI
      .2834      .2426     1.1684      .2463     -.1997      .7665

Indirect effect(s) of X on Y:
          Effect     BootSE   BootLLCI   BootULCI
TOTAL      .2936      .1395      .0411      .5835
Ind1       .2034      .1241     -.0152      .4678
Ind2      -.0049      .0778     -.1599      .1531
Ind3       .0950      .0540      .0154      .2230

Indirect effect key:
Ind1 ACEtot      ->    Peritra     ->    LSHStot
Ind2 ACEtot      ->    DESSC       ->    LSHStot
Ind3 ACEtot      ->    Peritra     ->    DESSC       ->    LSHStot

************************ ANALYSIS NOTES AND ERRORS ************************

Level of confidence for all confidence intervals in output:
  95.0000

Number of bootstrap samples for percentile bootstrap confidence intervals:
  10000

------ END MATRIX -----
```

Appendix V

Serial Mediation Model of PTSD Output

```
**************************************************************************
Model  : 6
    Y  : ITQtot
    X  : ACEtot
   M1  : Peritra
   M2  : DESSC

Covariates:
 Age

Sample
Size:  81

**************************************************************************
OUTCOME VARIABLE:
 Peritra

Model Summary
          R       R-sq        MSE          F        df1        df2          p
      .4881      .2382      .7813    12.1951     2.0000    78.0000      .0000

Model
              coeff         se          t          p       LLCI       ULCI
constant    -1.2268      .3373    -3.6373      .0005    -1.8984     -.5553
ACEtot        .1494      .0389     3.8458      .0002      .0721      .2268
Age           .0206      .0090     2.2951      .0244      .0027      .0385

**************************************************************************
OUTCOME VARIABLE:
 DESSC

Model Summary
          R       R-sq        MSE          F        df1        df2          p
      .4456      .1986   139.0941     6.3602     3.0000    77.0000      .0007

Model
              coeff         se          t          p       LLCI       ULCI
constant    19.0281     4.8671     3.9095      .0002     9.3363    28.7198
ACEtot       -.0326      .5655     -.0577      .9542    -1.1587     1.0935
Peritra      4.2488     1.5107     2.8124      .0062     1.2405     7.2571
Age           .2539      .1238     2.0507      .0437      .0074      .5004

**************************************************************************
```

```
**************************************************************************
OUTCOME VARIABLE:
 ITQtot

Model Summary
          R       R-sq        MSE          F        df1        df2          p
      .7565      .5724    88.6672    25.4301     4.0000    76.0000      .0000

Model
              coeff         se          t          p       LLCI       ULCI
constant     8.3169     4.2542     1.9550      .0543     -.1561    16.7899
ACEtot       1.2312      .4515     2.7269      .0079      .3320     2.1305
Peritra      7.4411     1.2666     5.8747      .0000     4.9184     9.9638
DESSC        -.0072      .0910     -.0786      .9375     -.1884      .1741
Age           .2757      .1015     2.7161      .0082      .0735      .4779


****************** DIRECT AND INDIRECT EFFECTS OF X ON Y *****************

Direct effect of X on Y
     Effect         se          t          p       LLCI       ULCI
     1.2312      .4515     2.7269      .0079      .3320     2.1305

Indirect effect(s) of X on Y:
          Effect     BootSE   BootLLCI   BootULCI
TOTAL     1.1078      .3774      .4154     1.8986
Ind1      1.1121      .3702      .4348     1.8876
Ind2       .0002      .0434     -.0965      .0925
Ind3      -.0045      .0616     -.1269      .1271

Indirect effect key:
Ind1 ACEtot      ->    Peritra     ->    ITQtot
Ind2 ACEtot      ->    DESSC       ->    ITQtot
Ind3 ACEtot      ->    Peritra     ->    DESSC       ->    ITQtot

*********************** ANALYSIS NOTES AND ERRORS ************************

Level of confidence for all confidence intervals in output:
  95.0000

Number of bootstrap samples for percentile bootstrap confidence intervals:
  10000

------ END MATRIX -----
```