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Understanding and Exploring the Factors and Interventions Associated with Psychosis

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Declaration

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

Structure and Word Counts

Section One: Literature Review

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Section Two: Empirical Study

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Lay Summary

Literature Review

Previous research has found clear evidence to support the effectiveness of self-help interventions in improving psychotic outcomes. However, little is known about the effectiveness of cognitive behavioural therapy (CBT) specific self-help for psychosis, given that CBT is a highly recommended treatment for psychosis. Over recent years, research has grown regarding CBT-specific self-help for psychosis, warranting an overall review of the literature. The first section of this thesis aimed to review the literature base on CBT-based self-help interventions in treating psychosis and other related outcomes. Moreover, this review aimed to gain insight into the forms of CBT-based self-help that have been developed over time, given that a substantive review of this has not been completed. Of the 10 included studies, seven papers found credible evidence to support the effectiveness and efficacy in reducing psychotic symptoms post-intervention. Some evidence was also found for improving secondary outcomes to psychosis, such as anxiety and depressive symptoms, as well as improving daily functioning skills and overall well-being. The review was the first to solely explore the effectiveness of CBT-based self-help for psychosis as well as associated outcomes. Due to some reported methodological limitations and concerns with study quality, the findings should be interpreted with some caution. Further studies of higher quality, exploring effectiveness with included follow-up periods, is required to understand effectiveness longevity.

Empirical Study

The second part of the thesis reports an empirical study, which aimed to explore factors relating to hallucination tendencies, building on past research. Previous studies have shown that people with psychosis have abnormal source monitoring skills (usually measured with a signal detection task), and hence an impaired ability to know whether a voice is

present or not; it is also known that early childhood trauma is a risk factor for hallucinations, but trauma does not seem to be associated with impaired source monitoring (Varese et al., 2012). People with PTSD who, like people with psychosis have extensive trauma histories, but do not typically experience hallucinations, were therefore expected to differ from people with hallucinations by having preserved source monitoring. Hence, the authors predicted that, in a comparison between people with PTSD and people with psychosis, source monitoring abnormalities would be specific to people with psychosis.

An online cross-sectional between-groups study was conducted. Three groups (PTSD, psychosis, healthy controls) of participants ($N = 81$) completed a battery of outcome measures on trauma, dissociation, and voice hearing. Participants also completed an online signal detection task to measure source monitoring ability. It was found that the psychosis sample had abnormal bias scores on the source monitoring task, evidencing more bias to assume a voice was present under uncertain conditions. The results found no direct link between childhood trauma and source monitoring ability, suggesting that source monitoring is a possible neurocognitive deficit unique to people with psychosis. Future studies should research the neurocognitive basis of source monitoring deficits in psychosis, and potential future interventions to improve source monitoring skills. Clinical implications, strengths and limitations of the research and described in the report.

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Section One - Literature Review

Cognitive Behavioural Self-help Interventions for Individuals Experiencing Psychosis: A Systematic Review

Abstract

Objectives

This systematic literature review aimed to explore two key research questions: 1) what CBT-based self-help interventions have been developed for people experiencing psychosis? 2) what is the effectiveness of these interventions?

Method

A systematic literature review was conducted, following a published protocol which can be found at: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42022375132. A systematic search was conducted across Scopus, PsycInfo and Web of Science to identify relevant literature, exploring CBT-based self-help interventions for individuals experiencing psychosis. The PICO search strategy tool was used to generate search terms. A narrative synthesis was conducted, and papers were appraised for quality.

Results

Ten studies were included in the review. Five papers were rated as weak, two rated as moderate and three were rated as strong in quality. Seven papers found credible evidence to support the effectiveness of CBT-based self-help in reducing psychosis. Across the studies, common secondary outcomes included depression, overall psychological well-being, and daily functioning, all of which were also found to significantly improve following self-help intervention.

Conclusion

This review presents a synthesis of the evidence on CBT-based self-help interventions available for psychotic presentations. Interventions differed in terms of method of delivery, application, and theoretical basis. Evidence was found for the effectiveness of CBT-based self-help for psychosis, as well as tentative evidence to support its secondary benefit for depression, anxiety, overall well-being, and functioning. Due to methodological

shortcomings, long-term outcomes are unclear. Strengths, limitations, clinical implications, and suggestions for future research are discussed.

Keywords: Psychosis, Schizophrenia, Self-help, Cognitive-behavioural Therapy, CBT.

Practitioner Points:

- There is evidence to suggest that CBT-based self-help for psychosis is effective in reducing psychotic symptomology.
- There is some provisional evidence to suggest that CBT-based self-help for psychosis is effective in reducing secondary outcomes such as anxiety and depressive symptoms, as well as improving daily functioning skills and overall wellbeing.
- Long-term effectiveness is unclear due to the lack of follow-up periods across the studies.
- Study quality is low and therefore further high-quality research is required to improve the evidence-base.

Introduction

Psychosis

Psychosis is a term used to characterise the ways in which people may perceive and process things differently from others, leading to difficulties with distinguishing what is real and what is not (Lieberman & First, 2018) and is usually accompanied by the presence of hallucinations (multi-sensory experiences with the absence of stimuli) and/or delusions (fixed false beliefs). Behavioural disturbances, and lack of insight into the pathologic nature of the experiences can also be present (American Psychiatric Association, 2013).

The nature of these symptoms can make psychosis ineffable for individuals who experience it, creating difficulties when they attempt to communicate about their symptoms (Fusar-Poli et al., 2022). The incidence of psychosis has been estimated to be 31.7 per 100,000 people in England (Kirkbride et al., 2012), and sufferers are reported to die around 10-15 years earlier in comparison to the general population (Simon et al., 2018). People who experience psychosis are also reported to have lower levels of quality of life (Holubova et al., 2016), have higher self-harm and suicide incidences (Challis et al., 2013), and report impairments in their social, occupational, and daily functioning (Al-Halabí et al., 2016). The experience of psychosis is known to be the defining feature of a variety of clinical diagnoses, such as schizophrenia spectrum disorders and bipolar disorder (Scott et al., 2015).

Psychosis Interventions

National Institute for Health and Care Excellence (NICE) currently recommend that people experiencing psychosis are offered oral antipsychotic medication in conjunction with individual cognitive behavioural therapy (CBT) or family interventions, to occur over at least 16 sessions (NICE, 2014). Thus, many studies continue to demonstrate the effectiveness that antipsychotic medication can have in reducing psychotic symptoms (Tandon et al., 2010, Woods et al., 2017). Despite these perceived benefits, many individuals express a strong wish

to reduce or stop taking antipsychotic medication due to significant reported side effects such as weight gain, sedation, and sexual dysfunction (Longden & Read, 2016). CBT for psychosis (CBTp) is primarily reported to be effective in reducing psychotic symptoms, with the primary aim of targeting delusions and hallucinations through adopting a formulation-based approach to distress (Bighelli et al., 2018; Jauhar et al., 2014; Turner at al., 2014; Turner et al., 2020). CBTp has also been found to reduce the development of psychosis across vulnerable groups (Stafford et al., 2013).

Alternative Interventions

CBTp is resource-intensive, with many mental health services struggling to meet the demand for this type of therapy (Haddock et al., 2014). In addition, many individuals experiencing psychosis do not engage in complete therapy protocols (Holding et al., 2016), highlighting some key issues with implementing one to one individual therapy in routine practice. In addition, CBTp has been subject to past debate, with some arguing that the evidence for its effectiveness has been 'oversold' and that funding for CBTp research has potentially overshadowed other possible effective interventions (McKenna & Kingdon, 2014). It has thus been argued that focusing on building interventions around what can realistically be offered in services, and in line with new developments such as digital technologies and alternative therapies, could be helpful in overcoming these barriers and widening the offer of treatment (Thomas, 2015).

Ongoing research has started to uncover important factors related to the likelihood of psychotic experience, such as the role of attachment (Birchwood et al., 2000; Carr et al., 2018), trauma (Read et al., 2001; Varese et al., 2012) and acceptance (Gilbert et al., 2001) and approaches have started to adapt their practice to reflect these advances, with less focus on changing 'faulty thinking' (Thomas, 2015). Evidence for the more eclectic approaches to treating psychosis has also gained more credibility recently, with a focus on the personal

meaning of an individual's psychotic experiences and empowering people to be active within their therapy. Within this, mindfulness-based interventions have demonstrated some positive findings for people with psychosis (Liu et al., 2021). Acceptance and commitment therapy (ACT) has also been found to be helpful for people experiencing psychosis, reducing hospital admissions, and increasing psychological flexibility.

Self-help

Self-help is a commonly accessed intervention, which has been considered to be a way in which individuals can utilise psychological treatment with limited delay, hence overcoming the resource issues and system pressures that affect many mental health services (Perkins et al., 2006). Self-help interventions can be defined as psychological treatments in which the patient accesses the intervention more or less independently from professionals (Cuijpers & Schuurmans, 2007) and can involve some guidance from a therapist (guided) or can be completely unguided. Some research has highlighted the perceived benefits of self-help interventions over face-to-face therapy, such as the ability for individuals to take the intervention at their own pace, and have the ability and time to consolidate their learning (Williams & Whitfield, 2001). Self-help resources are argued to be cheap, adaptable, and simple to use, which make them particularly advantageous for timely care within pressured systems (Cuijpers & Schuurmans, 2007).

There is a growing body of literature suggesting that self-help formats of therapy are helpful for many mental health conditions such as anorexia-nervosa (Bailer et al., 2004), bulimia-nervosa (Durand & King, 2003), anxiety and depression (Fletcher et al., 2005) and obsessive-compulsive disorder (Imai et al., 2022). Thus, a systematic review and meta-analysis evidenced that self-help approaches can be effectively delivered in a variety of ways, such as through manuals, over the internet and through psychoeducation, both guided and unguided by a professional (Chamberlain et al., 2008; Kocovski et al., 2019; O'Mara et al.,

2023). Further research has evidenced that self-help interventions can also be delivered through smartphone devices, on computer package software or over the telephone (Greenwell et al., 2015). Self-help interventions have furthermore been delivered at group-level, through peer support networks and have shown to be of benefit for many mental health difficulties (Pfeiffer et al., 2011). Thus, research has shown that the more effective self-help interventions for mental health difficulties tend to employ cognitive behavioural therapy (CBT) techniques (Baguley et al., 2010).

Self-help Interventions and Psychosis

Farhall et al. (2007) first discussed how people with psychosis were capable of identifying their own coping behaviours to manage psychotic symptoms, demonstrating the potential natural ability that people with psychosis have in self-treating their experiences. Self-help approaches have been used for people with psychosis for many years (Snowdon, 1980). Scott et al. (2015) conducted the first systematic review and meta-analysis into the effectiveness of self-help interventions for people with psychosis. Notably, they found that from 24 studies, self-help approaches had on average 'small to medium' effect sizes on overall psychotic-related symptoms, suggesting that self-help interventions have benefit for people with psychosis in reducing distressing symptoms. However, it was noted by the authors that only two out of the 24 studies within the review involved delivering a CBT-based self-help intervention, despite the fact that CBTp is highly recognised as a first-line treatment for psychosis by NICE (2014). It was argued that this could be a potential gap in the research, and the author's suggested that future research should investigate CBT-specific self-help methods for people with psychotic presentations. Since this publication, the evidence for self-help approaches based on CBT principles for psychotic experiences has been growing, prompting the need for an updated review.

In completing this review, the potential for self-help interventions for psychosis based on a CBT foundation will be thoroughly investigated, and the more recent literature will be analysed. At the time of writing the review, and to the authors knowledge, no up-to-date reviews of the literature regarding CBT-informed self-help interventions for psychosis were found. As such, it is difficult to be aware of the effectiveness of these interventions in clinical practice and the types of which are being developed and utilised.

The Rationale for the Current Review

A systematic review and meta-analysis published eight years ago (Scott et al., 2015) found evidence that self-help interventions could be effective for patients with psychosis, but an evidence gap was identified, with a dearth of studies of CBT-specific self-help interventions for psychosis were lacking. Since then, research into CBT-based self-help interventions for psychosis has expanded, warranting an updated comprehensive review of the relevant literature.

Aims

This current review aims to explore two key research questions: 1) what CBT-based self-help interventions have been developed for people experiencing psychosis? 2) what is the effectiveness of these interventions?

In order to answer these questions, this systematic review will aim to identify quantitative research exploring forms of cognitive behavioural self-help interventions carried out with people experiencing psychosis. The quality of these studies will also be assessed.

Method

The published protocol for this review was pre-registered on PROSPERO in November 2022 and can be found on the following link. (https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=375132).

Since the publication date, revisions and additions to the protocol methodology have

been made, which are detailed within the link and also within Appendix A. The stage of the review was also updated as progression was made.

Systematic Review

A systematic search was conducted across three databases (Web of Science, Scopus and PsycInfo) in February 2023, in order to identify the literature investigating the effectiveness of CBT-based self-help interventions for psychosis. To select papers, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidance was followed in order to support the process of selecting the literature (Page et al., 2021). To improve rigour, the final completed PRISMA checklist is detailed in Appendix B. Ethical approval was not required for this particular systematic review. The PRISMA diagram for this flow of the strategy can be found within Figure 1. For additional clarification, the inclusion and exclusion criteria are shown in Table 1, and search terms for the review are shown in Table 2. Elements of the PICO search strategy tool (Richardson et al., 1995) were used to support the process of generating search terms for this review, and some search terms were derived from the review published by Scott et al. (2015). To improve the searching process, a consultation was also held with a university liaison librarian specialising in Psychology to check search terms before searching commenced. The support included the use of Boolean operators (AND and OR) to widen the search remit. Searches were limited from the year 1990 until present time, with the aim of including the relevant CBT self-help intervention papers reviewed by Scott et al. (2015) in order to provide a more rigorous update of the literature.

The present review excluded papers which were not published in the English language. Grey literature was not included in order to maintain study quality (Pappas & Williams, 2011). Following systematic searching, research papers from the three databases were extracted and duplicates were removed at this stage of analysis. Titles and abstracts

were then screened against the necessary criteria, to assess for the appropriateness to the research questions of the review. Full-text review was then completed against the necessary criteria. Finally, once included studies were ascertained, reference lists of these papers were searched to find additional relevant papers. To assist with the process of screening, the Mendeley software was used to organise and enable hand citation searching.

Figure 1

PRISMA Flow Diagram

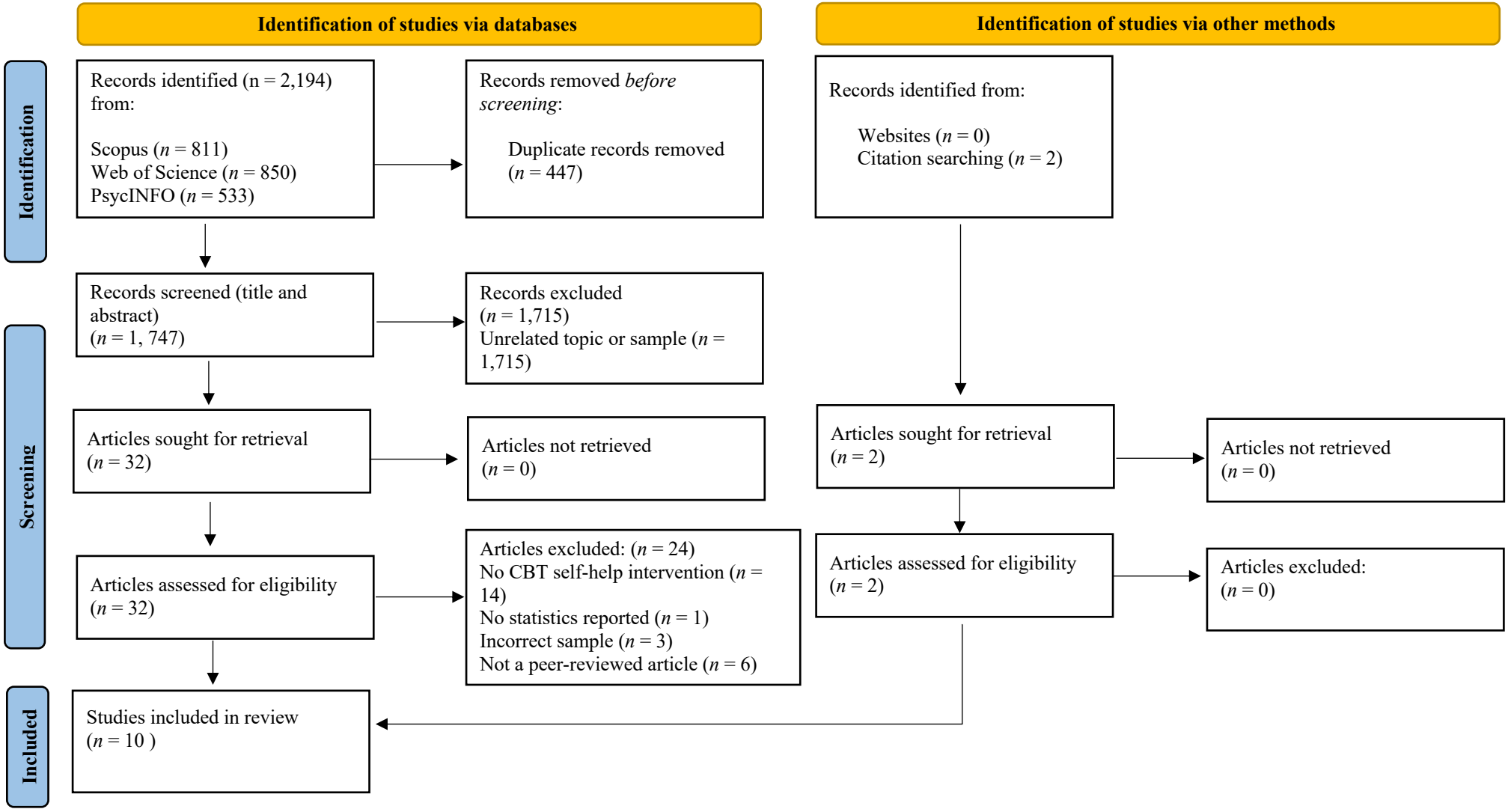

Table 1

Inclusion and Exclusion Criteria

Inclusion	Exclusion
- Quantitative studies - Peer-reviewed published research - Studies investigating the effectiveness of a form of self-help* intervention for psychosis based on CBT principles - Studies that recruited individuals experiencing symptoms relating to psychosis to receive a CBT self-help intervention - Studies measuring quantitative outcomes for psychosis symptoms - Studies measuring other quantitative outcomes on symptoms associated with psychotic experience e.g., quality of life, distress, or mood. - Quantitative statistics available	- Studies not published in English - Grey literature - Unpublished literature

Note. For the purpose of this review and in line with the previous review by Scott et al. (2015), a self-help intervention was defined in line with Bower and Richard's (2001) definition, whereby the intervention is conducted mainly independent of a mental health professional.

Table 2

Search Terms

Construct	Search Terms
Population	Psychosis OR psychotic OR schizophrenia OR “schizophrenia spectrum disorder” OR “hearing voices”
Intervention	"Self-help" OR “guided self-help” OR "self-monitoring" OR “self-directed” OR “minimal guidance” OR “cognitive behavioural therapy self-help” OR “CBT self-help”
Comparison	Not applicable
Outcome	Not applicable

Study Selection

Initial searches of the literature yielded 2,194 papers across three databases. Articles were extracted to the Mendeley software programme, and duplicates were removed, resulting in 1,747 papers. Titles and abstracts of these papers were then screened by the author and were checked against the necessary criteria, resulting in 32 articles meeting eligibility to be screened at full-text level. Articles were generally screened out at this stage if they did not include a CBT self-help intervention, a psychosis sample was not present, it was not a peer-reviewed article, or statistics were not reported. The excluded papers are presented in Appendix C. In addition to this, reference lists were finally searched, resulting in two additional papers. Thus, 10 papers were included within this current systematic review. During the screening process, an independent trainee clinical psychologist checked a proportion of the papers for screening at full-text level (15%) to ensure reliability of the included studies. A meeting was held between the author and the independent reviewer, and no discrepancies or differences in screening were reported during this process; however, had discrepancies been detected they would have been resolved through discussion until consensus was reached. These final papers were organised using Microsoft Excel software using a form specific to conducting systematic reviews. Study characteristics were extracted from the papers, which included author and date, origin of the study, participant demographics, type of cognitive behavioural self-help intervention, and outcome of the intervention and effect size.

Quality Appraisal

The quality of all papers was analysed by the Effective Public Health Practice Project (EPHPP) Quality Assessment Tool for Quantitative Studies (Thomas et al., 2004; Appendix D). The EPHPP is noted to be a well-established tool for assessing study quality, providing a standardised approach to assessing quality based on different quantifiable categories:

selection bias, study design, confounders, blinding, data collection methods and withdrawals and dropouts. Quality is rated for each of these components by receiving a numerical value of 1 (strong), 2 (moderate) or 3 (weak). Overall quality is achieved by summing the individual component scores, producing a final 'global' rating of either strong (no weak ratings), moderate (one weak rating) or weak (two or more weak ratings) for each individual paper. In terms of its effectiveness as a quality appraisal tool, the EPHPP has been found to demonstrate fair levels of inter-rater agreement for individual domains (Armijo-Olivo et al., 2012), as well as good content validity levels (Thomas et al., 2004). A trainee clinical psychologist, independent to this review, also rated a random selection of the papers (*n* = 30%) and any disagreements were planned to be resolved via discussion.

Results

Overall Summary of Studies

A total of 10 studies were included in the systematic review, whereby the previously stated PRISMA flow diagram clearly outlines the screening phases in Figure 1. All papers were peer-reviewed and published across various journals between the years of 2012 and 2021. A 'study characteristics' summary can be located in Table 3 in alphabetic order, to provide information regarding study context and statistical results. Following the second-rater screening, 100% agreement was reached on whether papers should be included or excluded during full-text reviewing.

The studies included within this review contained either cohort studies (n = 4) or randomised controlled trials (n = 6), in order to explore the effectiveness or efficacy of a CBT based self-help intervention. It is important to note that as both uncontrolled cohort studies and RCTs have been identified in the literature, the information they contain addresses both *efficacy* (the impact of the intervention under ideal conditions, usually determined by controlled clinical trials) and *effectiveness* (the impact in real world conditions as determined either by uncontrolled cohort studies or trials specifically designed for this purpose) (Singal et al., 2014).

Regarding geographic location, three of the studies took place in the United Kingdom (UK) (Bucci et al., 2018; Hazell et al., 2018; Taylor et al., 2021), three took place in the United States (US) (Gottlieb et al., 2013; Gottlieb et al., 2017; Granholm et al., 2012), two in Germany and/or Switzerland (Moritz et al., 2016; Westermann et al., 2020). Finally, one study occurred in Portugal (Almeida et al., 2018) and one study was conducted in Canada (Naeem et al., 2016).

The total number of participants included across the studies was 379. The sample included both male (n =196), female (n = 182) and other (n = 1) participants. Mean

participant average age ranged between 35.57 (SD = 10.88) and 48.7 years (SD = 9.1). The mental health diagnosis of participants varied between studies, whereby three studies required participants to have a diagnosis of schizophrenia (Almeida et al., 2018; Gottlieb et al., 2017; Naeem et al., 2016), three studies required participants to have a diagnosis of either schizophrenia or schizoaffective disorder (Granholm et al., 2011; Gottlieb et al., 2013; Moritz et al., 2016), three studies required participants to have a diagnosis or experience of psychosis (Bucci et al., 2018; Hazell et al., 2018; Taylor et al., 2021) and, finally, one study had the requirement of a diagnosis of a schizophrenia spectrum disorder (Westermann et al., 2020).

In regard to CBT-based self-help intervention, studies varied in terms of their treatment modality. Thus, four of the studies administered the CBT self-help intervention either using a mobile phone through a texting service, or through an App (Almeida et al., 2018; Bucci et al., 2018; Granholm et al., 2011; Taylor et al., 2021). Similarly, four studies utilised an internet-based intervention (Gottlieb et al., 2013; Gottlieb et al., 2017; Moritz et al., 2016; Westermann et al., 2020) and the final two studies implemented standard written or paper-based self-help CBT treatments (Hazell et al., 2018; Naeem et al., 2016). From these interventions, they were either conducted unguided or guided by healthcare professionals. Five of the studies reported ‘guided’ interventions (Granholm et al., 2011; Hazell et al., 2018; Naeem et al., 2016; Taylor et al., 2021; Westermann et al., 2020). Comparatively, five of the papers reported ‘unguided’ or ‘self-guided’ interventions (Almeida et al., 2018; Bucci et al., 2018; Gottlieb et al., 2013; Gottlieb et al., 2017; Moritz et al., 2016). Interventions all ranged between six and twelve weeks in length.

In order to measure the effectiveness of the CBT self-help interventions on psychotic symptoms, the most common outcome measure was the Positive and Negative Syndromes Scale (PANSS) which was used in six studies (Almeida et al., 2018; Bucci et al., 2018; Granholm et al., 2011; Moritz et al., 2016; Naeem et al., 2016; Westermann et al., 2020).

Table 3

Study Characteristics

Source and year	Title	Design	Country Setting	Sample, Mean Age, Gender, Diagnosis	Intervention Control Group	Follow-up	Psychosis Measures	Results	Other Measures	Results
Almeida et al. (2018)	Mobile application for self-management in schizophrenia	Cohort	Portugal Outpatient centre	Participants *n* = 9 Mean Age = 38.11 SD = 9.7 Male = 7 Female = 2 Diagnosis = Schizophrenia	Self-help app CBT – 8 weeks. *No control*	Pre / post	PANSS General	***Pre-post*** *p* = 0.027 (*p* Wilcoxon) PANSS general psychopathology showed significance pre/post.	RAS ES GS-ES SSSS PSPS	***Pre-post*** *p* = 0.008 (*p* Wilcoxon) *p* = 0.017 *p* = 0.007 *p* = 0.021 *p* = 0.012 All other measures showed significance pre/post.
Bucci et al. (2018)	Actissist: Proof-of-concept trial of a theory-driven digital intervention for psychosis	RCT	United Kingdom Early interventio n NHS	Participants *n* = 36 Age not reported. Male = 18 Female = 18 Diagnosis = Psychosis	Self-help app based on CBT – 12 weeks. CBT = 24 Control= 12	Pre / post & 22-week follow-up	PANSS Negative General	***Pre-post*** Cohen's *d*; 95% CI *PANSS negative* -0.85 (-1.58, -0.12) *PANSS general* -0.86 (-1.44, -0.28)	CDSS GAF PSPS ERS EQ-5D-5L	***Pre-post*** Cohen's *d*; 95% CI -0.65 (-1.28, -0.02) No effect No effect No effect No effect

							Total	*PANSS total* -0.85 (-1.44, -0.25)		
							PSYRATS	No effect		
								The PANSS general, negative symptoms and total showed a large effect pre/post. Results were not sustained at 22 week follow up.		Only the CDSS total score showed a large effect pre/post. Results not sustained at 22-week follow up.
Granholm et al. (2011)	Mobile assessment and treatment for schizophrenia (MATS): a pilot trial of an interactive text-messaging intervention for medication adherence, socialization, and auditory hallucinations	Cohort	United States Outpatient treatment centre	Participants *n* = 42 Mean Age = 48.70 SD = 9.1 Male = 29 Female = 13 Diagnosis = Schizophrenia or Schizoaffective	Text message intervention (guided) based on CBT– 12 weeks. *No control*	Pre / post	PANSS	***Pre-post*** No significant findings.	BDI-II ILSS	***Pre-post*** No significant findings.

Gottlieb et al. (2013)	Web-based cognitive-behavioral therapy for auditory hallucinations in persons with psychosis: A pilot study	Cohort	United States Outpatient mental health	Participants *n* = 21 Mean Age = 40.1 SD = 13.63 Male = 13 Female = 8 Diagnosis = Schizophrenia or Schizoaffective	Self-guided CBT internet intervention – 10 weeks. *No control*	Pre / post	PSYRATS BAVQ-R PSYRATS significance pre / post intervention, auditory hallucination scale.	***Pre-post*** Auditory hallucination subscale $p = .007$ Not significant.	BDI-II BPRS	***Pre-post*** Not significant. $p = .001$ BPRS significance pre / post intervention.
Gottlieb et al. (2017)	Randomized controlled trial of an internet cognitive behavioral skills- based program for auditory hallucinations in persons with psychosis	RCT	United States Outpatient mental health	Participants *n* = 37 Mean Age CBT = 43.79 (SD = 13.16) Mean Age Control = 40.28 (SD = 11.69) Male = 23 Female = 14 Diagnosis = Schizophrenia	Internet-based self-help CBT programme - 10 weeks. CBT = 19 Control = 18	Pre / post & 3-month follow-up.	PSYRATS BAVQ-R PS	Not significant between groups. Not significant between groups. Not significant between groups.	BPRS BDI-II SLOF BCIS	Not significant between groups. Not significant between groups. $F(1, 28) = 4.68$, $p = .039$, ES = .43. Not significant between groups. SLOF significant between groups post intervention.

								Pre-post		***Pre-post***
Hazell et al. (2018)	Guided self-help cognitive-behaviour Intervention for VoicEs (GiVE): Results from a pilot randomised controlled trial in a transdiagnostic sample	RCT	United Kingdom NHS mental health outpatient	Participants *n* = 28 Mean Age = 42.50 SD = 12.23 Male = 11 Female = 16 Other = 1 Diagnosis = Psychosis	Guided self-help CBT – 12 weeks. CBT = 14 Control = 14	Pre / post (at 12 weeks)	HPSVQ	Cohen's *d*; 95% CI 1.78, (0.86, 2.70 CI)	HADS anxiety SWEMBS RSES	Cohen's *d;* 95% CI 0.94, (0.13, 1.75) 0.95, (0.13, 1.75) 0.83 (0.03, 1.63)
								Large significant effect found between groups on HPSVQ.		Large significant effect for HADS, SWEMBS AND RSES between groups.
								Pre-post		***Pre-post***
Moritz et al. (2016)	Effects of online intervention for depression on mood and positive symptoms in schizophrenia	RCT	Germany Mental health service	Participants *n* = 58 Mean Age CBT = 38.19 (SD = 11.78) Mean Age Control = 43.43 (SD = 8.42) Male = 27 Female = 31 Diagnosis = Schizophrenia or Schizoaffective	Internet CBT self-help– 12 weeks. CBT = 31 Control = 27	Pre / post (at 3 months)	The Paranoia Checklist PANSS	No significant group differences. No significant group differences.	PHQ-9 CES-D	$F(1, 46) = 3.71$, $p = 0.06$, medium effect (η^2 0.075) $F(1, 46) = 9.84$, $p = 0.003$, large effect (η^2 0.176)
										Significant difference between groups on CES-D with large effect.

										Significant different between groups on the PHQ-9 with a medium effect.
Naeem et al. (2016)	Cognitive behavior therapy for psychosis based guided self-help (CBTp-GSH) delivered by frontline mental health professionals: Results of a feasibility study	RCT	Canada Community-based treatment service	Participants *n* = 33 Mean Age = 40.30 SD = 11.7 Male = 17 Female = 16 Diagnosis = Schizophrenia	CBT guided self-help – 12/16 sessions CBT = 18 Control = 15	Pre / post (at 16 weeks)	PANSS Positive	***Pre-post*** *F*(1, 30) = 6.77, *p* = 0.014. Cohen's *d* = 0.91.	WHODAS .20	***Pre-post*** *F*(1, 30) = 27.15, *p* = 0.000. Cohen's *d* = 1.99.
							Negative	*F*(1, 30) = 7.35, *p* = 0.011. Cohen's *d* = 0.70.		
							General	*F*(1, 30) = 6.68, *p* = 0.015. Cohen's *d* = 0.92.		
							PSYRATS Hallucinations	*F*(1, 30) = 13.18, *p* = 0.001 Cohen's *d* = 1.24.		
							Delusions	*F*(1, 30) = 7.47, *p* = 0.010. Cohen's *d* = 0.81.		
								Significant and large effects found for PANSS and PSYRATS between groups post intervention.		Significant and large effect found for WHODAS.20 between groups post intervention.

								Pre-post		***Pre-post***
Taylor et al. (2021)	A novel smartphone-based intervention targeting sleep difficulties in individuals experiencing psychosis: A feasibility and acceptability evaluation	Cohort	United Kingdom NHS community care team	Participants *n* = 14 Mean Age = 35.57 SD = 10.88 Male = 9 Female = 5 Diagnosis = Psychosis	Guided smart-phone CBT intervention – 6 weeks. *No control*	Pre / post	R-GPTS (Ideas of reference scale)	Cohen's *d* = 0.49. Medium effect. Mean change 4.36 (CI 1.25, 7.45)	WSAS	Cohen's *d* = 0.27 Small effect. Mean change 3.00 (CI -0.32, 6.32)
							SPEQ-H (Hallucination subscale)	No effect.	ISI	Cohen's *d* = 1.02 Large effect. Mean change 5.55 (CI 2.64, 8.45)
									PSQI	Cohen's *d* = 0.83 Large effect. Mean change 3.27 (CI 0.91, 5.64)
									DASS-21 Depression	Cohen's *d* = 0.42 Small effect. Mean change 5.64 (CI 3.49, 7.79)
									Anxiety	Cohen's *d* = 0.35 Small effect. Mean change 2.73 (CI -0.89, 6.35)
									Stress	Cohen's *d* = 0.24 Small effect. Mean change 2.55 (CI -0.46, 5.56)
									WEMWBS	Cohen's *d* = 0.26 Small effect. Mean change -3.18 (CI -6.24, -0.12)
									WHOQOL	No significant findings.

								Intention-to-treat post intervention (between groups)
Westermann et al. (2020)	Internet-based self-help for Psychosis: Findings from a randomized controlled trial	RCT	Switzerland and Germany Community mental health centre	Participants *n* = 101 Mean Age = 40 SD = 9.60 Male = 42 Female = 59 Diagnosis = Schizophrenia Spectrum Disorders	Guided internet self-help – 8 weeks CBT = 50 Control = 51	Pre / post (at 8 weeks) & 6-month follow-up	PANSS (positive factor)	Cohen's *d* = 0.05 (CI 95% -0.34, 0.44) no effect.
							LSHS	Cohen's *d* = 0.33 (CI -0.06, 0.72), small effect.
							The Paranoia Checklist	Cohen's *d* = 0.24 (CI -0.15, 0.63), small effect.
							Overall composite score of psychotic symptom severity based on the 3 outcomes	Cohen's *d* = 0.24 (CI -0.15, 0.63), small effect.
								Follow up: Effects remained for the outcome measures. No deterioration found at 6-month follow up.

Note. N/A = Not Applicable. RAS = Recovery Assessment Scale. ES = Empowerment scale. GS-ES = General Self-Efficacy Scale. SSSS = Social Support Satisfaction Scale. PSPS = Personal and Social Performance Scale. PANSS = Positive and Negative Syndromes Scale. PSYRATS = The Psychotic Symptom Rating Scale. CDSS = Calgary Depression Scale for Schizophrenia. GAF = Global Assessment of Functioning Scale. ERS = Empowerment Rating Scale. EQ-5D-5L =

Health Status and Quality of Life. BDI-II = Beck Depression Inventory 2. ILSS = Independent Living Skills Survey. BAVQ-R = The Belief about Voices Questionnaire. BPRS = Brief Psychiatric Rating Scale. PS = Paranoia Scale. SLOF = The Specific Levels of Functioning Scale. BCIS = The Beck Cognitive Insight Scale. HPSVQ = Hamilton Program for Schizophrenia Voices Questionnaire (voice-impact subscale). WHODAS.20 = WHO Disability Assessment Schedule. R-GPTS = Paranoid Thoughts Scale. SPEQ-H = Specific Psychotic Experiences Questionnaire. SPEQ-H (hallucination subscale) = Specific Psychotic Experiences Questionnaire. WSAS = Work and Social Adjustment Scale . WEMWBS = Warwick-Edinburgh Mental Well-being Scale. DASS-21 = Depression, Anxiety and Stress Scale. PSQI = Pittsburgh Sleep Quality Index. ISI = Insomnia Severity Index. LSHS = Launay-Slade Hallucination Scale. WHOQOL = Quality of Life Measure.

Study Quality

Global ratings for quality appraisal can be found in Table 4. Following independent rating by a trainee clinical psychologist, a meeting was arranged between the author and the second reviewer to discuss ratings. A virtual discussion was held to clarify the blinding process and selection bias in one study which had not been rated by the second reviewer. Following discussion and clarification of this quality measure, 100% agreement was reached for the quality assessment. Overall papers were rated as either weak (n = 5), moderate (n = 2) or strong (n = 3). Hence, 50% percent of the papers were measured as weak, 20% were moderate, and 30% were strong. As half of the papers included in the review were rated to be weak in methodological quality, caution will be required in drawing conclusions from the literature as a whole.

The risk of selection bias component was rated as 'weak' for two studies (Almeida et al., 2018; Westermann et al., 2020) and 'moderate' for eight studies (Bucci et al., 2018; Gottlieb et al., 2013; Gottlieb et al., 2017; Granholm et al., 2011; Hazell et al., 2018; Moritz et al., 2016; Naeem et al., 2016; Taylor et al., 2021). Selection biases tended to be evident in the current papers due to the sampling involving self-referral or referrals from professionals.

In view of study design, this was rated as 'moderate' for four of the studies (Almeida et al., 2018; Gottlieb et al., 2013; Granholm et al., 2011; Taylor et al., 2021), as these were cohort designs. Six of the remaining studies were rated to be 'strong' in quality (Bucci et al., 2018; Gottlieb et al., 2017; Hazell et al., 2018; Moritz et al., 2016; Naeem et al., 2016; Westermann et al., 2020), as they were reported to be a randomised controlled design.

In terms of confounders, most studies were rated as 'weak' for controlling for confounding variables during analysis of results (Almeida et al., 2018; Bucci et al., 2018; Gottlieb et al., 2013; Granholm et al., 2011; Hazell et al., 2018; Taylor et al., 2021). However, four of the studies did identify and control for confounding variables during final

analysis (Gottlieb et al., 2017; Moritz et al., 2016; Naeem et al., 2016; Westermann et al., 2020). Common confounding variables were reported to be age, gender, education level. In regard to blinding, one paper was rated as 'weak' (Bucci et al., 2018) as both the participants and researchers were aware of the purpose of the study. The majority of papers were rated as being 'moderate' in quality (Almeida et al., 2018; Gottlieb et al., 2013; Gottlieb et al., 2017; Granholm et al., 2011; Hazell et al., 2018; Naeem et al., 2016; Westermann et al., 2020; Taylor et al., 2021) and one paper was rated as 'strong' (Moritz et al., 2016), whereby neither the participants nor researchers in the papers were aware of treatment allocation.

Five of the studies were rated as being 'weak' in quality, whereby the data collection methods were not clearly described in the papers (Almeida et al., 2018; Bucci et al., 2018; Gottlieb et al., 2013; Hazell et al., 2018; Taylor et al., 2021). Two papers were rated as 'moderate' whereby either reliability or validity was discussed for some of the measures (Granholm et al., 2011; Gottlieb et al., 2017). Thus, three papers were rated to be 'strong' as reliability and validity were clearly described for relevant tools (Moritz et al., 2016; Naeem et al., 2016; Westermann et al., 2020). Finally, in terms of dropout and withdrawal rates, most studies were rated as 'strong as they showed clarity regarding withdrawal and/or dropout rates (Almeida et al., 2018; Bucci et al., 2018; Granholm et al., 2011; Gottlieb et al., 2013; Gottlieb et al., 2017; Hazell et al., 2018; Moritz et al., 2016; Naeem et al., 2016; Taylor et al., 2021). One paper was rated as 'moderate' in quality, as it showed limited transparency for withdrawal and/or dropout rates (Westermann et al., 2020).

In wider exploration of the five weak studies, three of these did not incorporate a control group within their design (Almeida et al., 2018; Gottlieb et al., 2013; Taylor et al., 2021), making it difficult to know what outcomes are due to the self-help intervention compared to other variables. This makes it more challenging to draw meaningful conclusions from the studies. In further critique, three of the studies did not include a follow-up period in

their design (Almeida et al., 2018; Hazell et al., 2018; Taylor et al., 2021) which creates difficulty in understanding the long-term treatment benefits applicable to real-word clinical settings, with the results only generalisable to short-term interventions rather than over a longer period. More so, in measuring the outcomes of psychosis, Bucci et al. (2018) incorporated the PANSS as an outcome measure however did not include the positive symptom scale within this, which measures symptoms such as delusions and hallucinations. The authors do not explain a reason for this; therefore, it is unclear whether the intervention has had benefit on these symptoms specifically. Similarly, Almeida et al. (2018) use a general PANSS score, therefore it is unclear how the intervention has impacted both positive and negative symptoms independently.

Table 4

Quality Assessment Scores - EPHPP Quality Assessment Tool (Thomas et al., 2004)

Study	Selection Bias	Study Design	Confounders	Blinding	Data Collection	Withdrawal and Dropout	Global Rating
Almeida et al. 2018)	Weak	Moderate	Weak	Moderate	Weak	Strong	Weak
Bucci et al. (2018)	Moderate	Strong	Weak	Weak	Weak	Strong	Weak
Granholm et al. (2011)	Moderate	Moderate	Weak	Moderate	Moderate	Strong	Moderate
Gottlieb et al. (2013)	Moderate	Moderate	Weak	Moderate	Weak	Strong	Weak
Gottlieb et al. (2017)	Moderate	Strong	Strong	Moderate	Moderate	Strong	Strong
Hazell et al. (2018)	Moderate	Strong	Weak	Moderate	Weak	Strong	Weak
Moritz et al. (2016)	Moderate	Strong	Strong	Strong	Strong	Strong	Strong
Naeem et al. (2016)	Moderate	Strong	Strong	Moderate	Strong	Strong	Strong
Taylor et al. (2021)	Moderate	Moderate	Weak	Moderate	Weak	Strong	Weak
Westermann et al. (2020)	Weak	Strong	Strong	Moderate	Strong	Moderate	Moderate

Varieties of CBT-based Self-help Interventions

All studies explored a form of CBT-based self-help intervention for psychosis-related symptoms. In addressing the first research question, this part of the narrative synthesis will focus on discussing the multiple interventions in further detail.

Guided and Unguided Interventions

Five of the studies used a form of guided self-help intervention (Granholm et al., 2011; Hazell et al., 2018; Naeem et al., 2016; Taylor et al., 2021; Westermann et al., 2020). Thus, Hazell et al. (2018) involved providing 1:1 support to participants whereby qualified clinical psychologists guided participants through the self-help workbook throughout the eight, one-hour long sessions. The study by Naeem et al. (2016) also included weekly support from health professionals, who guided participants through the self-help handouts and worksheets during the 1:1 therapy sessions. Similarly, Taylor et al. (2021) incorporated a trainee clinical psychologist into intervention delivery, who supported participants to complete the smartphone self-help intervention by providing a meeting before completion of the programme, as well as offering 30-minute contacts per week to trouble-shoot any technical difficulties, barriers to engagement and help to implement the CBT strategies. Comparatively, Westermann et al. (2020) implemented support to participants once a week by 'guides' who had at least a bachelor's degree in psychology. This support included checking through participants' online progress, provided written feedback and gave reminders to complete self-help tasks. Differing from the above studies, intervention guides within Granholm et al. (2011) provided daily support to participants, by sending 12 text-messages across six days in the week which involved delivery of the self-help intervention, in text message form.

In regard to the additional papers, the five final studies reported the use of 'unguided' means (Almeida et al., 2018; Bucci et al., 2018; Gottlieb et al., 2013; Gottlieb et al., 2017; Moritz et al., 2016). For example, Gottlieb et al. (2013) involved study staff who provided general information on the self-help intervention and were available throughout to answer any questions. Moritz et al. (2016) provided video support throughout the entire intervention however, no personal feedback or direct therapeutic support was provided to participants. Both Almeida et al. (2018) and Gottlieb et al. (2017) provided information before completion of the therapy, on how to use the programme. Finally, Bucci et al. (2018) involved video support within the intervention, explaining the therapy process.

Intervention Platform

Appearing to reflect the shift towards remote therapies, two of the 10 papers included a face-to-face incorporated self-help CBT intervention (Hazell et al., 2018; Naeem et al., 2016). Comparatively, a variety of the interventions were conducted over the internet (Gottlieb et al., 2013; Gottlieb et al., 2017; Moritz et al., 2016; Westermann et al., 2020). The most common intervention was conducted using a mobile phone, either through an App (Almeida et al., 2018; Granholm et al., 2011; Taylor et al., 2021) or alternatively using a text-messaging service (Bucci et al., 2018).

CBT Intervention Principles

All papers reported the use of a self-help intervention based on CBT principles. Two of the 10 studies cited models which were used as part of the CBT self-help intervention. For example, Hazell et al. (2018) involved a five-module intervention including topics of managing voices, targeting negative beliefs, targeting unhelpful beliefs, improving assertiveness and future planning of skills. Modules were based on the CBT model by Birchwood and Chadwick (1997), with the aim of reducing the impact of voices in people with psychosis. Similarly, Naeem et al. (2016) discussed using a CBT-based model for

schizophrenia, originally developed by Turkington et al. (2008), which involved modules of psychoeducation, dealing with hallucinations, paranoia, challenging thoughts, behavioural activation, problem-solving and improving communication skills.

Some studies developed their own CBT-based protocols. For example, Gottlieb et al. (2013, 2017) reported developing a CBT intervention with help from a clinical psychologist, an expert in CBT for psychosis. This intervention involved logging daily voice experience, rating distress, and programme taught strategies to cope with the voice, video tutorials on psychosis and dysfunctional thinking, quizzes, and games to assist with applying concepts and practising CBT coping skills. Strategies included self-monitoring, psychoeducation, cognitive distortions, and cognitive restructuring. Bucci et al. (2018) similarly reported developing a CBT intervention called 'Actissist' with the help from patients and key stakeholders, based on the cognitive model of psychosis. This intervention incorporated challenging unhelpful thoughts, providing alternative thinking, and using helpful coping strategies. Almeida et al. (2018) also designed and tested their own CBT intervention for schizophrenia within an MDT. Part of the intervention involved modifying patients' beliefs about delusions and hallucinations. Finally, Granholm et al. (2011) utilised a text messaging CBT intervention, 'Mobile Assessment and Treatment for Schizophrenia' MATS, which aimed to challenge unhelpful beliefs and incorporate the use of behavioural experiments. Both Moritz et al. (2016) and Taylor et al. (2021) incorporated interventions based on CBT frameworks. These typically included psychoeducation, thought challenging, and coping techniques for managing psychotic symptoms. Finally, Westermann et al. (2020) incorporated a CBT-based intervention for psychosis which involved the modules of paranoid ideation, voice hearing, self-esteem, sleep hygiene, metacognition, depression, mindfulness, worrying, social competence and relapse prevention.

Effectiveness and Efficacy of CBT-based Self-help Interventions

In addressing the second research question, this part of the narrative synthesis will focus on the effectiveness or efficacy of the interventions in treating primarily psychotic symptoms, as well as other related symptoms.

RCT Study Findings

Psychosis Outcomes

The efficacy of CBT-based self-help on psychotic related symptoms were explored within all six RCTs (Bucci et al., 2018; Gottlieb et al., 2017; Hazell et al., 2018; Moritz et al., 2016; Naeem et al., 2016; Westermann et al. 2020). Bucci et al. (2018) explored psychotic outcomes using the PANSS. Immediate treatment effects 12 weeks post-intervention were found to be large on negative symptoms (d = -0.85), with a post-treatment mean score of 14 for controls (SD = 3.9), compared to 13.3 (SD = 4.5) in the intervention group. Similar effects were observed for general symptoms of psychotic symptomology (d = -0.86) with a post-treatment mean score of 34.5 (SD = 8.7) for controls, and 28.4 (SD = 8.8) for the intervention group. However, these effects were not sustained at 22-week follow-up. Similarly, Hazell et al. (2018) found large effects between groups on the HPSVQ (d = 1.78) suggesting a large reduction in voice-hearing symptomology in psychotic presentations at 12 weeks. This is reflected in the mean scores between groups, with a post-treatment mean score of 22.15 (SD = 6.50) for the intervention group, and 25.64 (SD = 4.89) for control participants. Naeem et al. (2016) also reported reductions in psychotic symptoms post-intervention at 16 weeks compared to the control group on the PANSS. Large treatment effects were noted for positive (d = 0.91), negative (d = 0.70), and general symptoms (d = 0.92) of psychosis. For the PANSS general scale, the mean score for the intervention group post intervention was 13.33 (SD = 8.89) compared to controls mean score of 23.30 (SD = 12.25). In addition, significantly large treatment effects were found on the PSYRATS hallucination (d = 1.24) and delusion

scales (d = 0.81). Finally, Westermann et al. (2020) reported small effects within the intention-to-treat analyses for post scores on the LSHS (d = 0.33) and the Paranoia Checklist (d = 0.24), however, no effects were evidenced for the PANSS pre-post intervention. Comparative to these studies, Gottlieb et al. (2017) found no significant differences pre- and post-intervention for psychotic symptomology on the PSYRATS, BAVQ-R or The Paranoia Scale. Moritz et al. (2016) also found there to be no effect on psychotic symptomology post-intervention on the PANSS and the Paranoia Checklist compared to controls. Collectively, the majority of the studies report the benefits of CBT-based self-help on psychotic symptoms most commonly on the PANSS however, it is unclear whether effects are sustained over time due to lack of follow-up periods.

Secondary Outcomes

Some psychosis-based studies also explored secondary outcomes, most of which were mental health related. Bucci et al. (2018) found there to be a large effect (d = -0.65) for the reduction of depressive symptoms on the CDSS post intervention compared to the control group, with a mean score of 10.8 (SD = 5.1) for controls, compared to a mean score of 5.1 (SD = 5.1) in the intervention group. Similarly, Moritz et al. (2016) found there to be a large significant effect for depressive symptoms post-intervention compared to the control group on the CES-D (η^2 = 0.176), as well as a medium significant effect on the PHQ-9 measuring depression severity (η^2 = 0.075). Likewise, Hazell et al. (2018) reported large significant effects between pre- and post-intervention scores on anxiety (d = 0.94), self-esteem levels (d = 0.83) and overall mental well-being (d = 0.95). These findings suggest that individuals who experienced CBT-based self-help for psychosis had significantly improved scores on depression, anxiety, self-esteem, and overall mental wellbeing.

Gottlieb et al. (2017) found a significant difference to occur between groups on a scale measuring daily functioning and daily living skills (SLOF) post-intervention, with a

post-test mean score of 125.6 (*SD* = 11.28) for the intervention group. And 113.81 (*SD* = 13.33 for controls. Similarly, Naeem et al. (2016) found there to be a large significant effect on pre-post scores on the WHODAS 2.0 for functioning and disability (*d* = 1.99). Despite promising findings, both Bucci et al. (2018) and Hazell et al. (2018) were graded as 'weak' in study quality, therefore significant findings and treatment effects should be interpreted cautiously.

Cohort Study Findings

Psychosis Outcomes

The effectiveness of CBT-based self-help on psychotic related symptoms were explored within the four remaining cohort studies (Almeida et al., 2018; Granholm et al., 2011; Gottlieb et al., 2013; Taylor et al., 2021). Firstly, Almeida et al. (2018) reported significance on pre-post scores for the PANSS following an 8-week intervention ($p = 0.027$), suggesting a high reduction in psychotic symptoms, with a mean score of 24.55 reducing to 22.67 post intervention (*SD's* not reported). Similarly, Gottlieb et al. (2013) reported a significant difference pre-post intervention on the PSYRATS ($p = 0.007$), suggesting a significant reduction in auditory hallucination level after a 10-week self-help intervention, with a mean score of 26.76 (*SD* = 6.75) reducing to 22.94 (*SD* = 6.44) post treatment. Finally, Taylor et al. (2021) reported a medium significant effect following intervention on the R-GPTS ($d = 0.49$), with a mean score of 11.45 (*SD* = 10.14) at baseline reducing to 7.09 (*SD* = 7.62) post intervention, suggesting that paranoid thoughts significantly reduced following a period of intervention. In contrast to the majority of studies, Granholm et al. (2011) reported no significant findings in pre-post scores on the PANSS following the 12-week text-message-based CBT self-help intervention. Similar to the controlled studies, longitudinal effects are unclear due to lack of follow-up periods.

Secondary Outcomes

Almeida et al. (2018) reported significant findings between pre and post-test scores on measures of recovery (RAS) ($p = 0.008$), empowerment (ES) ($p = 0.017$), self-efficacy (GS-ES) ($p = 0.007$), social support (SSSS) ($p = 0.021$) as well as personal and social performance (PSPS) ($p = 0.012$), suggesting that an improvement of symptoms for those with psychosis were also found within these additional areas. In addition, Gottlieb et al. (2013) reported significant findings post-intervention on the BPRS ($p = 0.001$), a measure of general psychopathology, suggesting that scores significantly reduced following the intervention. Finally, Taylor et al. (2021) reported effects to occur post intervention on measures assessing for work and social adjustment (WSAS) ($d = 0.27$), insomnia (ISI) ($d = 1.02$), sleep quality (PSQI) (d = 0.83), depression ($d = 0.42$), anxiety ($d = 0.35$), and stress (DASS-21) ($d = 0.24$) and overall wellbeing (WEMWBS) ($d = 0.26$). These findings suggest varied outcomes for people with psychosis when completing a CBT-based self-help intervention. For the uncontrolled studies, it should be of note that the majority of the papers were rated to be of 'weak' quality due to methodological concerns, therefore caution is needed when interpreting and generalising the results.

Discussion

Summary of the Research

Due to the benefit that general self-help interventions have been found to have on psychotic experiences (Scott et al., 2015), this systematic review addressed the gap in the literature identified by Scott et al. (2015) by investigating CBT-only self-help interventions. This systematic review therefore aimed to explore the types of CBT-based self-help interventions developed for people experiencing psychosis, and the effectiveness and efficacy of these interventions.

Intervention Types

Fifty percent of the papers investigated a form of 'guided' self-help whereby the intervention was supported by a facilitator (Granholm et al., 2011; Hazell et al., 2018; Naeem et al., 2016; Taylor et al., 2021; Westermann et al., 2020). Each study incorporated guided self-help in a slightly modified way, and ranged from daily support to weekly support, either through face-to-face contact or remote means. The remaining papers explored 'unguided' self-help, independent of a facilitator (Almeida et al., 2018; Bucci et al., 2018; Gottlieb et al., 2013; Gottlieb et al., 2017; Moritz et al., 2016). All studies were similar in the sense that no therapy support was provided in terms of therapeutic content. However, all studies provided a form of support to participants in regard to mostly technical aspects of accessing the intervention, as all unguided interventions were internet or mobile phone based. To summarise, it appears that both guided and unguided CBT-based self-help interventions have been developed for individuals with psychosis experience. In regard to intervention platform, most interventions were delivered either over the internet or through a mobile phone app compared to only two face-to-face examples of interventions. It appears that heavy weighting is towards self-help interventions using remote means, in comparison to face-to-face contact. Finally, all studies involved a self-help intervention based on CBT principles. Some studies

incorporated a CBT intervention based on an existing model (Hazell et al., 2018; Naeem et al., 2016), with the aim of reducing psychotic symptoms such as hallucinations and delusions. Comparatively, the majority of the studies developed their own CBT protocol (Almeida et al., 2018; Bucci et al., 2018; Gottlieb et al., 2013; Gottlieb et al., 2017; Granholm et al., 2011) with the similar aim of reducing psychotic symptoms through cognitive and behavioural strategies. Finally, the remaining two papers (Moritz et al., 2016; Taylor et al., 2021) involved CBT interventions based on some CBT principles such as psychoeducation and thought challenging. To summarise, the majority of papers involved building a novel CBT therapeutic protocol to test effectiveness or efficacy.

Psychosis Outcomes

Overall, it would appear that psychotic experiences significantly reduced following exposure to a self-help intervention based on CBT. Collectively, large significant treatment effects (Bucci et al., 2018; Hazel et al., 2018; Naeem et al., 2016), and small significant effects (Westermann et al., 2020) were evidenced across the majority of the RCTs.

In reducing psychotic symptoms, however the longevity of the effects remains unclear. The two remaining studies (Gottlieb et al., 2017; Moritz et al., 2016) reported no significant treatment benefits. A commonality between these two studies were their unguided means, which could tentatively pose questions as to whether unguided interventions are as effective as guided interventions. In view of the cohort studies, the majority of the studies reported significant findings on reducing psychotic experiences post-intervention (Almeida et al., 2018; Gottlieb et al., 2013; Taylor et al., 2021), however one study reported no significant benefit (Granholm et al., 2011). It therefore appears that most evidence suggests the benefits that CBT self-help can have in treating multiple symptoms of psychosis, with the PANSS being the most commonly used tool to demonstrate this.

Secondary Outcomes

In view of the secondary outcomes, depression scores were commonly associated with significant treatment effect post intervention for psychosis (Bucci et al., 2018; Hazell et al., 2018; Moritz et al., 2016; Taylor et al., 2021), suggesting the benefit of CBT self-help in also reducing depressive symptoms in those with psychosis. Thus, tentative evidence was also found for the effectiveness of CBT self-help in various outcomes such as daily living skills and function (Gottlieb et al., 2017; Naeem et al., 2016), general psychological well-being (Gottlieb et al., 2013; Taylor et al., 2021) and anxiety (Hazell et al., 2018; Taylor et al., 2021). As the additional secondary outcomes varied greatly between each study, it is difficult to make firm conclusions, however it is clear that depression, daily living skills, general well-being and anxiety symptoms were most commonly found to improve post-intervention.

Quality Critique

It is important to note that 50% of the papers were highlighted as having weak methodological quality. Reflecting on the results and the reason for such quality ratings, critiques of the included studies are largely centred on a number of points. Thus, a significant issue in the quality of the papers is regarding the minimal use of follow-up periods within the study designs, which creates difficulty in ascertaining the longevity of the treatment impact and applicability to clinical settings. In further discussion of the control groups adopted, the studies within the review implemented these differently, for example waitlist or treatments usual. The treatment effects may have been impacted by the type of control group used by each study. For example, using waitlists could mean the treatment effect is exaggerated (for example, because control patients are adversely affected by being required to wait), compared to using treatment-as-usual as a control, which could lead to attenuated effect sizes because the controls receive an active and similar treatment. These variations between studies create difficulty in generalising the findings (Furukawa et al., 2014). The RCTs perhaps provide

more confidence in the intervention having the desired impact, due to the comparison with controls, compared to the studies assessing effectiveness which did not have control groups. This creates difficulty in deciphering whether changes in psychotic symptomology were in fact due to the intervention or uncontrolled factors. Moreover, the issues noted regarding the lack of diversity across the study samples, as well as the small sample sizes in some of the studies creates problems when generalizing the findings more widely, as well as with statistical power of the studies.

Strengths and Limitations

This current review addressed a gap in the literature and acknowledged potential research ideas suggested by Scott et al. (2015) in their previous review, whereby it was recommended that further research into CBT specific self-help for psychosis would be of relevance for clinical practice. This is therefore the first known review to explore solely the effectiveness of CBT-based self-help for psychosis, as well as providing further understanding of the varieties of CBT self-help interventions available for those experiencing psychosis. Various strengths can be identified in the review. More so, following PRISMA guidance increases quality of the review, as well as allowing for clear replication of the review if appropriate. A further strength of this review is that a protocol was submitted for publication prior to commencing the review, which abides by best research practice guidelines. More so, the systematic process was also supported by a second reviewer during the paper screening process and quality assessment in order to improve the reliability of decisions. In discussion of some strengths, the most commonly used psychometric measures across studies were the PANSS and the PSYRATS. The PANSS has shown to demonstrate high test-retest reliability (*ICC* = 0.93) and adequate internal consistency ($\alpha = 0.71$) (Edgar et al., 2014). In addition, the PSYRATS has also been shown to demonstrate good inter-rater and retest reliability, as well as good internal validity (Drake et al., 2007).

Regarding limitations, half of the included studies were rated as 'weak' in quality (*n* = 5) which can impact on reliability of the study findings. More so, grey literature was excluded from this review due to the lack of peer-reviewed processes (Paez et al., 2017). Therefore, niche, or emerging research findings may have been overlooked, which may have impacted the results. Furthermore, a variety of the papers involved in the review were a cohort design. Within these, the self-help CBT intervention was not compared to a control group, therefore creating difficulty in drawing meaningful assumptions regarding the impact of the intervention, with lack of control for confounding variables. In addition, most of the studies did not include a follow-up after the intervention period. Of these, only three studies completed follow-ups between 22-weeks and six months. This makes it difficult to draw firm conclusions on the true impact of the self-help interventions over a longer period of time. Finally, this review excluded articles not published in the English language, which may have introduced bias to the findings. Most of the studies were completed in either the UK (*n* = 3) or the US (*n* = 3), creating generalisability concerns of the findings to wider societies and cultures.

Clinical Implications

This is the first review to solely explore the effectiveness of CBT-based self-help for psychosis and the specific types of interventions available within this arena. The results from this review tentatively suggest the benefit that those with psychotic symptoms experience from engaging in a form of CBT self-help. This review also tentatively suggests that CBT-based self-help for those with psychosis may also be beneficial in reducing other related symptoms, such as depressive symptoms, anxiety, and overall mental well-being. As a result, mental health services could develop and consider implementing more CBT-based self-help treatments based on reducing psychotic symptomology and associated symptoms, given the perceived effectiveness evidenced within this review.

There are several areas for direction of future research. As a large proportion of the studies were cohort in nature with the lack of a control group, future studies could focus on continuing to investigate the effectiveness of CBT-based self-help for psychosis within randomised controlled designs to increase methodological rigour. To address issues with lack of follow-ups, future studies could also ensure follow-up periods are included within their study design, to ascertain effectiveness of the interventions over time. Additionally, due to significant issues with quality ratings for the majority of the studies, further research could also focus on addressing methodological difficulties, creating high-quality research to review. A meta-analysis was not performed due to significant study heterogeneity (e.g., differences in outcome measures and samples) and issues with study quality. Thus, a replication of the current review once supplementary high-quality research has been completed would be advantageous, with the inclusion of a meta-analysis. This would enable more confidence to be drawn from this review, investigating the effectiveness of CBT-based self-help interventions for psychosis. Although it was beyond the scope of this current review, it may also be noteworthy for future research to study the difference in effectiveness between guided and unguided CBT self-help interventions for psychosis, as well as the comparisons between remote and face-to-face self-help interventions in treating psychosis symptoms.

Conclusion

A systematic review and narrative synthesis of 10 studies found that CBT-based self-help interventions ranged on a number of different factors, such as method of delivery (guided or unguided), application (face-to-face or remote) and theoretical basis (form of CBT principles). After weighing up the findings, this review provides tentative evidence for the short-term effectiveness of CBT-based self-help for reducing symptoms of psychosis, whereby seven studies concluded the effectiveness in reducing psychotic symptomology post-treatment, however the longevity of effectiveness remains unclear. Some support has also been found for secondary outcomes such as depression, overall well-being, daily functioning, and anxiety across a small variety of studies, however additional research is needed to gain further certainty with these effects.

Overall quality of the research was reported to be mixed, with 50% of the papers displaying ‘weak’ quality, with most concerns with methodological issues within the papers. Therefore, findings should be interpreted with some caution. It is suggested that additional high-quality research is completed to explore these effects over a longer period of time to test intervention longevity. If the above points are addressed, perhaps more consideration may be given to recommending CBT-based self-help to be part of the treatment guidelines for psychosis.

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Appendix A

Protocol Changes - Prospero

1. Review question order changed to reflect order of analysis.
2. Database spelling changes, specifications around English papers, grey literature and when papers would be searched from.
3. Inclusion/exclusion criteria added into the protocol once specified.
4. Addition of participant population specifications (country/age/gender).
5. Study context section tweaked to specify the interventions would be CBT specific for self-help.
6. Quality tool updated (EPHPP tool to be used), added into this section.
7. Specified data synthesis (addition of systematic review and narrative approach, further specifications around this).

Appendix B

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.	Page 8
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	Page 9
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	Page 12
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 9-10
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	Page 9-10
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 14-15
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 14-15
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each	Page 18-25

Section and Topic	Item #	Checklist item	Location where item is reported
		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.	
	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.	Page 18-25
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 14
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.	Page 18-25
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)).	Page 18-25
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	Page 18-25
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	Page 18-25
	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 18-25
	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).	Page 14-15
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	Page 14-15
RESULTS			

Section and Topic	Item #	Checklist item	Location where item is reported
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.	Page 11
Study characteristics	17	Cite each included study and present its characteristics.	Page 18-24
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	Page 28
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 18-24
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	Page 26
	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.	Page 15-35
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	Page 15-35
	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
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	Page 15-35
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	Page 35
	23b	Discuss any limitations of the evidence included in the review.	Page 38

Section and Topic	Item #	Checklist item	Location where item is reported
	23c	Discuss any limitations of the review processes used.	Page 38
	23d	Discuss implications of the results for practice, policy, and future research.	Page 39
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 9
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	Page 9
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	Page 9
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

Appendix C

Full titles of Studies Excluded from Review (24)

- Smartphone-assisted guided self-help cognitive behavioral therapy for young people with distressing voices (SmartVoices): Study protocol for a randomized controlled trial
- Technology-enabled collaborative care for youth with early psychosis: Results of a feasibility study to improve physical health behaviours
- Digital smartphone intervention to recognise and manage early warning signs in schizophrenia to prevent relapse: The EMPOWER feasibility cluster RCT
- Insight and the number of completed modules predict a reduction of positive symptoms in an Internet-based intervention for people with psychosis
- Increasing access to cognitive–behavioural therapy for patients with psychosis by evaluating the feasibility of a randomised controlled trial of brief, targeted cognitive–behavioural therapy for distressing voices delivered by assistant psychologists: The GiVE2 trial
- Evaluation of ongoing participation of people with schizophrenia in a mutual support GroSingle-session mobile-augmented intervention in serious mental illness: A three-arm randomized controlled trial
- Potential applications of digital technology in assessment, treatment, and self-help for hallucinations
- Delivery of cognitive-behaviour therapy for psychosis: A service user preference trialup as a CoWeb-Based psychoeducation program for caregivers of first-episode of psychosis: An experience of Chinese population in Hong Kong
- Creating a supportive environment: Peer support groups for psychotic disorders
- The acceptability, usability and short-term outcomes of Get Real: A web-based program for psychotic-like experiences (PLEs)
- Self-help and guided self-help interventions for schizophrenia and related disorders
- Effectiveness of a peer-led self-management programme for people with schizophrenia: Protocol for a randomized controlled trialmplementary Intervention to Outpatient Psychiatric Treatment
- Impaired action self-monitoring in schizophrenia patients with auditory hallucinations
- The effectiveness of peer support groups in psychosis: A randomized controlled trial

- Internet forums: A self-help approach for individuals with schizophrenia?
- Pilot randomised controlled trial of a brief coping-focused intervention for hearing voices blended with smartphone-based ecological momentary assessment and intervention (SAVVy): Feasibility, acceptability and preliminary clinical outcomes
- Combining compensatory cognitive training and medication self-management skills training, in inpatients with schizophrenia: A three-arm parallel, single-blind, randomized controlled trial
- Evaluation of an internet-based metacognitive training for individuals who hear voices
- Simple mobile technology health management tool for people with severe mental illness: A randomised controlled feasibility trial
- An investigation of an internet-based cognitive behavioral therapy program for auditory hallucinations
- Smartphone-enhanced symptom management in psychosis: Open, randomized controlled trial
- Using 'WeChat' online social networking in a real-world needs analysis of family members of youths at clinical high risk of psychosis
- 'Care co-ordinator in my pocket': a feasibility study of mobile assessment and therapy for psychosis (TechCare)
- Smartphone-delivered self-management for first-episode psychosis: The ARIES feasibility randomised controlled trial

Appendix D

EPHPP Quality Assessment Tool for Quantitative Studies

QUALITY ASSESSMENT TOOL FOR QUANTITATIVE STUDIES

EPHPP
Effective Public Health Practice Project

COMPONENT RATINGS

A) SELECTION BIAS

(Q1) Are the individuals selected to participate in the study likely to be representative of the target population?

1 Very likely
2 Somewhat likely
3 Not likely
4 Can't tell

(Q2) What percentage of selected individuals agreed to participate?

1 80 - 100% agreement
2 60 – 79% agreement
3 less than 60% agreement
4 Not applicable
5 Can't tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

B) STUDY DESIGN

Indicate the study design

1 Randomized controlled trial
2 Controlled clinical trial
3 Cohort analytic (two group pre + post)
4 Case-control
5 Cohort (one group pre + post (before and after))
6 Interrupted time series
7 Other specify _____
8 Can't tell

Was the study described as randomized? If NO, go to Component C.

No Yes

If Yes, was the method of randomization described? (See dictionary)

No Yes

If Yes, was the method appropriate? (See dictionary)

No Yes

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

C) CONFOUNDERS

(Q1) Were there important differences between groups prior to the intervention?

1 Yes
2 No
3 Can't tell

The following are examples of confounders:

1 Race
2 Sex
3 Marital status/family
4 Age
5 SES (income or class)
6 Education
7 Health status
8 Pre-intervention score on outcome measure

(Q2) If yes, indicate the percentage of relevant confounders that were controlled (either in the design (e.g. stratification, matching) or analysis)?

1 80 – 100% (most)
2 60 – 79% (some)
3 Less than 60% (few or none)
4 Can't Tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

D) BLINDING

(Q1) Was (were) the outcome assessor(s) aware of the intervention or exposure status of participants?

1 Yes
2 No
3 Can't tell

(Q2) Were the study participants aware of the research question?

1 Yes
2 No
3 Can't tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

E) DATA COLLECTION METHODS

(Q1) Were data collection tools shown to be valid?

1 Yes
2 No
3 Can't tell

(Q2) Were data collection tools shown to be reliable?

1 Yes
2 No
3 Can't tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

F) WITHDRAWALS AND DROP-OUTS

(Q1) Were withdrawals and drop-outs reported in terms of numbers and/or reasons per group?

1 Yes
2 No
3 Can't tell
4 Not Applicable (i.e. one time surveys or interviews)

(Q2) Indicate the percentage of participants completing the study. (If the percentage differs by groups, record the lowest).

1 80 -100%
2 60 - 79%
3 less than 60%
4 Can't tell
5 Not Applicable (i.e. Retrospective case-control)

RATE THIS SECTION	STRONG	MODERATE	WEAK	
See dictionary	1	2	3	Not Applicable

G) INTERVENTION INTEGRITY

(Q1) What percentage of participants received the allocated intervention or exposure of interest?

1 80 -100%
2 60 - 79%
3 less than 60%
4 Can't tell

(Q2) Was the consistency of the intervention measured?

1 Yes
2 No
3 Can't tell

(Q3) Is it likely that subjects received an unintended intervention (contamination or co-intervention) that may influence the results?

4 Yes
5 No
6 Can't tell

H) ANALYSES

(Q1) Indicate the unit of allocation (circle one)

community organization/institution practice/office individual

(Q2) Indicate the unit of analysis (circle one)

community organization/institution practice/office individual

(Q3) Are the statistical methods appropriate for the study design?

1 Yes
2 No
3 Can't tell

(Q4) Is the analysis performed by intervention allocation status (i.e. intention to treat) rather than the actual intervention received?

1 Yes
2 No
3 Can't tell

GLOBAL RATING

COMPONENT RATINGS
Please transcribe the information from the gray boxes on pages 1-4 onto this page. See dictionary on how to rate this section.

A	**SELECTION BIAS**	**STRONG**	**MODERATE**	**WEAK**	
		1	2	3	
B	**STUDY DESIGN**	**STRONG**	**MODERATE**	**WEAK**	
		1	2	3	
C	**CONFOUNDERS**	**STRONG**	**MODERATE**	**WEAK**	
		1	2	3	
D	**BLINDING**	**STRONG**	**MODERATE**	**WEAK**	
		1	2	3	
E	**DATA COLLECTION METHOD**	**STRONG**	**MODERATE**	**WEAK**	
		1	2	3	
F	**WITHDRAWALS AND DROPOUTS**	**STRONG**	**MODERATE**	**WEAK**	
		1	2	3	Not Applicable

GLOBAL RATING FOR THIS PAPER (circle one):

1	STRONG	(no WEAK ratings)
2	MODERATE	(one WEAK rating)
3	WEAK	(two or more WEAK ratings)

With both reviewers discussing the ratings:

Is there a discrepancy between the two reviewers with respect to the component (A-F) ratings?

No Yes

If yes, indicate the reason for the discrepancy

1	Oversight
2	Differences in interpretation of criteria
3	Differences in interpretation of study

Final decision of both reviewers (circle one):

1	**STRONG**
2	**MODERATE**
3	**WEAK**

Section Two – Empirical Study

An Experimental Study Exploring Source Monitoring Processes in Populations with Experience of Voice Hearing and Trauma

Abstract

Objectives

Trauma is known to be a risk factor in psychosis and PTSD, and yet only the former group typically experiences auditory-verbal hallucinations (AVHs). One explanation is that AVHs also require source monitoring deficits. Hence, we hypothesize that psychotic patients with AVHs and patients with PTSD should report high levels of trauma, and high levels of trauma-related dissociation, compared to healthy controls but only the former should show impaired source monitoring as measured by a signal detection task.

Methods

A cross-sectional between-groups design was implemented. Participants in the PTSD group (n = 27), psychosis with a history of AVHs group (n = 27) and healthy control group (n = 27) completed measures of hallucination proneness, childhood trauma, dissociation, and an online signal detection task.

Results

Childhood trauma and dissociation scores were higher in the PTSD and psychosis group compared to controls. Signal detection bias scores were significantly different between groups, with the psychosis group showing more bias. No significant difference in sensitivity scores across groups was found. Correlational analysis found a significant relationship between hallucination proneness and both childhood trauma and bias score. No correlation was found between childhood trauma and source monitoring abnormalities.

Conclusions

The psychosis group exhibited more bias on the signal detection task compared to the PTSD and control group. Source monitoring difficulties are specific to people with psychosis, and PTSD patients do not evidence these abnormalities despite both groups having trauma and

dissociation. Future studies may research neurocognitive explanations for source monitoring abnormalities in psychosis.

Keywords: Psychosis, Schizophrenia, PTSD, Source Monitoring, Signal Detection, Dissociation.

Practitioner Points:

- Source monitoring abnormalities appear to be unique to people with psychosis who experience hallucinations.
- Individuals with PTSD do not have difficulties with source monitoring, despite having similarly high levels of childhood trauma and dissociation to psychotic samples.
- There appears to be no direct link between source monitoring and childhood trauma, suggesting that source monitoring is the result of a potential neurocognitive deficit.
- Future research should aim to further explore source monitoring and its impact and possible interventions to improve this skill within psychotic samples.

Introduction

Hallucinations can occur in all the human senses (Teeple et al., 2009), ranging from the experience of inner voices, visions, invisible companions, and otherness perceptions. The term 'hallucination' itself was first coined in the 17th century by a physician named Sir Thomas Browne, deriving from the Latin word 'alucinari' meaning to 'wander in the mind'. Hallucinations have thus been documented in the literature for many years (Watkins, 2008), and remain to be a key area of interest in the present day. From the 18th century onwards, the experience of hallucinations began to be considered a sign of psychiatric illness, and were clearly defined by Slade and Bentall (1988) as experiences comparable to perceptions that occur in the absence of appropriate stimuli, have the impact of real perceptions, and are not controlled by the person experiencing them. For added context, the term 'psychosis' may sometimes be used interchangeably with 'schizophrenia spectrum disorder' or 'schizophrenia' within this thesis to describe individuals who experience hallucinations such as voices and who have a relevant diagnosis (see below), as these terms are commonly adopted within current mental health services.

Experiences of hallucinations can vary significantly from person to person. Some are purposely sought out by the use of psychedelic substances, whereas others are considered to be a privileged experience holding spiritual associations in some cultures across the world (Rogers et al., 2020). However, hallucinations are most commonly reported by clinical populations in those diagnosed with a schizophrenia spectrum disorder (Lecrubier et al., 2007) such as schizophrenia, schizophreniform, schizoaffective, delusional, or brief psychotic disorder (Diagnostic and Statistical Manual of Mental Disorders, 5th ed; DSM-5, American Psychiatric Association, 2013). Hallucinations can also be observed in disorders such as depression (Slotema et al., 2012) as well as in dementia and Parkinson's disease (Hauf et al., 2012) and have also been found to occur in between 5-28% of the general healthy population

(Bauer et al., 2011; Johns et al., 2004). Nonetheless, hallucinatory experiences are often regarded to be highly psychologically distressing for those who experience them.

Research has shown that between 60-80% of people with a diagnosis of a schizophrenia spectrum condition experience an auditory form of hallucination (Waters et al., 2014), such as hearing voices (auditory-verbal hallucinations; AVHs) or sounds which are not present. AVHs are also considered to be the most common form of hallucination experienced by this clinical population (Chaudhury, 2010; Lim et al., 2016; Linszen et al., 2022). During AVHs, voices and sounds can often be perceived as coming from inside of the person or from the outside world. Comparably, some people may hear their own thoughts being spoken as a dialogue, whereas other people may hear voices having a conversation about them in the third person. Hearing voices can vary from hearing commands to passive discussions, which can be pleasant or distressing in nature (Larøi et al., 2012).

In the hope of successfully treating and managing auditory hallucinations in people, it is essential to understand the mechanisms behind them. Many explanations have been offered over the years in terms of key hypotheses and theories. Cognitive perceptual theories, such as one suggested by Hoffman & Rapaport (1994) argues that auditory hallucinations are the result of language production abnormalities caused by parasitic memory difficulties, also more commonly known as false memories. Other models propose that auditory hallucinations are automatic stored representations that a person may find difficult to detach from, which proceed to take the form of a memory, possibly from experiences direct trauma or abuse (Morrison & Baker, 2000). Other similar models propose that auditory hallucinations are a result of ‘inner speech’ (thinking in words, McGuire et al., 1995), whereby a person misconceives their inner monologues as coming from another person (Gould, 1949; Mosley et al., 2013) .

All of these theories concern the type of mental contents that are experienced as hallucinations. However, any theory of hallucinations must explain why these contents are experienced as alien to the self. Bentall (1990) has therefore proposed that people who experience auditory hallucinations have a deficit in a metacognitive skill, known as 'source monitoring'. Source monitoring refers to the ability to discriminate between real and imagined events, sometimes called 'reality testing', so that a failure in this process causes individuals to misattribute internal thoughts and other mental contents to an external source. Source monitoring should not be confused with source memory, which is separately defined as the ability to recall the source of learned information (Guo et al., 2006).

To test source monitoring ability, signal detection theory (SDT) was used by Bentall and Slade (1985) to test the ability to recognise verbal stimuli (voices) against background noise. Research has consistently shown that people who experience hallucinations perform abnormally on this form of test, showing an abnormal bias score (Barkus et al., 2007; Bentall & Slade, 1985; see Brookwell et al., 2013 for a meta-analytic review; Vercammen et al., 2008). Response bias can be defined as the tendency to favour one response over another in conditions of uncertainty, and is independent of sensitivity, which is the overall ability to detect signals in the environment. In this context, an abnormal bias is manifested as an inclination for participants who experience hallucinations, compared to people who do not experience hallucinations, to assume a voice is present when trying to detect signals against a noisy background. However, despite this bias, people with hallucinations typically exhibit no abnormality, or significant decrement in their sensitivity score (Varese et al., 2012).

Trauma and Hallucinations

There is considerable evidence to suggest that childhood trauma such as sexual, physical, and emotional abuse has a direct link with hallucination onset. Freud (1936) was in fact the earliest pioneer to study this association, by reporting that hallucinations are a

product of repressed traumatic memories. More recently, a study by McCarthy-Jones et al. (2014) found that, from 199 voice hearers, 12% of people reported the voice to be a memory of previous conversations from the past, typically of a traumatic nature. Reiff et al. (2011) found that people who experienced abuse in childhood scored highly on a measure assessing into hallucination experience. Raune et al. (2006) found a relationship to exist between persecutory voices and experience of intrusive traumatic events. More notably, in a British epidemiological sample Bentall et al. (2014) found there to be a specific link between hallucinations and childhood sexual abuse, and this finding was replicated in a US epidemiological sample (Sitko et al., 2014) and in a survey of the British prison population (Shevlin et al., 2015). A recent meta-analysis also found a significant correlation between childhood trauma and severity of hallucinations (Bailey et al., 2018), further strengthening confidence in this association.

In light of the apparent importance of this association, understanding the pathway from childhood trauma to hallucination onset is crucial. Thus, research has suggested that dissociation plays an important role in mediating the relationship between these two factors (Moskowitz et al., 2011). Dissociation is commonly defined as the process whereby somebody feels disconnected from themselves, the world, and their body and is commonly linked to traumatic events, trauma responses and overwhelming experiences (Dalenberg et al., 2012). Key research has thus evidenced the relationship between psychosis and dissociation-proneness (Longden et al., 2020). A study by Varese et al. (2012) found that people with experience of hallucinations reported higher dissociative tendencies and higher levels of childhood trauma, and dissociation was found to be a mediating variable between childhood trauma and hallucination proneness. Varese et al. (2012), as had previous researchers (see above) also found that hallucinating individuals had more dysfunctional bias on a source monitoring task, affecting their ability to decipher what is real and what is not.

However, no association was found between this bias and childhood trauma, nor dissociation. This finding suggests that there appears to be two district processes which jointly lead to the onset of hallucinations; dissociation and source monitoring difficulties (Varese et al., 2012). The origins of patients' source monitoring deficits are unknown, but they do not appear to be related to adversity.

Like people who hear voices, people with a diagnosis of post-traumatic stress disorder (PTSD) also very often have childhood trauma histories (Powers et al., 2015; Widom, 1999) and commonly report dissociation to occur (Hansen et al., 2018). However, they do not typically report experiencing hallucinations in the same way that people with psychosis do. Instead, patients with PTSD tend to experience 'pseudo-hallucinations', such as a critical inner voice, but are aware that the voice is their own (Brewin et al., 2010). Additional research has also evidenced the ability that PTSD patients' have in recognising their pseudohallucinations as their own thoughts (Anketell et al., 2011). It could be suggested that psychotic patients with hallucination experience are not able to do this, because they have source monitoring in addition to their dissociative abnormalities, as found by Varese et al. (2012). If this is so, psychotic patients with hallucinations should be similar to patients with PTSD on measures of dissociation but should differ by also having source monitoring abnormalities which are absent in PTSD patients.

The aim of this current project is to therefore to build on the findings from the Varese et al. (2012) study, by including a clinical control group of PTSD patients. In this way, by investigating both psychotic and PTSD samples, we will be able to further untangle and understand the mechanisms that lead to hallucinations and further examine the theory proposed by Varese et al. (2012), and explain why only psychotic patients, and not PTSD patients, experience hallucinations. This leads to the following hypotheses which will be explored in this joint project conducted with a fellow clinical psychology doctoral candidate,

who will analyse data on dissociation and peritraumatic dissociation (dissociation that occurs at the time of a traumatic experience; Agorastos et al., 2013). Please note that only hypotheses 1 and 3 will be explored in the present thesis.

1. 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.

2(a). Both individuals with psychosis and PTSD will show increased dissociation compared to controls.

2(b). Tentatively, we expect this to be true for both dissociation and peritraumatic dissociation and for peritraumatic dissociation to predict dissociation.

3. ACEs will predict disposition toward hallucination but not source monitoring ability.

Method

Design

This online study adopted a cross-sectional between-groups design, aiming to test the hypotheses outlined above. Quantitative data was collected through a self-report online questionnaire published using Qualtrics® software. Secondly, an online computer-based signal detection task was embedded into the Qualtrics® link, using the Gorilla experiment builder platform (www.gorilla.sc).

The study involved three groups of participants a psychosis group, a PTSD group, and a healthy control group. It should be of note that recruitment for this project was conducted jointly with another trainee clinical psychologist, whereby there are shared components to the methodology, but statistical analyses were conducted to test different hypotheses. See Appendix A for more information on the joint nature of the project.

Ethical Approval

The current study attained both HRA and Health and Care Research Wales (HCRW) ethical approval following a review dated the 26th of July 2022 (Reference 311110; Appendix B). The British Psychological Society's (BPS) guidance on managing ethical issues when completing online research was abided by throughout the process. Participants were given the choice to be entered into a prize draw following participation to win a £50 Amazon gift voucher. This was considered to be an appropriate reward at the time of study, after discussion with the ethics committee.

Patient and Public Involvement (PPI)

Service users were directly involved in the research. The project was discussed with clinical psychologists working in Early Intervention Psychosis and Community Mental Health Teams within Sheffield Health and Social Care National Health Service (NHS) trust. Scoping work was conducted around the feasibility of recruiting from these services, and clinical psychologists within these services were asked about caseload numbers, feasibility of recruitment in this area, and for feedback on the clarity of the information and debrief sheet. From this feedback, it was ascertained that the Early Intervention Service has around 400 service users with a schizophrenia spectrum diagnosis under their care who may be eligible to participate in this study. The community mental health service work with clients with PTSD, however, the service did not have specific statistics on how many clients have this diagnosis.

Following ethical approval, two members from the Hearing Voices Network (HVN), who met the inclusion criteria for the study, were met with on separate occasions in an online meeting to briefly present the research and discuss their thoughts and reflections on the proposed study regarding recruitment, consent, and the self-report measures. Both members of the group fed back around the use of diagnostic language throughout the study and the difficulty that some people have with psychiatric labels such as 'psychosis' and

'schizophrenia'. Both members expressed their concern regarding recruitment from NHS services due to time pressure of staff and suggested that social media recruitment would be beneficial. From this overall feedback, disclaimers have been made available throughout the study and on information sheets to explain the reason for using medical terminology in a research context, validating the feelings some people may have regarding psychiatric labels

Participants

Sample Size Calculations

Varese et al. (2012) provided data on SDT performance (beta scores). Hallucinating patients scored 0.19 (0.38), and controls scored 0.66 (0.38). We expect PTSD patients to score similarly to controls on this measure. G*Power calculates an effect size of 0.6. With alpha = .01 and power = 0.8, this gives a required sample size of 45, or 15 per group. If the effect size was to fall to 0.3, the required sample size is 156, which is too large to be feasible. A post-hoc power estimate using the same values for power and alpha estimated that a sample size of 25 per group would be able to detect an effect size of 0.45; this sample size seems a reasonable compromise and feasible. This gives a total sample size of 75 participants would be required for this study, 25 per group.

Inclusion and Exclusion

In reference to the 'psychosis' clinical group, participants were required to live in the UK, be over the age of 18, able to read and write in English, able to provide consent, have a diagnosis of a schizophrenia spectrum disorder and either be currently hallucinating or have a history of hallucination experience, and able to identify a past trauma. For specific details, people with a diagnosis of the umbrella term 'schizophrenia spectrum disorder' can include participants with schizophrenia, schizophreniform, schizoaffective, delusional, and brief psychotic disorders (Diagnostic and Statistical Manual of Mental Disorders, 5th ed; DSM-5, American Psychiatric Association, 2013).

For the ‘PTSD’ clinical group, participants were required to live in the UK, be over the age of 18, be able to read and write in English, be able to provide consent, identify as having a diagnosis of PTSD or complex PTSD (CPTSD) and be able to identify a past trauma. This diagnosis was verified by scores above the correct cut-off on the International Trauma Questionnaire (ITQ; Cloitre et al., 2018). PTSD participants were not able to have a current or past history of hearing voices.

For the ‘healthy control’ group, participants were required to live in the UK, be over the age of 18, able to read and write in English, be able to provide consent, have no history of hearing voices or PTSD/CPTSD and be able to identify a past trauma. Thus, all participants were permitted to have experience of comorbid conditions of common mental health problems such as anxiety and depression.

All participants were required to use a set of headphones to perform the signal detection task. Finally, individuals who identified as having a hearing impairment were excluded from the current study at group level due to the nature of the audio task requirement. People who did not have access to the internet and a laptop were also excluded from this study, and those on a mental health section were unable to participate.

Recruitment

Healthy Control Group

All participants were recruited using opportunistic sampling methods between August 2022 and February 2023. For the healthy control group, the social media platform Facebook was used to advertise the current study (Appendix C). Participants who wished to take part were asked to contact the researchers through email, whereby the researchers provided a web link which directed the participant to the online questionnaire on Qualtrics®. Participants were also provided with an anonymous code to enter before completing the study to ensure identification of their group assignment. Individuals who chose to access the web link were

directed to an electronic participant information sheet (Appendix D) and a consent form (Appendix E) presented on Qualtrics®. Participants were only able to proceed with the questionnaire measures and audio task once they had provided informed consent.

Clinical Groups

With the primary aim of recruiting participants through NHS mental health services, both researchers met with service leads over a video call from early intervention in psychosis services and community mental health teams to discuss the research and the inclusion and exclusion criteria for the clinical groups. Service leads were provided with the relevant study documentation and were asked to suitably identify potential participants by contacting the researchers by email. Email prompts regarding recruitment were sent to service leads on a bi-weekly basis. However, despite the effort, it should be of note that no participants were successfully recruited through NHS services.

During social media recruitment for the clinical groups, Facebook was used to advertise the study (Appendix F and G). Adverts were posted into UK-based support groups for either psychosis, schizophrenia or PTSD/CPTSD. Similar to the healthy control group, potential participants were asked to contact the researchers via email, expressing their interest in participating. Following this, the online study link was shared with participants. Participants were also assigned a unique ID code to help identify their clinical group status. All participants were informed that the study would take approximately 20-30 minutes to fully complete. It should be of note that all clinical participants were recruited through online means due to the inability of NHS services to identify suitable participants within the study timescale.

Procedure

All experimental data was collected through Qualtrics® between August 2022 and February 2023. Upon accessing the web link, participants were first asked to read the

information sheet (Appendix D) and provide their informed consent (Appendix E) to complete the study. Participants were then asked to enter their participant identification number, provided by the researchers via email, which allowed them to complete the brief demographic questionnaire (Appendix H). Following this, participants were provided with the International Trauma Questionnaire (Appendix I), followed by the Adverse Childhood Experiences Questionnaire (Appendix J), the Dissociative Experiences Scale (Appendix K), the Launay-Slade Hallucination Scale-Revised (Appendix L) and the Somatoform Dissociation Questionnaire – Peritraumatic (Appendix M), and finally the Peritraumatic Dissociative Experiences Questionnaire (Appendix N). Instructions for all questionnaires are detailed in the appendices. In line with advice from the ethics committee for online studies, several prompts were displayed throughout the questionnaire on Qualtrics®, reminding the participant to contact the Sheffield crisis team, their GP, the Samaritans, or emergency services if needed. Following completion of the online questionnaires, participants were asked to click a button on the screen which directed them to the online signal detection task located on the Gorilla Experiment platform. Instructions to the task were made available to the participant on screen (Appendix O) before the completion of the task. After completion of this audio task, all participants were presented with a debrief sheet (Appendix P) before exiting the study.

Measures

Demographic Questionnaire

Participants first completed a short five-item demographic questionnaire (Appendix H) to ascertain individual age, gender, ethnicity, education level and employment status prior to completing further measures. This was included in order to control for possible covariates within the research.

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

Participants completed the ITQ (Appendix I), which is a validated self-report measure focusing on the features of PTSD and CPTSD, which employs diagnostic rules corresponding to the International Classification of Diseases, 11th Revision (ICD 11, WHO 2019). The 18-item scale incorporates questions on responses relating to traumatic events, the effects of the responses, how true a statement is of an individual, and questions on beliefs and emotions. Respondents are asked to rate questions as either not at all (0 points), a little bit (1 point), moderately (2 points), quite a bit (3 points) and extremely (4 points). Some questions are related to a diagnosis of CPTSD, whereas others are related only to PTSD. Scores are then added and matched against criteria for PTSD and CPTSD. The measure is made freely available to the public.

Recent research has found that the ITQ succeeds in measuring reliable and clinically significant change of PTSD and CPTSD symptomology (Cloitre et al., 2021). The ITQ has been shown to demonstrate good properties of reliability, with Cronbach's alpha coefficients ranging between $\alpha = .63$ (avoidance subscale) to $\alpha = .91$ (total scale) for the PTSD clusters, as well as between $\alpha = .73$ (affective dysregulation-hyperactivation subscale) to $\alpha = .91$ (total scale) for the different CPTSD clusters (Karatzias et al., 2017). In terms of validity of the ITQ, good agreement has been evidenced with diagnostic interviews (Hansen et al., 2021). Thus, regarding discriminant and convergent validity, the ITQ has evidenced to show good relationships between PTSD symptoms and trauma exposure (Cyr et al., 2022), as well as good construct validity (Ho et al., 2019).

Adverse Childhood Experiences Questionnaire (ACEs; Felitti et al., 1998)

Participants completed the 10-item self-report ACEs questionnaire, which retrospectively measures childhood trauma before the age of 18 (Appendix J). This measure assesses 10 types of childhood trauma, including parental alcoholism, domestic violence,

family member imprisonment, parental mental health problems, parental separation, physical abuse, sexual abuse, verbal abuse, emotional neglect, and psychical neglect. Participants are required to provide *'yes'* or *'no'* answers to the 10 items. *'Yes'* responses are scored one point each and are added up to provide an overall ACE score. Higher ACE scores indicate increased experiences of adverse childhood experiences. This measure is widely used globally with clinical and non-clinical samples and is considered valid and reliable (Kazeem, 2015). Specifically, the ACE has evidenced adequate internal consistency with a Cronbach's alpha of $\alpha = .88$ (Murphy et al., 2014) as well as good construct validity (Wingenfeld et al., 2011).

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

Participants completed the DES measure (Appendix K), which is a 28-item scale measuring daily life experiences, with the aim of measuring dissociation in both normal and clinical populations. The DES total score is the average of all questions, whereby the minimum score is 0% and the maximum is 100% for each question. To calculate the total score, the zero on the percentage is removed (e.g., 30% = 3). All numbers are added together, multiplied by 10 and divided by 28 to calculate the average DES core. Thus, this measure shows good test-retest and good split-half reliability. Scores also indicate good internal consistency and construct validity (Bernstein & Putman, 1986). Specifically, Cronbach's alpha's of .96 and .97 have been observed for the DES total score when repeated across two periods of time, demonstrating high internal consistency (Dubester & Braun, 1995). Additionally, the measure has shown to have good convergent validity with other questionnaire and interview measures assessing dissociative tendencies (IJzendoorn & Schuengel, 1996).

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

Participants completed the LSHS-R (Appendix L), which is a 12-item scale measuring the occurrence of hallucinations in the general population, using a five-point Likert scale for responses in order to rate statements (0 = certainly does not apply to me, 1 = possibly does not apply to me, 2 = unsure, 3 = possibly applies to me, 4 = certainly applies to me). Higher scores indicate higher hallucination experience. The LSHS-R has demonstrated good reliability and validity within the literature (Waters et al., 2003). Specifically, it has shown to exhibit adequate psychometric properties (Cella et al., 2008), correlating highly with similar hallucinatory measures, for example the Peters Delusion Inventory-21 (PDI-21) (Peters et al., 2004) as well as demonstrating a Cronbach's alpha coefficient of 0.9, showing good internal consistency (Fonseca-Pedrero et al., 2010).

The Signal Detection Task

Participants finally accessed the signal detection task through the Qualtrics® link, directing them onto the Gorilla experiment platform. The signal detection task was originally created by Bentall and Slade (1985) and further modified by Barkus et al. (2007) and has thus been used in many studies subsequently. The computer task involved participants listening to a series of white noise bursts through a set of headphones on their computer, with each sound burst lasting 3.5 seconds. Across the 70 trials, some bursts involved a voice saying '*who'* within the white noise, whereas others did not have a voice present within the white noise. Participants were required to indicate whether a voice was present or not in each burst, by using their computer keyboard. With all self-report measures and the online signal detection task included, participants were informed that it would take approximately 20-30 minutes of their time. In terms of findings, the task produces independent parameters of 'sensitivity' and 'response bias', both calculated using an algorithm developed by Stanislaw and Todorov (1999). Sensitivity can be defined as an overall accuracy measured, indicating how 'sensitive'

an individual is when discriminating whether a voice is present or not. Varese et al. (2012) clearly defined sensitivity as the capacity one has to detect a noise (signal) from background noise within an audio-based task. Comparatively, response bias can be defined as the tendency to assume the voice is present under conditions of uncertainty. Positive scores suggest that participants tend to have a bias towards choosing 'yes' to hearing a voice whereby a negative score would indicate that participants would favour 'no' when making this judgment (Please see Appendix Q for further information on the task and analysis of this).

Results

Data Analytic Strategy

All quantitative data was analysed using IBM SPSS® statistics 26.0. Descriptive data for demographic information were calculated and presented in Table 1. Trauma-type groupings on the ITQ were coded, narratively discussed, and presented within Figure 1. Differences between groups on the demographic variables were examined with Chi-squared analyses or one-way analysis of variance (ANOVA).

Descriptive data was analysed for the clinical outcome variables, and descriptive data for the outcome measures were also calculated and presented in Table 2. For the analysis on outcome measure data between groups, one-way analysis of covariance (ANCOVA) with age as a covariate was used to explore the difference between groups on the measures, with post-hoc Bonferroni corrections.

Finally, partial correlation analyses were also completed to explore relationships between childhood trauma (ACE) and hallucination proneness (LSHS-R); childhood trauma (ACE) and signal detection bias; childhood trauma (ACE) and signal detection sensitivity, and finally bias, sensitivity and hallucination proneness (LSHS-R).

Descriptive Data

A total of 81 participants were included in the final data set. Table 1 presents the demographic information for each clinical group, in mean scores and percentages, as well as overall combined scores.

Table 1

Participant Demographic Variables across Groups

	Control Group	**Psychosis Group**	**PTSD Group**	**Overall**
N	27	27	27	81
Gender	7 Male (25.9%) 20 Female (74.1%)	8 Male (29.6%) 17 Female (63%) 2 Gender neutral (7.4%)	5 Male (18.5%) 22 Female (81.5%)	20 Male (24.7%) 59 Female (72.8%) 2 Gender neutral (2.5%)
Mean Age (years) (SD) Range (years)	28.74 (5.43) 24-54	41.56 (12.25) 20-70	37.37 (10.90) 23-59	35.89 (11.22) 20-70
Ethnicity	24 White (88.9%) 3 Non-White (11.1%)	23 White (85.2%) 4 Non-White (14.85%)	21 White (77.8%) 6 Non-White (22.2%)	68 White (84%) 13 Non-White (16%)
Education	1 School Education (3.7%) 10 University Graduate (37%)	8 School Education (29.6%) 14 University Graduate (51.8%) 5 Post-Graduate (18.5%)	1 School Education (3.7%) 12 University Graduate (44.4%) 14 Post-Graduate (51.8%)	10 School Education (12.3%) 36 University Graduate (44.4%) 35 Post-Graduate (43.3%)

	16 Post-Graduate (59.3%)			
Employment	27 Employed (100%)	9 Employed (33.3%) 18 Not Employed (66.7%)	21 Employed (77.8%) 6 Not Employed (22.2%)	57 Employed (70.4%) 24 Not Employed (29.6%)

Note. SD = Standard deviation

Participants

Of the 81 total participants overall, the mean age was reported to be 35.89. Of these individuals, 72.8% were reported to be female, 24.7% were male, and 2.5% identified as gender neutral. In terms of ethnicity overall, the majority of the sample were of White ethnicity (84%). Regarding education for the overall participants, the majority of the sample were either a graduate of university (44.4%) or a post-graduate student (43.3%). In terms of employment, over half of the sample were classed as employed (70.4%), and 29.6% were not employed. Please see Table 1 for a further breakdown of demographic information per clinical group.

Regarding between-group differences on the demographic factors, gender did not significantly differ between groups, $X^2(4, N = 81) = 5.34$, $p = .254$. The effect size, calculated using Phi, was noted to be 0.2 indicating a small effect. However, a one-way ANOVA revealed a significant difference for age between groups $F(2,78) = 11.59$, $p < .001$. A Bonferroni post-hoc test revealed that individuals in the PTSD group were significantly older than the healthy control group, $p < .05$, and individuals in the psychosis group were also significantly older than the healthy control group, $p < .001$. Thus, a significant difference was found on education between groups $X^2(4, 81) = 16.35$, $p < .05$, whereby individuals in the psychosis group had lower rates of postgraduate education and more school education compared to the control group and PTSD group who tended to report higher rates of postgraduate education. The effect size was found to be 0.4, indicating a medium effect size. A further Chi-square test also indicated a significant difference in employment between groups, $X^2(2, N = 81) = 29.84$, $p < .001$. The effect size was noted to be 0.6, indicating a large effect size. Specifically, more individuals in the psychosis group were unemployed compared to controls and the PTSD group. Comparatively, ethnicity was not found to significantly differ between groups, $X^2(2, N = 81) = 1.28$, $p = .527$. The effect size was noted to be 0.1,

indicating a small effect size. Appendix R presents the outputs for descriptive data, and Appendix S presents group comparisons for demographic factors

Outcome measure data was checked for normal distribution using histograms. No marked discrepancies were noted across outcome measures for the clinical groups. Therefore, parametric tests were used in the primary analysis. Regarding descriptive data on the ITQ, 26 individuals in the control group did not meet the diagnostic cut-off for PTSD but one scored for PTSD. In the psychosis group, 12 individuals did not meet cut-off for PTSD diagnosis, two met the criteria, and 13 met criteria for CPTSD. In the PTSD group, three individuals did not meet cut-off for PTSD, five met the criteria and 19 met cut-off for CPTSD. The failure of three individuals to meet the PTSD criteria on our diagnostic instrument likely reflects the inaccuracies of their self-diagnoses or those given to them by a clinician. On the ACE measure, the PTSD group had a higher mean score (4.37) than the psychosis group (3.74) and the control group (1.67). For the DES measure, the psychosis group on average scored highest (31.99), followed by the PTSD group (31.89) and the control group (20.22). For the LSHS-R, psychosis participants scored highest on average (15.15), compared to the PTSD group (10.56) and the control group (5.44).

For signal detection sensitivity scores, it would appear that on average, the psychosis group displayed reduced sensitivity in the ability to discriminate between hearing a voice or not (-.33) compared to the healthy control and PTSD group. With regard to bias scores, it would appear that, on average, the psychosis group tended to show more bias in favouring ‘yes’ to hearing a voice, compared to the control and PTSD group.

Table 2

Participant Clinical Variables Data across Groups

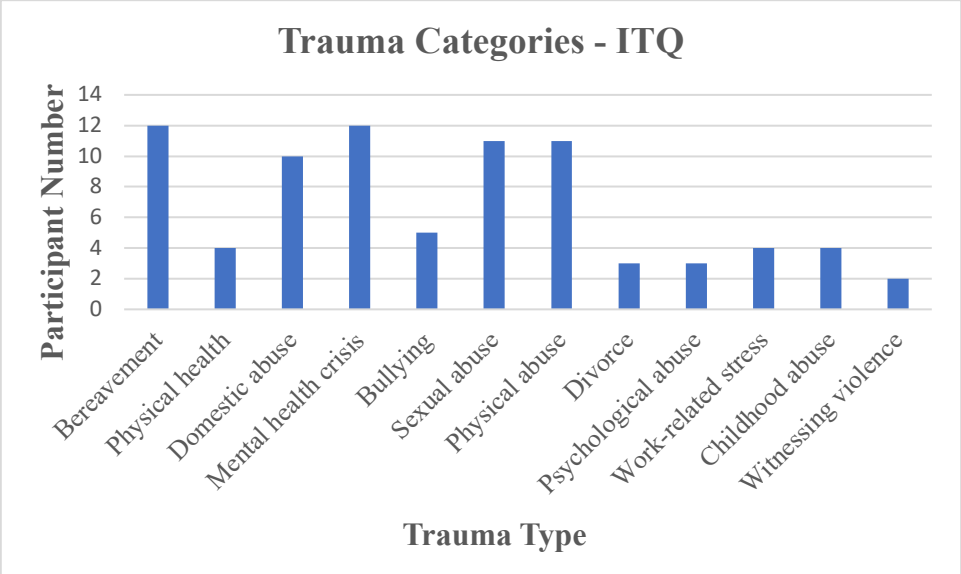
Outcome Measure	Control Group	Psychosis Group	PTSD Group
ITQ	26 no diagnosis (96.3%) 1 PTSD diagnosis (3.7%)	12 no diagnosis (44.4%) 2 PTSD diagnosis (7.4%) 13 CPTSD (48.1%)	3 no diagnosis (11.1%) 5 PTSD diagnosis (18.5%) 19 CPTSD (70.4%)
ACEs (Mean, SD)	1.67 (1.71)	3.74 (2.44)	4.37 (2.76)
DES (Mean, SD)	20.22 (11.72)	31.99 (11.16)	31.89 (12.53)
LSHS-R (Mean, SD)	5.44 (5.23)	15.15 (3.26)	10.56 (4.48)
Signal Detection: Bias (Mean, SD)	-.19 (.70)	.27 (.80)	-.09 (.80)
Signal Detection: Sensitivity (Mean, SD)	.28 (1.10)	-.33 (1.25)	.01 (1.27)

As shown in Figure 1, reported trauma experiences were grouped into different categories based on reported trauma on the ITQ measure. It is evident that bereavement was one of the highest reported traumas across participants, with 12 individuals disclosing to being affected by this. Examples of bereavement also included loss to suicide and witnessing the death of a person. Twelve participants also identified a mental health crisis to be traumatic, which included witnessing self-harm or parental mental health difficulties. 11 participants identified sexual abuse as their traumatic event, and a further 11 people reported physical abuse as their traumatic event. Thus, 10 participants reported domestic abuse to be a traumatic event, followed by five participants who disclosed bullying, four reported a

physical health event to be traumatic such as experiencing meningitis or an ectopic pregnancy. Moreover, four more participants identified work-related trauma such as losing a job, and four identified childhood abuse as their traumatic event. three participants disclosed experience of divorce to be traumatic, participants reported psychological abuse as traumatic, and finally two participants stated that witnessing violence was a traumatic life event.

Figure 1

Trauma Categories on the International Trauma Questionnaire (ITQ)



In regard to clinical variables, one-way analysis of covariance (ANCOVA) tests were completed on all clinical variables, with age included as a covariate due to the marked difference found between groups. There was missing data on the signal detection tasks for seven out of the 81 participants. Therefore, the signal detection part of the analysis (sensitivity and bias) included 74 participants' data (26 = healthy control, 26 = psychosis, 22 = PTSD). All ANCOVAs are presented within Appendix T.

A one-way ANCOVA, with age added as a covariate on the ACE data was significant, $F(2,77) = 7.890$, $p < .001$. The effect size, calculated as partial eta squared, was noted to be 0.2, demonstrating a large effect, as per guidelines for interpreting partial eta squared (Correll et al., 2022). Age was not a significant covariate on this measure. Post-hoc Bonferroni corrected comparisons between the groups found a significant difference between healthy controls and both the psychosis group, $p < 0.05$, and the PTSD group, $p < .001$. The difference between schizophrenia and PTSD groups was not significant, $p = .982$. Overall, ACE scores were similarly higher in the PTSD and psychosis groups.

A one-way ANCOVA, with age as a covariate on the DES data was significant, $F(2,77) = 4.981$, $p < .01$. The effect size, calculated as partial eta squared, was found to be 0.1, indicating a large effect. Age was not a significant covariate on this measure. Post-hoc Bonferroni corrected comparisons between the groups found a significant difference between the healthy controls and both the psychosis group, $p < .05$ and the PTSD group, $p < .05$, but the difference between the psychosis and PTSD groups was not significant, $p = 1.00$. Thus, both the PTSD and psychosis groups scored significantly higher on the DES measure than controls.

A one-way ANCOVA, with age as a covariate on the LSHS-R data was significant, $F(2,77) = 28.50$, $p < .001$. The effect size, calculated as partial eta squared, was noted to be 0.4, indicating a large effect. Age was not found to be a significant covariate on this measure.

In terms of post-hoc tests, a significant difference was found between healthy controls and the psychosis group, $p < .001$, as well as between healthy controls and PTSD, $p < .001$. A significant difference was also found between individuals with PTSD and psychosis, $p < .001$. In summary, all of the groups scored significantly differently from the others, with the psychosis groups scoring highest, the healthy controls scoring lowest, and the PTSD group scoring in-between.

A one-way ANCOVA, with age as a covariate on the signal detection sensitivity data, was not significant between groups, $F(2,70) = .200$, $p = .819$. The effect size, calculated as partial eta squared, was found to be 0, indicating no effect. However, on the signal detection response bias data, a significant difference was found between groups $F(2,70) = 2.709$, $p < .05$. The effect size, calculated as partial eta squared, was noted to be 0.1, indicating a large effect. Age was found to be a significant covariate on this measure, $p < .05$, meaning that when controlling for age, a significant difference was found between groups on bias data. Specifically, post-hoc tests with Bonferroni correction found there to be a significant difference between healthy controls and psychosis participants, $p < .05$. A significant difference was not found between healthy controls and PTSD patients, $p = 1$, but the difference between schizophrenia and PTSD patients failed to reach significance, $p = .096$. This indicates that the psychosis group had a response bias to favouring ‘yes’ to hearing a voice in the SDT compared to the healthy control group who had a bias to favouring ‘no’ to hearing a voice in the task.

As one participant in the control group met criteria on the ITQ for a PTSD diagnosis, and three participants did not meet PTSD threshold within the PTSD clinical group, four participants’ data was temporarily removed for the purpose of conducting a sensitivity analysis to ensure results remained the same pre and post removal. Thus, significance levels

remained the same following the removal of this data and re-analysing through identical analyses.

Whilst also controlling for age, partial correlations on the whole sample were undertaken to understand the relationship between the clinical variables, detailed in Table 3. A significant correlation was found between the ACE score and hallucination level on the LSHS-R. As expected, no significant correlation was found between ACE score and bias or sensitivity scores. This indicates no direct relationship between childhood trauma and source monitoring abnormalities across groups.

As anticipated, a significant correlation was found between hallucination proneness on the LSHS-R and SDT bias scores. This suggests that higher hallucination scores are associated with higher response bias scores. However, a significant correlation was also found between hallucination level on the LSHS-R and sensitivity scores. This shows that as individuals score higher on sensitivity scores, hallucination proneness reduces. Please see Appendix U for the SPSS partial correlation output.

Table 3

Whole Sample Partial Correlations between Clinical Variables

Variables	**ACE**	**Bias**	**Sensitivity**	**LSHS-R**
ACE				
Correlation	1.000	.163	-.155	**.304***
Significance	.	.168	.189	**.009***
df	0	71	71	71
Bias				
Correlation	.163	1.000	-.031	**.242***
Significance	.168	.	.796	**.039***
df	71	0	71	71
Sensitivity				
Correlation	-.155	-.031	1.000	**-.246***
Significance	.189	.796	.	**.036***
df	71	71	0	71

LSHS-R				
Correlation	.304	.242	-.246	1.000
Significance	.009	.039	.036	.
df	71	71	71	0

Note. Significance (2-tailed)

Discussion

Summary of Results

In regard to group comparisons on the clinical outcome measures, and in line with previously discussed research, childhood trauma scores (ACEs) were significantly higher in both psychotic and PTSD samples compared to healthy controls. In addition to these findings, the results also found that 'bereavement' and 'mental health crisis' were the highest reported trauma experiences across the three groups on the ITQ measure.

Bentall (1990) argued that individuals with psychosis may have a failure in source monitoring ability and that this cognitive deficit is central to hallucination development. Credible support for this theory has been gathered over the years, whereby research has consistently shown that individuals with hallucinatory experiences show an abnormal bias on source monitoring tasks compared to non-hallucination participants (Brookwell et al., 2013; Varese et al., 2012). Due to previous significant findings on this topic area, this study primarily aimed to add to the evidence base and build on this research by comparing source monitoring abilities amongst people with psychosis and PTSD, attempting to provide further clarification as to whether source monitoring abnormalities are unique to individuals with psychosis, given the fact that people with psychosis and PTSD share similar background histories in trauma and dissociation. In summary, this study mainly aimed to provide further understanding as to why people with psychosis and PTSD differ with respect to hallucinatory experiences despite the fact that both exhibit similarly high levels of childhood trauma and dissociation.

As expected, people with psychosis were more prone to bias on the signal detection task, reflecting a tendency to have a response bias to favouring 'yes' to hearing a voice in the task compared to PTSD and control patients. Furthermore, the hypothesis that ACEs would predict hallucination level but not source monitoring ability was supported. Thus, partial correlations on the whole sample found a relationship between ACEs and hallucination score, but not between ACEs and source monitoring ability. This suggests that there is not a direct connection between childhood trauma experience and source monitoring ability, tentatively supporting an additive model in which both trauma-related process and source monitoring deficits contribute to hallucinations.

The findings were consistent with those of Varese et al. (2012) and many other studies which have examined source monitoring abilities in people with AVHs (Barkus et al., 2007; Brookwell et al., 2013; Vercammen et al., 2008). These findings have thus been strengthened by comparing scores with a PTSD clinical sample in the current study, who share similar trauma histories and dissociative tendencies to those with psychosis symptoms. The findings confirm that source monitoring is unique to psychosis, and those with PTSD do not have this difficulty despite other clinical similarities. This could explain why people with psychosis go on to develop hallucinations and individuals with PTSD do not. One possible hypothesis could be that people with psychosis have a pre-existing neurocognitive deficit which affects their ability to perform well on source monitoring tasks.

An unexpected finding was a significant correlation at whole sample level between hallucination proneness and signal detection sensitivity scores, whereby as sensitivity scores increased, hallucination proneness decreased. Differing from this, the between-group comparisons (ANCOVA) found no significant group difference in signal detection sensitivity scores. A possible explanation for this could be that even though age was controlled for on the correlation analysis, age related effects may not have been entirely eliminated. It could

also be possible that a third unknown variable is impacting on the correlational findings. It would be necessary for future studies to provide well-balanced groups in terms of demographic factors in order to eliminate possible confounding effects.

Strengths and Limitations

To the researchers' knowledge, this is the first study to explore signal detection abilities among both psychotic and PTSD clinical samples combined. Therefore, this novel addition to the research base adds to our understanding of the pathway to developing psychotic symptoms and the different factors and unique mechanisms between both clinical diagnoses. This also appears to be the first study to use a signal detection task online, evidencing its feasibility and acceptability as well as social media being a feasible option for recruitment. Efforts were made to recruit the sample from both NHS services and online social media, and services were regularly approached regarding recruitment. Despite these efforts, all of the participants were recruited from social media which limits the diversity and inclusivity of the sample, possibly highlighting the stretched nature of NHS services at the time of recruitment and the priorities of clinical staff. It is important to note therefore that implementing an entirely online study may have created inclusivity issues with the sampling, meaning those unable to access a laptop or the internet could not take part in the study, creating a significantly less diverse sample and difficulties with the generalisability of the findings to wider society and perhaps those that are representative of the clinical population. However, a strength of this study was the ability for all testing to be completed remotely, increasing accessibility for participants who may have found it more challenging to factor in travelling to NHS bases to complete the study.

Some other limitations of the work must be acknowledged. Participants were not asked about current mental health or physical health medications and whether they were taking these at the time of the study, which may have impacted the results. Thus, the methods

within the study were all of a self-report nature, whereby difficulties such as social desirability bias can influence the responses. In addition, completing studies online, which requires a participant to have access to certain equipment, can mean that people who meet inclusion criteria may have been unable to access the study due to logistic reasons, impacting on the equality within sampling. Also, the diagnoses of the clinical groups were not prior confirmed by a qualified mental health professional. This could have in turn impacted the accuracy of clinical diagnoses between groups, where it was found that three participants who identified as having PTSD did not score clinically on the measure of PTSD. In final discussion, participants were also offered an incentive of the chance to win an Amazon voucher for participation. Although this is an effective way to increase response rates, participation bias may be introduced into the study, whereby people may misrepresent themselves to be able to participate in the study.

Clinical and Theoretical Implications

This research has important clinical and theoretical implications to consider. From a theoretical perspective, this research improves the current understanding of psychosis and its possible aetiology. It is clear that multiple mechanisms are required to experience AVHs, and source monitoring deficits are unique to individuals who experience psychosis. In regard to highlighting the clinical implications, it may be argued that treating trauma symptoms in those with psychosis with trauma-focused therapies may only be targeting a proportion of the perceived difficulties. Thus, it may also be necessary to further understand and clarify the origins of source monitoring abnormalities and whether there are links to neuropsychological dysfunction. This may then lead to further understanding of the ways in which source monitoring could be improved in populations of people experiencing AVHs, and whether treatments need to be adapted to inform clinical practice.

Future Research Directions

These particular findings helpfully guide future research into studying the possible neurocognitive causes of psychosis, whereby it may be beneficial to further study source monitoring amongst this population in more depth. For example, it may be of use to investigate whether signal detection bias scores differ within this population depending on demographic factors or other variables such as specific psychotic-related diagnoses. Researchers could also consider monitoring psychosis treatment trials regarding source monitoring ability, testing whether this cognitive ability improves post-intervention. Due to the evident uniqueness that those with psychosis exhibit with source monitoring deficits, future research could build on exploring the general impact of this deficit on individuals affected, for example, how it affects their mental health, general well-being, or daily living skills, which could help guide assessments and inform future treatments to improve source monitoring abilities. Within future studies, it may also be useful to gather qualitative experience of completing a signal detection task, helping to gather insight into experiences of this cognitive deficit in those with psychosis.

Conclusion

In conclusion, this current study is the first to test source monitoring abilities amongst both PTSD and psychotic samples. The findings indicated significant differences in signal detection bias scores between groups, whereby people with psychosis exhibited source monitoring deficits compared to those with PTSD and healthy participants. In addition, partial correlations revealed an expected relationship between childhood trauma and hallucinations but not between childhood trauma and source monitoring. This indicates that source monitoring deficits are not the direct result of trauma, and may be more clearly understood by neurocognitive deficits, unique to people who develop hallucinations. Thus, clear strengths, limitations, and implications have been identified from this research and

thoroughly discussed. Researchers may be more guided to research the neurocognitive causes of psychosis, monitor psychosis treatments to investigate source monitoring change pre- and post-intervention, as well as investigate how source monitoring deficits can impact people with psychosis. It may also be advantageous to conduct research into interventions to improve source monitoring ability amongst this population.

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Appendices

Appendix A

Shared and Distinct Aspects of the Project

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

The shared components of the project included:

- The same participants and dataset were used across the two projects however different outcome measures were analysed to meet different aims.
- All participants completed all measures for both projects.
- IRAS ethics application for the project was shared between researchers.

The distinct aims of the projects are included below:

Hypotheses/ aims of project by EK

1. 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.
2. ACEs will predict hallucination level, but not source monitoring ability.

Hypotheses/aims of project by LH

1. The primary hypothesis was that both the psychosis and PTSD groups will report higher levels of dissociation on the DES than the control group.
2. A secondary hypothesis was that ACEs would predict dissociation and that dissociation would mediate the relationship between ACEs and VH.

Appendix B

HRA and HCRW 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.

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

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

What are my notification responsibilities during the study?

The standard conditions document "*After Ethical Review – guidance for sponsors and investigators*", issued with your REC favourable opinion, gives detailed guidance on reporting expectations for studies, including:

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

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

Who should I contact for further information?
Please do not hesitate to contact me for assistance with this application. My contact details are below.

Your IRAS project ID is **311110**. Please quote this on all correspondence.

Yours sincerely,
Kathryn Davies

Approvals Specialist

Email: approvals@hra.nhs.uk

Copy to: *Professor Richard Bentall*

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

Appendix C

Control Group Advert

The University Of Sheffield.

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

Research participation opportunity, for a chance 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 45 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
- Able to read and write in English
- Can provide consent
- Live in the UK
- 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 and internet access

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

Before participation, please contact either 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.

Appendix D

Information Sheet

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:

1. Be aged 18 or over
2. Live in the UK
3. Be able to read and write in English
4. Be able to provide consent
5. Have a clinical diagnosis of PTSD or complex PTSD
6. Have no history of hallucinations (such as hearing voices)
7. Able to identify a past traumatic experience

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

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

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

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

Due to the nature of the task, all individuals with a hearing impairment will not be able to participate, or those without a laptop or access to the internet. People on a mental health section will not be able to participate

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 Sinah 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 E

Consent Form

The University Of Sheffield.

Consent Form

Please tick the appropriate boxes	Yes	No
Taking Part in the Project:		
I have read and understood the project information sheet, dated DD/MM/YYYY 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 F

PTSD Advert

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?

If you participate, you will have the option to enter a **prize draw** to win a **£50 Amazon voucher!**

Please note, the language we use 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

Due to the nature of the task, individuals with a hearing impairment will not be able to participate, or those without a laptop/computer and 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 G

Psychosis Group Advert

The University Of Sheffield.

Research Participation Opportunity

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
- Aged over 18 years
- Can read and write in English
- Can provide consent
- Not on a mental health section
- Live in the UK
- Able to identify a 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 and 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 H

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 menu):

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/dick leave

Appendix I

International Trauma Questionnaire (ITQ)

International Trauma Questionnaire

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

Below are problems that people who have had stressful or traumatic events sometimes experience. The questions refer to ways you typically feel, ways you typically think about yourself and ways you typically relate to others. Answer the following thinking about how true each statement is of you.

How true is this of you?	***Not at all***	***A little bit***	***Moderately***	***Quit a bit***	***Extremely***
C1. When I am upset, it takes me a long time to calm down.	0	1	2	3	4
C2. I feel numb or emotionally shut down.	0	1	2	3	4
C3. I feel like a failure.	0	1	2	3	4
C4. I feel worthless.	0	1	2	3	4
C5. I feel distant or cut off from people.	0	1	2	3	4
C6. I find it hard to stay emotionally close to people.	0	1	2	3	4
In the past month, have the above problems in emotions, in beliefs about yourself and in relationships:					
C7. Created concern or distress about your relationships or social life?	0	1	2	3	4
C8. Affected your work or ability to work?	0	1	2	3	4
C9. Affected any other important parts of your life such as parenting, or school or college work, or other important activities?	0	1	2	3	4

Appendix J

The Adverse Childhood Experiences (ACEs) Questionnaire

Adverse Childhood Experience Survey		
QUESTION	**Yes**	**No**
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?		
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?		
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, anal, or vaginal intercourse with you?		
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?		
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?		
Were your parents ever separated or divorced?		
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?		
Did you live with anyone who was a problem drinker or alcoholic, or who used street drugs?		
Was a household member depressed or mentally ill, or did a household member attempt suicide?		
Did a household member go to prison?		
Add up your "yes" answers – that's your ACES score		

Appendix K

Dissociative Experiences Scale (DES)

This questionnaire consists of 28 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. **Please select the appropriate percentage.**

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.

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

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.

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

3. Some people have the experience of finding themselves in a place and having no idea how they got there.

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

4. Some people have the experience of finding themselves dressed in clothes that they don't remember putting on.

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

5. Some people have the experience of finding new things among their belongings that they do not remember buying.

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

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.

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

7. Some people sometimes have the experience of feeling as though they are standing next to themselves or watching themselves do something as if they were looking at another person.

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

8. Some people are told that they sometimes do not recognize friends or family members.

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

9. Some people find that they have no memory for some important events in their lives (for example, a wedding or graduation).

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

10. Some people have the experience of being accused of lying when they do not think that they have lied.

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

11. Some people have the experience of looking in a mirror and not recognizing themselves.

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

12. Some people sometimes have the experience of feeling that other people, objects, and the world around them are not real.

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

13. Some people sometimes have the experience of feeling that their body does not belong to them.

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

14. Some people have the experience of sometimes remembering a past event so vividly that they feel as if they were reliving that event.

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

15. Some people have the experience of not being sure whether things that they remember happening really did happen or whether they just dreamed them.

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

16. Some people have the experience of being in a familiar place but finding it strange and unfamiliar.

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

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.

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

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.

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

19. Some people find that they are sometimes able to ignore pain.

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

20. Some people find that they sometimes sit staring off into space, thinking of nothing, and are not aware of the passage of time.

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

21. Some people sometimes find that when they are alone, they talk out loud to themselves.

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

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.

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

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.).

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

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).

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

25. Some people find evidence that they have done things that they do not remember doing.
26-Some people sometimes find writings, drawings, or notes among their belongings that they must have done but cannot remember doing.

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

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.

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

28. Some people sometimes feel as if they are looking at the world through a fog so that people or objects appear far away or unclear.

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

Appendix L

The Launay–Slade Hallucination Scale (LSHS-R*)*

Please circle the answer which most applies to you, from the 4 options.

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

4 = certainly applies to me 3 = possibly applies to me 2 = unsure 1 = possibly does not apply to me 0 = certainly does not apply to me

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

4 = certainly applies to me 3 = possibly applies to me 2 = unsure 1 = possibly does not apply to me 0 = certainly does not apply to me

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

4 = certainly applies to me 3 = possibly applies to me 2 = unsure 1 = possibly does not apply to me 0 = certainly does not apply to me

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

4 = certainly applies to me 3 = possibly applies to me 2 = unsure 1 = possibly does not apply to me 0 = certainly does not apply to me

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

4 = certainly applies to me 3 = possibly applies to me 2 = unsure 1 = possibly does not apply to me 0 = certainly does not apply to me

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

4 = certainly applies to me 3 = possibly applies to me 2 = unsure 1 = possibly does not apply to me 0 = certainly does not apply to me

7. I often hear a voice speaking my thoughts aloud

4 = certainly applies to me 3 = possibly applies to me 2 = unsure 1 = possibly does not apply to me 0 = certainly does not apply to me

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

4 = certainly applies to me 3 = possibly applies to me 2 = unsure 1 = possibly does not apply to me 0 = certainly does not apply to me

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

4 = certainly applies to me 3 = possibly applies to me 2 = unsure 1 = possibly does not apply to me 0 = certainly does not apply to me

10. I have heard the voice of the Devil

4 = certainly applies to me 3 = possibly applies to me 2 = unsure 1 = possibly does not apply to me 0 = certainly does not apply to me

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

4 = certainly applies to me 3 = possibly applies to me 2 = unsure 1 = possibly does not apply to me 0 = certainly does not apply to me

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

4 = certainly applies to me 3 = possibly applies to me 2 = unsure 1 = possibly does not apply to me 0 = certainly does not apply to me

Appendix M

Somatoform Dissociation Questionnaire (SDQ)

Instructions: Please answer the questions in this list by circling the answer that best describes 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, then you circle 'no'.

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

Appendix N

The 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 nor 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

Appendix O

Signal Detection Instructions - Gorilla

In this task you will be presented with some short bursts

of white noise.

Your job is to listen out for a voice in the noise.

Sometimes, there will be a voice that is quite easy to hear in the noise.

Sometimes ,the voice will be quieter, and it might be hard to tell if a voice is present or not.

Sometimes, there will be no voice in the noise at all.

After each burst of noise, press '1' if you think there was a voice present, and '2' if you don't think there was a voice.

The task will take approximately 2 minutes, and you will be notified when it has ended

Click the **next** button to start a short practice task.

next

Appendix P

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 Sinah 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 Q

Signal Detection Information

Background

Signal detection paradigms have been used to investigate auditory decision making in patients with psychosis for almost forty years. In these studies, participants listen to brief bursts of white noise (a hissing sound, like that from an untuned radio) and try and detect occasional voices speaking at a close-to-threshold (just detectable) level. Performance on these tests can be used to calculate two parameters: *sensitivity*, roughly the extent to which the individual is able to detect the signals (voices), and *bias*, roughly the tendency to assume the voice is there if uncertain.

In the first study to use this methodology, Bentall & Slade (1985) found that patients with auditory hallucinations show abnormal bias scores, and this has been replicated many times. For example, Varese et al. (2011) found that abnormal bias scores were present both in patients who are currently hallucinating and also in patients who had recovered from their hallucinations, but not those who had never hallucinated, showed the same pattern of responding. A meta-analysis by Brookwell et al. (2013) confirmed the effect in a synthesis of evidence from 15 patient studies and 9 studies investigating healthy people who reported hallucinatory experiences. Further replications have been published since, notably from an international collaboration which found that SDT was the psychological measure that was most robustly associated with hallucinations of all the measures investigated (Mosley et al., 2019).

What the test involves

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 and Figure 2 shows the structure of each trial.

Figure 1: Screenshot of instruction screen

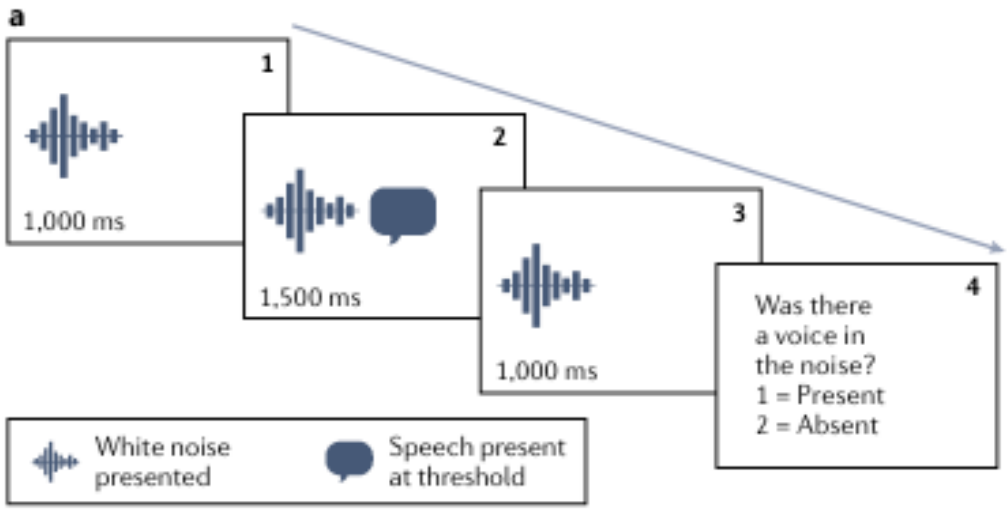
In this task, you will be presented with some short bursts of white noise.

Your job is to listen out for a voice in the noise. Sometimes there will be a voice that is quite easy to hear in the noise. Sometimes, the voice will be quieter, and it might be hard to tell if a voice is present or not. Sometimes, there will be no voice in the noise at all.

After each burst of noise, press '1' if you think there was a voice present, and '2' if you don't think there was a voice.

Press '1' to start a short practice task.

Figure 2: Trial structure



Technical aspects

The software for running this study has been programmed by Dr Peter Mosley at Northumbria University, using *Psychopy*, a free to use, cross-platform package developed for the specific purpose of running psychology experiments (https://www.psychopy.org/). We are currently working to develop an online version, which will use the Pavlovia package (https://pavlovia.org/) which has again been developed for the specific purpose of running psychology experiments.

Ethical considerations

The SDT is highly acceptable to patients and has been used in many previous studies as described above.

Appendix R

SPSS Outputs for Demographic Factors and Descriptives

Schizophrenia group refers to psychosis

Participant Group

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Healthy	27	33.3	33.3	33.3
	Schizophrenia	27	33.3	33.3	66.7
	PTSD	27	33.3	33.3	100.0
	Total	81	100.0	100.0	

Gender * Participant Group Crosstabulation

Count

		Participant Group			
		Healthy	Schizophrenia	PTSD	Total
Gender	Male	7	8	5	20
	Female	20	17	22	59
	Gender neutral	0	2	0	2
Total		27	27	27	81

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Age	81	20	70	35.89	11.216
Valid N (listwise)	81				

Ethnicity * Participant Group Crosstabulation

Count

		Participant Group			
		Healthy	Schizophrenia	PTSD	Total
Ethnicity	White	24	23	21	68
	Mixed or multiple ethnic groups (White and Black Caribbean, White and Black African, White and Asian, any other mixed ethnic background)	3	4	6	13
Total		27	27	27	81

Education * Participant Group Crosstabulation

Count

		Participant Group			
		Healthy	Schizophrenia	PTSD	Total
Education	School Education	1	8	1	10
	University Graduate	10	14	12	36
	Postgraduate	16	5	14	35
Total		27	27	27	81

Employment * Participant Group Crosstabulation

Count

		Participant Group			
		Healthy	Schizophrenia	PTSD	Total
Employment	Employed	27	9	21	57
	Not Employed	0	18	6	24
Total		27	27	27	81

Appendix S

SPSS Outputs for Demographic Factors and Group Comparisons

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			

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.

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	.257	.254
	Cramer's V	.182	.254
N of Valid Cases		81	

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.

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	.126	.527
	Cramer's V	.126	.527
N of Valid Cases		81	

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.

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	.449	.003
	Cramer's V	.318	.003
N of Valid Cases		81	

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.

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	.607	<.001
	Cramer's V	.607	<.001
N of Valid Cases		81	

Appendix T

Clinical Variables and Between Group Comparisons

DES

Tests of Between-Subjects Effects

Dependent Variable: DES Total

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2740.570[a]	3	913.523	6.621	<.001	.205
Intercept	2560.722	1	2560.722	18.560	<.001	.194
Age	267.346	1	267.346	1.938	.168	.025
Group	1374.491	2	687.245	4.981	.009	.115
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.

ACE

Tests of Between-Subjects Effects

Dependent Variable: ACE total

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	108.154[a]	3	36.051	6.465	<.001	.201
Intercept	55.429	1	55.429	9.939	.002	.114
Age	.080	1	.080	.014	.905	.000
Group	88.003	2	44.001	7.890	<.001	.170
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 .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.	Partial Eta Squared
Corrected Model	1287.179[a]	3	429.060	22.114	<.001	.463
Intercept	800.530	1	800.530	41.260	<.001	.349
Age	14.784	1	14.784	.762	.385	.010
Group	1105.969	2	552.984	28.501	<.001	.425
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 .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Bias

Tests of Between-Subjects Effects

Dependent Variable: BIAS

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	5.766[a]	3	1.922	3.284	.026	.123
Intercept	2.435	1	2.435	4.162	.045	.056
Age	2.678	1	2.678	4.577	.036	.061
Group	5.419	2	2.709	4.630	.013	.117
Error	40.962	70	.585			
Total	46.729	74				
Corrected Total	46.728	73				

a. R Squared = .123 (Adjusted R Squared = .086)

Pairwise Comparisons

Dependent Variable: BIAS

(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	-.722*	.244	.013	-1.320	-.123
	PTSD	-.217	.229	1.000	-.777	.344
Schizophrenia	Healthy	.722*	.244	.013	.123	1.320
	PTSD	.505	.231	.096	-.061	1.071
PTSD	Healthy	.217	.229	1.000	-.344	.777
	Schizophrenia	-.505	.231	.096	-1.071	.061

Based on estimated marginal means

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

b. Adjustment for multiple comparisons: Bonferroni.

Sensitivity

Tests of Between-Subjects Effects

Dependent Variable: SENSITIVITY

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	10.334[a]	3	3.445	2.470	.069	.096
Intercept	5.036	1	5.036	3.612	.061	.049
Age	5.537	1	5.537	3.971	.050	.054
Group	.557	2	.279	.200	.819	.006
Error	97.608	70	1.394			
Total	107.954	74				
Corrected Total	107.942	73				

a. R Squared = .096 (Adjusted R Squared = .057)

Pairwise Comparisons

Dependent Variable: SENSITIVITY

(I) Participant Group	(J) Participant Group	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a] Lower Bound	Upper Bound
Healthy	Schizophrenia	.237	.376	1.000	-.686	1.160
	PTSD	.098	.353	1.000	-.768	.963
Schizophrenia	Healthy	-.237	.376	1.000	-1.160	.686
	PTSD	-.139	.356	1.000	-1.012	.735
PTSD	Healthy	-.098	.353	1.000	-.963	.768
	Schizophrenia	.139	.356	1.000	-.735	1.012

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

Appendix U

Partial Correlation Output

Partial Corr

Correlations

Control Variables			ACE total	BIAS	SENSITIVITY	LSHS-R Total
Age	ACE total	Correlation	1.000	.163	-.155	.304
		Significance (2-tailed)	.	.168	.189	.009
		df	0	71	71	71
	BIAS	Correlation	.163	1.000	-.031	.242
		Significance (2-tailed)	.168	.	.796	.039
		df	71	0	71	71
	SENSITIVITY	Correlation	-.155	-.031	1.000	-.246
		Significance (2-tailed)	.189	.796	.	.036
		df	71	71	0	71
	LSHS-R Total	Correlation	.304	.242	-.246	1.000
		Significance (2-tailed)	.009	.039	.036	.
		df	71	71	71	0