The role and clinical correlates of complex PTSD in people with psychosis

Peter Panayi[1, 2*], Katherine Berry[1, 2], William Sellwood[3], Richard Bentall[4], Carolina Campodonico[5], Filippo Varese[1, 2]

[1]The University of Manchester, United Kingdom, [2]Complex Trauma and Resilience Research Unit, Manchester Academic Health Science Centre, United Kingdom, [3]Lancaster University, United Kingdom, [4]The University of Sheffield, United Kingdom, [5]University of Central Lancashire, United Kingdom

Submitted to Journal:
Frontiers in Psychology

Specialty Section:
Psychopathology

Article type:
Original Research Article

Manuscript ID:
791996

Received on:
09 Oct 2021

Revised on:
20 Jan 2022

Journal website link:
www.frontiersin.org

Conflict of interest statement

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest

Author contribution statement

PP, FV, KB and WS contributed to the conception and design of the study. FV, WS, CC and RPB were involved in collecting the data. PP analysed the data, and wrote the first draft of the manuscript. FV, KB, WS and RPB contributed to the final draft of the manuscript. All authors contributed to the article and approved its submission.

Keywords

Trauma, psychosis, PTSD, CPTSD, Mediation, disturbance of self-organisation

Abstract

Word count: 228

Traumatic experiences and post-traumatic stress are highly prevalent in people with psychosis, increasing symptom burden, decreasing quality of life and moderating treatment response. A range of post-traumatic sequelae have been found to mediate the relationship between trauma and psychotic experiences including the 'traditional' symptoms of post-traumatic stress disorder (PTSD). The International Classification of Diseases-11th Edition recognises a more complex post-traumatic presentation, complex PTSD (cPTSD), which captures both the characteristic symptoms of PTSD alongside more pervasive post-traumatic sequelae known as 'disturbances in self-organisation' (DSOs). The prevalence and impact of cPTSD and DSOs in psychosis remains to be explored. In the first study of this kind, 144 participants with psychosis recruited from North West United Kingdom mental health services completed measures assessing trauma, PTSD and cPTSD symptoms and symptoms of psychosis. Forty-per-cent of the sample met criteria for cPTSD, compared to 10% who met diagnostic criteria for PTSD. PTSD mediated the relationship between trauma and positive symptoms; DSOs did not contribute to explaining this relationship. Both PTSD and DSOs mediated the relationship between trauma and affective symptoms but did not explain a significant proportion of variance in negative symptoms. Cognitive and excitative symptoms of psychosis did not correlate with trauma, PTSD or DSO scores. This findings indicate the possible value of adjunct therapies to manage cPTSD symptoms in people with psychosis, pending replication in larger epidemiological samples and longitudinal studies.

Contribution to the field

Research has shown that people with psychosis often have a history of traumatic life experiences. As such, post-traumatic stress disorder (PTSD) is highly common in people with psychosis. Such complex trauma histories may lead to complex PTSD - a more severe and enduring presentation than PTSD that requires distinct trauma-focused interventions. This paper is the first (to the authors' knowledge) to investigate the rates of complex PTSD in a sample of people with psychosis, and explore its clinical correlates. This provides a basis for future research into the prevalence and impact of complex PTSD in people with psychosis.

Ethics statements

Studies involving animal subjects

Generated Statement: No animal studies are presented in this manuscript.

Studies involving human subjects

Generated Statement: The studies involving human participants were reviewed and approved by National Institute for Health Research, National Health Service. The patients/participants provided their written informed consent to participate in this study.

Inclusion of identifiable human data

Generated Statement: No potentially identifiable human images or data is presented in this study.

Data availability statement

Generated Statement: The data analyzed in this study is subject to the following licenses/restrictions: The dataset analysed in this study is not publicly available to protect the sensitivity and confidentiality of the participants.. Requests to access these datasets should be directed to Peter Panayi, peter.panayi@manchester.ac.uk.

The role and clinical correlates of complex PTSD in people with psychosis

Peter Panayi[1,2], Katherine Berry[1,2], William Sellwood[3], Carolina Campodinico[1,2], Richard P. Bentall[4], Filippo Varese[1,2]

[1]Division of Psychology and Mental Health, Manchester Academic Health Sciences Centre, University of Manchester, Manchester, UK

[2]Complex Trauma and Resilience Research Unit, Greater Manchester Mental Health NHS Foundation Trust, Manchester, UK

[3]Division of Health Research, University of Lancaster, Faculty of Health & Medicine, Lancaster, UK

[4]University of Sheffield, Department of Psychology, Sheffield, UK

***Correspondence:**
Peter Panayi
peter.panayi@postgrad.manchester.ac.uk

Keywords: psychosis, trauma, PTSD, cPTSD, disturbances of self-organisation, mediation.

Word count: 5,535

Number of tables: 3

Number of figures: 3

Abstract

Traumatic experiences and post-traumatic stress are highly prevalent in people with psychosis, increasing symptom burden, decreasing quality of life and moderating treatment response. A range of post-traumatic sequelae have been found to mediate the relationship between trauma and psychotic experiences, including the 'traditional' symptoms of post-traumatic stress disorder (PTSD). The International Classification of Diseases-11th Edition recognises a more complex post-traumatic presentation, complex PTSD (cPTSD), which captures both the characteristic symptoms of PTSD alongside more pervasive post-traumatic sequelae known as 'disturbances in self-organisation' (DSOs). The prevalence and impact of cPTSD and DSOs in psychosis remains to be explored. In the first study of this kind, 144 participants with psychosis recruited from North West United Kingdom mental health services completed measures assessing trauma, PTSD and cPTSD symptoms and symptoms of psychosis. Forty-per-cent of the sample met criteria for cPTSD, compared to 10% who

met diagnostic criteria for PTSD. PTSD and DSOs mediated the relationship between trauma and positive symptoms, controlling for dataset membership. Both PTSD and DSOs mediated the relationship between trauma and affective symptoms but did not explain a significant proportion of variance in negative symptoms. Cognitive and excitative symptoms of psychosis did not correlate with trauma, PTSD or DSO scores. These findings indicate the possible value of adjunct therapies to manage cPTSD symptoms in people with psychosis, pending replication in larger epidemiological samples and longitudinal studies.

1 Introduction

Traumatic life events and adverse childhood experiences may lead to various psychosocial difficulties. Perhaps the most notable consequence of such experiences is Post-Traumatic Stress Disorder (PTSD), characterized by re-experiencing (e.g., intrusive trauma memories), hyperarousal (e.g., irritability and hypervigilance) and avoidance of trauma reminders (1). Cohort studies have recorded a prevalence of PTSD as high as 7.8% in England (2). PTSD has been shown to predict adverse physical and mental health outcomes (3,4), as well as reduced quality of life and social functioning (5,6).

Following the classification of PTSD in the third edition of the Diagnostic and Statistical Manual of Mental Disorders (7), neither clinicians nor trauma survivors felt it captured the complex difficulties endorsed by victims of multiple or prolonged traumas. Hence, Herman (8) introduced the concept of complex PTSD (cPTSD). This includes the above core symptoms of PTSD, as well as broader and more severe symptomatology (e.g., cognitive, affective, and relational disturbance). Following a body of empirical research demonstrating a quantitative (9) and qualitative (10) distinction between PTSD and cPTSD, the most recent International Classification of Diseases (11th Edition; ICD-11, 1) has recognised cPTSD as a separate, sibling diagnosis to PTSD (11). This includes the symptoms of PTSD as above, alongside other symptoms collectively referred to as ‘disturbances of self-organisation’ (DSOs), including negative self-concept, emotional dysregulation and interpersonal difficulties. Prior studies indicate that core PTSD symptoms may be more severe in people with

cPTSD (12,13), that cPTSD is associated with increased burden (14), and requires disparate treatment approaches to PTSD (15).

Complex trauma histories are highly common among people with schizophrenia spectrum conditions (16), with meta-analyses consistently implicating trauma as an aetiological factor in psychosis (17–19). Trauma exposure may lead to symptoms of PTSD – namely, re-experiencing and memory intrusions – that may be appraised as anomalous experiences (e.g., hearing insults or phrases of past abusers appraised as an external voice in the present moment) (20). Systematic reviews have indicated that PTSD symptoms mediate the relationship between trauma and psychosis (21–23). Despite consistent evidence of the involvement of PTSD symptoms in the pathway between trauma and psychosis, there are no studies to our knowledge investigating the potential role of cPTSD.

The involvement of these additional post-traumatic sequelae in the trauma-psychosis relationship is plausible, considering previous studies which considered similar mediators. Systematic reviews have shown that emotion dysregulation, negative thoughts about the self and interpersonal difficulties mediate the relationship between trauma and psychosis (21–23). Meta-analytic evidence is concordant with these findings, showing that emotion dysregulation, negative self-concept and attachment difficulties predict specific psychotic symptoms following trauma exposure (24). Further plausibility for the role of cPTSD in the pathway from trauma to psychosis stems from repeated childhood trauma, an risk factor for cPTSD (25) that is highly common among those with psychosis (16). Similarly, PTSD is highly comorbid with psychosis (26,27), moderating treatment outcomes and reducing quality of life (28,29). This requires replication in a psychosis sample to inform assessment and intervention.

Negative symptoms of psychosis remain largely unexplained by PTSD. Strauss et al. (2011) found those meeting criteria for deficit schizophrenia (i.e., negative symptoms related to the illness itself lasting longer than 12 months; 29) were at lower risk of PTSD than those displaying secondary negative symptoms. Consistently, subsequent meta-analytic evidence (32) has found small, non-

significant effects of trauma-focused cognitive-behavioural therapies on negative symptoms. Together, these findings suggest PTSD symptoms may not mediate the relationship between trauma and negative psychotic symptoms. DSOs may, however, play a role in this relationship as opposed to PTSD, owing to their apparent clinical similarity with certain negative symptoms. For instance, DSOs may present as emotional numbing and anhedonia (25,33) as well as social withdrawal (34), consistent with negative symptom presentations in psychosis. The limited evidence-based interventions for negative symptoms and their associated burden (35) makes this mediation hypothesis worth exploring.

Psychotic symptomatology is not restricted to positive and negative domains. Affective difficulties are also common in people with psychosis, with anxiety and major depressive disorders affecting up to 1 in 3 people at their first episode (36). Systematic reviews suggest that these difficulties correlate with psychotic symptom severity, distress and content (37), and decrease quality of life (38), making affective problems key targets in psychological interventions for psychosis. PTSD is associated with a greater risk of anxiety and depression (39), and cPTSD even more so (40). Hence, post-traumatic sequelae may play a maintaining role in affective difficulties among people with psychosis.

Other symptom domains of psychosis have also been identified; namely, cognitive and excitative difficulties. PTSD symptoms do not correlate with cognitive difficulties in people with psychosis (41,42). However, those with an alleged neurodevelopmental predisposition to psychosis may be at greater risk of childhood victimization, especially bullying from peers (43). Thus, this pathway may interact with a trauma pathway to psychosis. The positive/negative symptom solutions typically used in the scoring of the PANSS may not capture such cognitive difficulties; factor analytic studies have identified a more complex underlying structure to the PANSS comprising positive, negative, cognitive, affective and excitative symptoms (44–46). Therefore, it is possible that post-traumatic sequelae more complex than PTSD – i.e., cPTSD – may lead to nuanced psychotic symptoms, such as cognitive/excitative symptoms. Given that adults with PTSD following childhood maltreatment scored significantly higher on cognitive dysfunction than those without such experiences (47), and also given that cPTSD is often associated with prolonged, repeated traumatic experiences during

childhood, it is plausible that cPTSD may incur greater cognitive consequences than PTSD. Preliminary findings support this hypothesis, demonstrating that childhood trauma is linked to subjective and objective cognitive difficulties among people with psychosis, including working memory and attention (48,49). Therefore, it is possible that DSOs rather than core PTSD symptoms may contribute to explaining cognitive and/or excitative symptoms of psychosis.

This study aimed to describe rates of cPTSD and PTSD in a trauma-exposed sample of people with psychosis, assess clinical differences in symptom severity between trauma groups, and explore the relative contribution of cPTSD via PTSD and DSOs in explaining the relationship between trauma and psychotic symptoms. Using a parallel mediation framework (illustrated in Figure 1), we tested separate mediational models to test whether PTSD and DSO symptoms mediated between trauma and positive, negative, affective, cognitive and excitative symptoms.

2 METHOD

2.3 Study design

This study employed a correlational design, combining data collected from a feasibility randomised controlled trial testing the feasibility and acceptability of a Eye-Movement Desensitisation and Reprocessing for psychosis intervention (the EASE trial) (57), and a previous research project within the University of Manchester Complex Trauma & Resilience Research Unit (58). Both samples were recruited from North West of England mental health services with ethical approval received from an National Health Service (NHS) research ethics committee.

2.4 Participants

This study employed the baseline sample of the EASE trial (n = 66) and the full sample recruited by Capodonico and colleagues (n = 85), thus N = 151.

The inclusion criteria for the parent studies are reported in full elsewhere (57,58). Generally, these included adults with a schizophrenia-spectrum diagnosis (or who met diagnostic criteria), that were registered with local NHS mental health services, and had capacity to provide informed consent at the time of recruitment. Exclusion criteria for both studies were requirement of an interpreter, a primary diagnosis of substance misuse, intellectual disability or gross cognitive dysfunction.

In addition to those set out by the parent studies, inclusion criteria for this study included endorsement of at least one traumatic life event on the Trauma and Life Events checklist (TALE; 33), with International Trauma Questionnaire (60) scores anchored to traumas identified by the TALE. Participants must also have completed the Positive and Negative Syndrome Scale (61).

2.5 Measures

The Positive and Negative Syndrome Scale (PANSS; 47) is a 30-item semi-structured clinical interview used to measure psychotic symptoms and general psychopathology. Items are scored on a Likert scale from 1 ('Absent') to 7 ('Extreme'), with higher scores indicating more severe symptoms. This study employed a pentagonal model of the PANSS, in accordance with factor analytic evidence (44,45). This is comprised of 5 factors: positive, negative, cognitive (measuring cognitive disorganization), affective (measuring anxiety and depression) and excitative (measuring activity and hostility); see Supplementary Table 1. Cronbach's α in this sample for these subscales were good, ranging from .73 to .83, aside from the negative subscale, where α = .66. This is comparable to prior research (62). All PANSS interviews were administered by trained and supervised research assistants/workers who completed thorough reliability assessments against 'gold standard' scores produced by expert PANSS raters. Raters across datasets demonstrated excellent inter-rater reliability with 'gold standard' scores, with baseline intra-class correlation coefficients (ICCs) ranging from .86 to .94 in the EASE dataset, and .90 in the Campodonico dataset.

The Trauma and Life Events Questionnaire (TALE; 33) is a 22-item self-report checklist assessing traumatic and difficult life experiences. Each event is scored for its occurrence, whether this was more than once, and whether this occurred when the participant was under/over 16 or both. The

number of traumas endorsed is summed to derive a traumatic experiences score. The TALE demonstrates good test-retest reliability and convergent validity with related trauma measures (33).

The International Trauma Questionnaire (ITQ; 46) is an 18-item self-report scale assessing the presence and severity of PTSD and DSOs within the past month. Items are administered in relation to an index trauma identified on the TALE as affecting the individual most in the past month. PTSD and DSO subscales are each comprised of 3 symptom clusters, themselves comprised of 2 items each. Both subscales include 3 additional items measuring functional impairment associated with the symptoms captured by each subscale. All items are scored on a 5-point Likert scale from 0 ('Not at all') to 4 ('Extremely'). As per the ITQ diagnostic algorithm, a probable diagnosis of PTSD is identified when a participant presents with a score of 2 or more on at least one item in each PTSD cluster, plus a score of 2 or more on at least one functional impairment item associated with these symptoms. The cPTSD threshold includes that of PTSD, as well as a score of 2 or more on at least one item in each DSO cluster, plus a score of 2 or more on at least one functional impairment item associated with these symptoms. PTSD and DSO items were totaled to derive continuous severity scores, with higher scores indicating higher severity. Scores within each DSO cluster were summed to derive continuous DSO scores for use in planned secondary analyses. Both PTSD and DSO subscales demonstrated high internal consistency in this sample (α = .83 and .87, respectively).

2.6 Procedures

Participants were first introduced to either parent study by members of their clinical teams, and signposted to the research team, if interested in participating. Participants then met with a researcher for more information about the relevant study at a mutually convenient location or a digital meeting (during the COVID-19 pandemic in affected periods of the EASE trial). Information sheets were then provided, and informed consent taken. Following informed consent, participants completed a battery of measures that included the PANSS, TALE and ITQ, in addition to other measures (see (57,58).

2.7 Data analysis

Diagnostic algorithms outlined above were applied to ITQ scores to group participants into those who met criteria for PTSD, cPTSD or neither. Independent samples t-tests were then used to explore mean differences in psychotic symptoms scores between these trauma groups. Correlation, regression and finally mediation analyses were used to examine the role of PTSD and DSO symptoms in the relationship between trauma and symptom dimensions. The Baron and Kenny (1986) requirement for the presence of a significant direct effect was used here as a conservative option to indicate subsequent mediation analyses, to minimize Type I error.

Out of 151 participants available from the parent studies, 144 people met inclusion criteria for this study. No cases were identified as multivariate outliers per Mahalanobis (64), Cook's (65) or Leverage analyses of distance. The data were then checked for normality and homoscedasticity; both assumptions were met per Curran and colleagues' criteria (66).

Within this dataset, less than 20% of the data were missing. Little's MCAR test was not significant, $\chi 2 = 257.59(251)$, $p = .37$, suggesting the data were missing at random. Thus, the missing scores were imputed where possible. Eight participants were missing PANSS scores on specific items likely obfuscated by remote assessments in the EASE trial; these participants were excluded from analyses involving these items. Where one of the two scores on an ITQ symptom was missing, this was imputed with the score on the other item. Where an ITQ functional impact score was missing, this was imputed with the mean of the other two available scores. One participant chose not to respond to one item on the TALE; this was not imputed, as trauma checklists are likely not missing at random. Then, specific items were summed to derive continuous TALE, PTSD, DSO, and PANSS subscale scores.

Twenty-four participants in the EASE trial completed their assessments remotely due to the COVID-19 lockdown restrictions on face-to-face working. This impacted the confidence of negative PANSS ratings reliant on factors more easily observed in person (e.g., gesticulation). Analyses were rerun with these participants excluded (n = 120), to check the validity of the full dataset. This did not affect

the outcomes of the study. As such, the following findings are in relation to the full combined sample.

To capture potential confounding differences between parent datasets, dataset membership was entered as a covariate in our analyses. This did not affect the outcomes of PANSS-negative or -affective analyses. As such, the analyses of these outcomes reported below do not include covariates. Dataset did, however, change the outcomes of analyses of PANSS-positive scores. Thus, the analyses thereof include dataset as a covariate. Bonferroni-corrected independent samples *t*-tests and bivariate Pearson correlations were used to assess the role of gender and age, respectively, as potential covariates. The only significant finding was a small, positive correlation between PANSS-cognitive scores and age ($r = .19$, $p = .027$). Age would therefore be included in analyses of PANSS-cognitive scores, but these were not indicated by bivariate correlations (see below).

3 RESULTS

3.3 Descriptive statistics

Demographic and clinical characteristics were aggregated across datasets, reported in Table 1. Participants reported a mean of 9.7 traumatic life experiences on the TALE. The most common experiences endorsed were loss or permanent separation from a close friend or relative (81%), bullying (70%), emotional (66%) and physical (62%) abuse.

3.4 The frequency of cPTSD

The ITQ diagnostic algorithm was applied to ITQ scores of the sample to delineate groups of participants meeting ICD-11 criteria for PTSD and cPTSD. Among those who met criteria for a post-traumatic stress diagnosis (50.7%), cPTSD was far more common (40.3%) than PTSD (10.4%).

3.5 Symptom severity between trauma group

A between-subjects MANOVA found a significant overall trauma diagnosis group differences across PANSS subscales ($F_{10, 252} = 4.702$, $p < .001$, Wilk's $\Lambda = .710$). Follow-up univariate ANOVAs detected significant differences on positive ($F_2 = 6.02$, $p = .003$, $\eta_p^2 = .09$), negative ($F_2 = 5.94$, $p = .003$, $\eta_p^2 = .08$) and affective ($F_2 = 17.16$, $p < .001$, $\eta_p^2 = .21$) PANSS subscales. No significant differences among cognitive ($F_2 = 1.30$, $p = .276$, $\eta_p^2 = .02$) or excitative ($F_2 = 6.14$, $p = .345$, $\eta_p^2 = .02$) subscales were observed. Post-hoc Tukey's tests were used to investigate significant differences between groups. These suggested that positive symptoms were significantly higher among those meeting criteria for cPTSD ($M = 16.86$, $SD = 3.93$) than those who met criteria for neither cPTSD nor PTSD ($M = 13.93$, $SD = 5.13$), as were negative symptoms (cPTSD: $M = 15.41$, $SD = 5.40$; none: $M = 12.66$, $SD = 4.21$). Affective symptoms were significantly higher among those meeting criteria for cPTSD ($M = 17.51$, $SD = 4.22$) compared to those meeting criteria for PTSD ($M = 13.86$, $SD = 3.59$) or neither ($M = 12.40$, $SD = 5.26$).

Another between-subjects MANOVA was used to assess differences among PTSD, DSO and TALE scores. This was also significant ($F_{6, 264} = 27.16$, $p < .001$, Wilk's $\Lambda = .38$). Follow-up univariate ANOVAs showed significant differences between PTSD ($F_2 = 72.80$, $p < .001$, $\eta_p^2 = .52$), DSO ($F_2 = 26.89$, $p < .001$, $\eta_p^2 = .29$) and TALE scores ($F_2 = 14.95$, $p < .001$, $\eta_p^2 = .18$). Post-hoc Tukey's tests were used in an attempt to replicate prior findings of PTSD symptom severity in people with cPTSD. PTSD scores were significantly higher among those meeting criteria for PTSD ($M = 15.93$, $SD = 4.42$) and cPTSD ($M = 18.66$, $SD = 3.98$) than those who did not meet criteria ($M = 8.09$, $SD = 5.32$). DSO scores were significantly higher among those meeting criteria for cPTSD ($M = 18.98$, $SD = 3.60$) than those meeting criteria for PTSD ($M = 9.80$, $SD = 4.90$) or neither ($M = 11.90$, $SD = 7.06$). Lastly, TALE scores were significantly higher among those meeting criteria for cPTSD ($M = 11.61$, $SD = 2.93$) than those meeting PTSD criteria ($M = 8.93$, $SD = 3.73$) or neither ($M = 8.39$, $SD = 3.57$).

3.6 Hierarchical Regressions

Bivariate Pearson correlations are presented in Table 1. These did not indicate a need for further regressions on excitatory subscales, as no significant relationships were observed with predictor variables. Hierarchical regressions were then used to assess whether DSO scores predicted positive,

negative, cognitive and affective PANSS scores, and whether these associations survived the addition of PTSD scores as a covariate (see Table 2 for coefficients). As neither PTSD nor DSOs were significant predictors of negative or cognitive subscale scores, exploratory mediation analyses were only assessed for positive and affective subscales.

3.7 Mediation analyses

3.7.1 Positive symptoms

Exploratory parallel mediation analyses were conducted via the SPSS PROCESS macro (model 4; 40) to assess whether PTSD and/or DSOs mediate the relationship between TALE and positive PANSS scores, including dataset as a covariate. TALE scores significantly predicted PTSD (b = .597, t_{137} = 3.989, p < .001, 95% CI [.349, .845]) and DSOs (b = .530, t_{137} = 3.648, p < .001, 95% CI [.290, .771]). Dataset also significantly predicted both PTSD (b = -3.463, t_{137} = -3.097, p = .002, 95% CI [-5.315, -1.611]) and DSOs (b = -4.008, t_{137} = -3.689, p < .001, 95% CI [-5.807, -2.209]). When controlling for PTSD, DSOs and dataset, TALE scores no longer predicted positive PANSS scores (b = .144, t_{135} = 1.338, p = .183, 95% CI [-.034, .321]). Both PTSD (b = .240, t_{135} = 3.650, p < .001, 95% CI [.131, .349]) and DSO scores (b = .143, t_{135} = 2.118, p = .036, 95% CI [.031, .255]) significantly mediated the relationship between TALE scores and positive PANSS scores. Dataset significantly predicted positive PANSS scores (b = 1.770, t_{135} = 2.235, p = .027, 95% CI [.458, 3.082]). Regression statistics are presented in Table 3, and results displayed graphically in Figure 2.

3.7.2 Affective symptoms

A similar mediation analysis was conducted to assess whether PTSD and DSOs mediate the relationship between TALE and affective PANSS scores. TALE scores significantly predicted PTSD (b = .711, t_{132} = 3.998, p < .001, 95% CI [.464, .958]) and DSOs (b = .649, t_{132} = 4.375, p < .001, 95% CI [.403, .895]). When controlling for PTSD and DSOs, TALE scores no longer predicted positive PANSS scores (b = .086, t_{130} = .840, p = .403, 95% CI [-.084, .257). PTSD scores significantly mediated the relationship between TALE scores and positive PANSS scores (b = .212, t_{130} = 3.342, p = .001, 95% CI [.107, .317]), as did DSO scores (b = .328, t_{130} = 5.139, p < .001, 95%

CI [.222, .434]). Regression statistics are presented in Table 3, and results displayed graphically in Figure 3.

4 DISCUSSION

To the authors' knowledge, this is the first study to investigate the frequency and correlates of cPTSD in a trauma-exposed sample of people with psychosis. A higher proportion of the sample met criteria for cPTSD than PTSD. The results suggest that participants meeting criteria for cPTSD presented with significantly higher positive, negative and affective symptoms than those who did not meet criteria for a trauma diagnosis. These did not differ from those meeting criteria for PTSD, aside from affective symptoms, which were significantly higher in the cPTSD group.

The frequency of cPTSD in our sample may suggest that PTSD symptoms in psychosis occur in the context of cPTSD. In this sense, our mediation models may hint at the role of cPTSD in the trauma-psychosis pathway. Consistent with hypotheses, PTSD and DSO symptoms mediated the relationship between trauma and positive symptoms. Of note, the DSO path became significant following the inclusion of dataset as a covariate. The mediation analyses were rerun in each dataset to tentatively investigate the validity of this effect; the coefficients of the DSO path closely resembled that of the adjusted, pooled analysis reported above, though these did not reach statistical significance in either dataset. This pattern of results suggests the samples of each parent dataset were inadequately powered to test these multivariate models individually. This preserves the validity of our results, but clearly requires further replication in larger samples. Also as hypothesized, both PTSD and DSOs were found to mediate the relationship between trauma and affective symptoms. However, significant relationships between excitative symptoms, PTSD and DSOs were not observed, and neither PTSD nor DSOs significantly predicted negative or cognitive symptoms, contraindicating further regression and mediation analyses.

Our main aim of assessing how common cPTSD is relative to PTSD in a trauma-exposed sample of people with psychosis was met. The considerable proportion of participants meeting criteria for cPTSD is consistent with prior research demonstrating the prevalence of difficulties consistent with

DSOs among those with psychosis (22,23,68). The finding that cPTSD may be more common than PTSD is consistent with other clinical samples (e.g., 11,34,42). This may be unsurprising, considering the prevalence of complex interpersonal trauma in this population, thought to underpin cPTSD (see (25). We did not replicate prior findings of increased PTSD symptom severity in people meeting cPTSD (12,13) criteria, though our descriptive statistics between groups hint at these findings in larger samples of people with psychosis. These results demonstrate the importance of trauma-informed approaches to assessment and treatment of those with psychosis, owing to the potentially high prevalence of cPTSD that larger epidemiological studies could confirm. Again, this could contextualize the reliability of PTSD mediating the trauma-psychosis relationship in terms of cPTSD, with specific symptoms thereof predicting specific psychotic phenomena. This is consistent with prior findings (24), but requires further empirical investigation.

The second aim of this study exploring the relative contribution of cPTSD via PTSD and DSOs in explaining the relationship between trauma and psychotic symptoms was also met. The finding that PTSD symptoms mediate the relationship between trauma and positive symptoms is consistent with prior systematic reviews (21–23) and meta-analyses (24). Indeed, it may be that re-experiencing symptoms of PTSD underpin positive symptoms in certain psychosis subgroups (70). The finding that DSOs also mediate this is not surprising, owing to the theoretical consistency between these and related constructs previously shown to predict hallucinations and delusions (21,23). Notably, however, the effect size of the PTSD path is almost double that of the DSO path, suggesting the way in which cPTSD may precipitate or maintain positive symptoms may primarily occur via PTSD symptoms, rather than DSOs. This finding could be explained by the sensory phenomenology of re-experiencing symptoms, compared to the psychological phenomenology of DSOs in cognitive and emotional patterns (71), leaving core PTSD symptoms open to interpretation as anomalous experiences (20). That said, re-experiencing symptoms have been shown not to correlate with positive PANSS scores (72). Indeed, recent network analyses have demonstrated that trauma-related beliefs and hypervigilance may be more closely related to positive symptoms of psychosis than re-experiencing symptoms (73). Therefore, it may be that the complexity of trauma histories among those with cPTSD lead to trauma beliefs dissimilar to those with PTSD that predict positive symptoms. However, qualitative (10) and quantitative (74) research suggests that trauma-related beliefs among those with cPTSD are similar to those with PTSD. The present study therefore requires

replication to assess the reliability of these findings, to further delineate the mechanism by which DSOs may impact psychotic symptoms.

Our findings suggest that cPTSD may underpin the affective difficulties among people with psychosis. This would be unsurprising, considering cPTSD is more strongly correlated with anxiety and depressive disorders than PTSD (75,76). Affective difficulties (i.e., anxiety and depressive disorders) are highly comorbid with psychosis (27). Prospective studies suggest anxiety and depression mediate the relationship between childhood victimisation and adolescent psychotic-like experiences (77), consistent with the affective pathway to psychosis (78). Affective difficulties may also maintain psychoses, posing a higher risk of maladaptive appraisals and behavioural responses to psychotic experiences that perpetuate the experience (79). Together with our findings, this literature could imply an aetiological or maintaining role of cPTSD in the affective pathway to psychosis. This requires exploration in longitudinal studies, which could indicate the adjustment of trauma-focused cognitive behaviour therapy for psychosis to account for cPTSD symptoms. Considering our model clustered DSOs together, such research may investigate symptom-specific relationships between cPTSD and psychosis to uncover finer mechanisms for therapeutic targets. These were not explored here following considerations of statistical power.

The small correlation between negative symptoms of psychosis and all trauma-related variables is consistent with the literature. Meta-analytic evidence has found no relationship between childhood trauma and negative symptoms (80), and that TF-CBT may not lead to significant improvements in this domain (32). Whilst reliable, these findings seem at odds with the consistency between negative and post-traumatic sequelae (e.g., interpersonal difficulties and social withdrawal, (34)), as well as recent network analyses demonstrating paths between specific adverse childhood experiences and negative symptoms (81). Negative symptoms may be divided conceptually into experiential and expressive subgroups (82); it may be that the PANSS score does not reflect this complexity that is captured by, for instance, the Scale for the Assessment of Negative Symptoms (83). Similar arguments may be applied to the measurement of positive symptoms in this study, considering experiences such as hallucinations and delusions were collapsed into a single score, despite research

demonstrating specific trauma pathways to each (24,70). Future studies may therefore adopt a symptom-specific approach to assess whether and how trauma and post-traumatic sequelae may predict specific psychotic symptoms. Prior studies have also shown no relationship between cognitive or excitative symptoms and PTSD (41,42); our findings are consistent with these. It is outlined above that high cognitive/excitative symptoms may reflect a subgroup of individuals experiencing psychosis via a neurodevelopmental pathway. Whilst atypical neurodevelopment may pose a risk for childhood victimization, this may not necessarily incur post-traumatic symptomatology (43). This further demonstrates the importance of assessing for trauma-related difficulties in psychosis, to inform whether said difficulties are incorporated into formulations and treatment plans.

A number of methodological limitations should be noted. For instance, the relatively small number of participants meeting criteria for PTSD may have reduced statistical power – G*Power analyses indicate an achieved power of 0.4 in the comparison of positive symptoms between trauma groups, far below the acceptable 0.8 (84). Our finding that those meeting criteria for neither PTSD nor cPTSD significantly differed in psychotic symptoms to those meeting cPTSD criteria may indicate a stepwise increase in psychotic symptom severity along the spectrum of trauma-related diagnoses. Future research in larger samples may better assess this, to delineate the clinical utility of diagnosing cPTSD separately from PTSD among those with psychosis.

The unidimensional measurement of emotional dysregulation on the ITQ may not represent the complexity of affective difficulties among those with cPTSD. The ITQ currently includes two items – one assessing emotional hyperactivation and the other hypoactivation – that are summed to derive a single emotional dysregulation score, as per ICD-11 guidance (85). Prior studies suggest that a bifactor structure of this DSO reflecting these dimensions - and measured by more items - may provide a better fit (69,86). This would align with research (e.g., 42) demonstrating the specificity of certain traumas with specific affective regulatory difficulties. Further, as a self-report measure, diagnostic categories assigned by the ITQ may not be as valid as, for instance, a structured clinical interview. The ITQ is the only validated psychometric measure of cPTSD, though Lechner-

Meichsner and Steil (2021) propose updates to the Clinician-Administered PTSD Scale to diagnose cPTSD. Perhaps these limitations may be considered in ongoing development of the ITQ.

Our models could not be adjusted for potential clinical confounds. Substance misuse is common among trauma survivors (89) and has been shown to predict psychosis (90), but was unfortunately not measured by the parent datasets. This could arguably act as a covariate in our model, though this is unclear based on prior systematic reviews (21). Another potential confound is dissociation – an associated, but not core, feature of both PTSD and cPTSD that has been shown to mediate the relationship between trauma and psychosis (21,23). Similarly, further exploration of contextual factors (e.g., lack of emotional resources) that may moderate the expression of complex trauma symptoms and their relationships with psychotic outcomes is warranted. Future research controlling for these confounds could elucidate further the relative contribution of cPTSD in explaining the trauma-psychosis relationship.

Owing to the cross-sectional nature of this study, causal interpretations of our model should be very tentative. The possibility of reverse causation from positive and/or affective symptoms to PTSD and DSOs cannot be completely discounted, though previous prospective studies make this unlikely (91). Paradigms focused on finer-grained measurement of cPTSD and psychosis may prove fruitful in future research refining these models. One paradigm - ecological sampling methods (ESM) – may address both questions, enabling a fine-grained assessment of whether DSOs and psychosis interact in the flow of daily life. One study (92) found emotion regulation predicted psychosis symptoms in daily life, despite no association between retrospective measures of the same variables, demonstrating the utility of ESM in overcoming common methodological limitations (e.g., recall bias).

The sample may constitute a limitation of this study. For one, it is predominantly white. The prevalence of psychosis in minority ethnic groups (93) coupled with the trauma of systemic racial discrimination could mean psychotic symptoms and DSOs interact differently in minoritised groups

than in their white counterparts. Indeed, systemic racism may decrease self-concept clarity (94), known to be common in people with psychosis (95) building the plausibility of this argument. Future research into this area may explore the generalisability of these findings to black and minority ethnic populations; such research may have implications for sociodevelopmental pathways to psychosis (see (96). Including those with affective psychosis may pose a further limitation of this sample, considering biological sequelae robustly mediate the relationship between trauma and bipolar disorder, as opposed to symptoms of post-traumatic stress (97). This heterogeneity may have diluted the effects of cPTSD in this sample. However, diagnoses were not collected using gold-standard tools. They were validated with clinical services and medical notes, though exact confounding effects are therefore difficult to determine. Future studies into the impact of cPTSD in psychosis may choose to focus specifically on non-affective psychosis samples to avoid such effects.

Our findings suggest a potentially nuanced impact of cPTSD in people with psychosis. Rates of cPTSD in our sample suggest that the 'core' symptoms of PTSD (i.e., re-experiencing, hyperarousal and avoidance) mostly occur in the context of cPTSD, impacting or maintaining positive symptoms. Both symptom domains of cPTSD (i.e., PTSD and DSOs) may play a role in the maintenance of positive symptoms and affective difficulties (i.e., anxiety and depression) among people with psychosis. Therefore, whilst trauma-focused interventions may be effective at addressing symptoms of trauma and psychosis in people with psychosis (98), a broader range of treatment options may need to be developed to address DSO-related difficulties. For example, dialectic behavioural skills training, demonstrated as most effective when used as an adjunct therapy (99) and more effective for cPTSD than cognitive processing therapy (100). In any case, diagnostic criteria on the ITQ require a functional impact of DSOs in at least one domain, demonstrating an increased treatment need among those with psychosis and comorbid cPTSD. Future research testing the reliability of our findings in larger, more representative samples may therefore have important assessment and treatment implications as trauma-informed care becomes the norm in psychosis services. Such research could employ intense longitudinal designs and adjust for potential confounds to further refine our models.

4.3 Conclusions

This is the first study to the authors' knowledge investigating the frequency of cPTSD in a trauma-exposed psychosis sample. In accordance with prior research, cPTSD was more common than PTSD in this sample, comprised of both early and chronic psychosis presentations. The functional impairment required to meet cPTSD criteria, as well as the potentially maintaining role cPTSD in positive and affective psychotic symptoms, demands further research into the impact of this comorbidity. This impact may be more nuanced than first thought, with symptom-specific relationships affecting individuals in different ways. Future research may investigate the relationship between symptoms of cPTSD and psychosis at a momentary level, to assess this potentially dynamic interplay between cPTSD and psychosis, as well as the reliability of these results.

5 Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

6 Author Contributions

PP, FV, KB and WS contributed to the conception and design of the study. FV, WS, CC and RPB were involved in collecting the data. PP analysed the data, and wrote the first draft of the manuscript. FV, KB, WS and RPB contributed to the final draft of the manuscript. All authors contributed to the article and approved its submission.

7 Funding

This study was conducted as part of the first authors' PhD, funded by the North West Social Sciences Doctoral Training Partnership.

The EASE trial is funded by the National Institute for Health Research (NIHR) Research for Patient Benefit programme (award no. PB-PG-0317-20037). The views expressed are those of the authors and not necessarily those of the NIHR or the Department of Health and Social Care.

8 Data Availability Statement

The datasets analysed for this study are not available due to the sensitivity of the dataset and participant confidentiality.

REFERENCES

1. World Health Organisation. International Classification of Diseases-11. 11th ed. 2019.

2. Lewis SJ, Arseneault L, Caspi A, Fisher HL, Matthews T, Moffitt TE, et al. The epidemiology of trauma and post-traumatic stress disorder in a representative cohort of young people in England and Wales. The Lancet Psychiatry [Internet]. 2019 Mar 1 [cited 2021 Jun 17];6(3):247–56. Available from: www.thelancet.com/psychiatry

3. Ryder AL, Azcarate PM, Cohen BE. PTSD and Physical Health [Internet]. Vol. 20, Current Psychiatry Reports. Current Medicine Group LLC 1; 2018 [cited 2021 Jun 17]. Available from: https://pubmed.ncbi.nlm.nih.gov/30367276/

4. Gradus JL. Prevalence and prognosis of stress disorders: A review of the epidemiologic literature. Clin Epidemiol [Internet]. 2017 May 3 [cited 2021 Jun 17];9:251–60. Available from: /pmc/articles/PMC5422316/

5. Balayan K, Maria K, Tobia G, Postolova A, Peek H, Akopyan A, et al. The impact of posttraumatic stress disorder on the quality of life: A systematic review. Int Neuropsychiatr Dis J. 2014;2(5):213–33.

6. Pagotto LF, Mendlowicz MV, Coutinho ESF, Figueira I, Luz MP, Araujo AX, et al. The impact of posttraumatic symptoms and comorbid mental disorders on the health-related quality of life in treatment-seeking PTSD patients. Compr Psychiatry [Internet]. 2015 Apr 1 [cited 2021 Jun 17];58:68–73. Available from: https://pubmed.ncbi.nlm.nih.gov/25656798/

7. Association AP. Diagnostic and Statistical Manual of Mental Disorders. 3rd ed. 1980.

8. Herman JL. Complex PTSD: A syndrome in survivors of prolonged and repeated trauma. J Trauma Stress [Internet]. 1992 Jul 1 [cited 2021 Jun 17];5(3):377–91. Available from: https://onlinelibrary.wiley.com/doi/full/10.1002/jts.2490050305

9. Hyland P, Shevlin M, Brewin CR, Cloitre M, Downes AJ, Jumbe S, et al. Validation of post-traumatic stress disorder (PTSD) and complex PTSD using the International Trauma Questionnaire. Acta Psychiatr Scand [Internet]. 2017 Sep 1 [cited 2021 Jun 17];136(3):313–22. Available from: https://pubmed.ncbi.nlm.nih.gov/28696531/

10. Stadtmann MP, Maercker A, Binder J, Schnepp W. Why do i have to suffer? Symptom management, views and experiences of persons with a CPTSD: A grounded theory approach. BMC Psychiatry [Internet]. 2018 Dec 19 [cited 2021 Jun 12];18(1). Available from: https://pubmed.ncbi.nlm.nih.gov/30567517/

11. Karatzias T, Cloitre M, Maercker A, Kazlauskas E, Shevlin M, Hyland P, et al. PTSD and complex PTSD: ICD-11 updates on concept and measurement in the UK, USA, Germany and Lithuania. Eur J Psychotraumatol [Internet]. 2017 [cited 2021 Jun 12];8(sup7):1418103. Available from: /pmc/articles/PMC5774423/

12. Murphy S, Elklit A, Dokkedahl S, Shevlin M. Testing the validity of the proposed ICD-11. PTSD and complex PTSD criteria using a sample from Northern Uganda. Eur J Psychotraumatol [Internet]. 2016 Sep 8 [cited 2021 Jun 17];7. Available from: /pmc/articles/PMC5018065/

13. Wolf EJ, Miller MW, Kilpatrick D, Resnick HS, Badour CL, Marx BP, et al. ICD-11 Complex PTSD in US National and Veteran Samples: Prevalence and Structural Associations with PTSD. Clin Psychol Sci a J Assoc Psychol Sci [Internet]. 2015 Mar 1 [cited 2021 Oct 8];3(2):215. Available from: /pmc/articles/PMC4350783/

14. Cloitre M, Brewin CR, Bisson JI, Hyland P, Karatzias T, Lueger-Schuster B, et al. Evidence for the coherence and integrity of the complex PTSD (CPTSD) diagnosis: response to Achterhof et al., (2019) and Ford (2020). Eur J Psychotraumatol [Internet]. 2020 Dec 31 [cited 2021 Jun 12];11(1):1739873. Available from: /pmc/articles/PMC7170304/

15. UK Psychological Trauma Society. Guideline for the treatment and planning of services for complex post-traumatic stress disorder in adults. McFetridge M, Swan A, Heke S, Karatzias T, Greenberg N, Kitchiner N, et al., editors. 2017.

16. Trauelsen AM, Bendall S, Jansen JE, Nielsen HGL, Pedersen MB, Trier CH, et al. Severity and persistence versus type of childhood adversity in non-affective first-episode psychosis. Schizophr Res [Internet]. 2015 Oct 1 [cited 2021 Jun 12];168(1–2):573–4. Available from: https://pubmed.ncbi.nlm.nih.gov/26144882/

17. Varese F, Smeets F, Drukker M, Lieverse R, Lataster T, Viechtbauer W, et al. Childhood

adversities increase the risk of psychosis: A meta-analysis of patient-control, prospective-and cross-sectional cohort studies. Schizophr Bull [Internet]. 2012 Jun 18 [cited 2021 Jun 12];38(4):661–71. Available from: https://academic.oup.com/schizophreniabulletin/article/38/4/661/1870563

18. Kelleher I, Keeley H, Corcoran P, Ramsay H, Wasserman C, Carli V, et al. Childhood trauma and psychosis in a prospective cohort study: Cause, effect, and directionality. Am J Psychiatry [Internet]. 2013 Jul 1 [cited 2021 Jun 12];170(7):734–41. Available from: https://pubmed.ncbi.nlm.nih.gov/23599019/

19. Bell CJ, Foulds JA, Horwood LJ, Mulder RT, Boden JM. Childhood abuse and psychotic experiences in adulthood: Findings from a 35-year longitudinal study. Br J Psychiatry. 2019;214(3):153–8.

20. Morrison, Frame L, Larkin W. Relationships between trauma and psychosis: A review and integration [Internet]. Vol. 42, British Journal of Clinical Psychology. John Wiley & Sons, Ltd; 2003 [cited 2021 Jun 15]. p. 331–53. Available from: https://bpspsychub.onlinelibrary.wiley.com/doi/full/10.1348/014466503322528892

21. Williams J, Bucci S, Berry K, Varese F. Psychological mediators of the association between childhood adversities and psychosis: A systematic review. Clin Psychol Rev. 2018 Nov;65:175–96.

22. Sideli L, Murray RM, Schimmenti A, Corso M, La Barbera D, Trotta A, et al. Childhood adversity and psychosis: a systematic review of bio-psycho-social mediators and moderators. Psychol Med. 2020 Aug;50(11):1761–82.

23. Alameda L, Rodriguez V, Carr E, Aas M, Trotta G, Marino P, et al. A systematic review on mediators between adversity and psychosis: potential targets for treatment. Psychol Med [Internet]. 2020/08/03. 2020;50(12):1966–76. Available from: https://www.cambridge.org/core/article/systematic-review-on-mediators-between-adversity-and-psychosis-potential-targets-for-treatment/5D46AE296D523352BB317F66E722E23D

24. Bloomfield MAP, Chang T, Woodl MJ, Lyons LM, Cheng Z, Bauer-Staeb C, et al. Psychological processes mediating the association between developmental trauma and specific

psychotic symptoms in adults: a systematic review and meta-analysis. World Psychiatry [Internet]. 2021 Feb 1;20(1):107–23. Available from: https://doi.org/10.1002/wps.20841

25. Cloitre M, Garvert DW, Brewin CR, Bryant RA, Maercker A. Evidence for proposed ICD-11 PTSD and complex PTSD: A latent profile analysis. Eur J Psychotraumatol [Internet]. 2013 [cited 2021 Jun 12];4(SUPPL.). Available from: /pmc/articles/PMC3656217/

26. Achim AM, Maziade M, Raymond É, Olivier D, Mérette C, Roy M-A. How Prevalent Are Anxiety Disorders in Schizophrenia? A Meta-Analysis and Critical Review on a Significant Association. Schizophr Bull [Internet]. 2011 Jul [cited 2021 Aug 3];37(4):811. Available from: /pmc/articles/PMC3122284/

27. Buckley PF, Miller BJ, Lehrer DS, Castle DJ. Psychiatric comorbidities and schizophrenia. Schizophr Bull [Internet]. 2009 May [cited 2021 Jun 12];35(2):383–402. Available from: /pmc/articles/PMC2659306/

28. Grubaugh AL, Zinzow HM, Paul L, Egede LE, Frueh BC. Trauma exposure and posttraumatic stress disorder in adults with severe mental illness: A critical review [Internet]. Vol. 31, Clinical Psychology Review. Clin Psychol Rev; 2011 [cited 2021 Aug 3]. p. 883–99. Available from: https://pubmed.ncbi.nlm.nih.gov/21596012/

29. Hassan AN, De Luca V. The effect of lifetime adversities on resistance to antipsychotic treatment in schizophrenia patients. Schizophr Res [Internet]. 2015 Feb 1 [cited 2021 Aug 3];161(2–3):496–500. Available from: https://pubmed.ncbi.nlm.nih.gov/25468176/

30. Strauss GP, Duke LA, Ross SA, Allen DN. Posttraumatic stress disorder and negative symptoms of schizophrenia. Schizophr Bull [Internet]. 2011 May [cited 2021 Jun 12];37(3):603–10. Available from: /pmc/articles/PMC3080684/

31. Carpenter WT, Heinrichs DW, Wagman AMI. Deficit and nondeficit forms of schizophrenia: The concept. Am J Psychiatry [Internet]. 1988 [cited 2021 Jun 12];145(5):578–83. Available from: https://pubmed.ncbi.nlm.nih.gov/3358462/

32. Brand RM, McEnery C, Rossell S, Bendall S, Thomas N. Do trauma-focussed psychological interventions have an effect on psychotic symptoms? A systematic review and meta-analysis.

Schizophr Res [Internet]. 2018 May 1 [cited 2021 Jun 12];195:13–22. Available from: https://pubmed.ncbi.nlm.nih.gov/28844432/

33. Favrod J, Nguyen A, Tronche AM, Blanc O, Dubreucq J, Chereau-Boudet I, et al. Impact of positive emotion regulation training on negative symptoms and social functioning in schizophrenia: A field test. Front Psychiatry [Internet]. 2019 Jul 1 [cited 2021 Jun 12];10:532. Available from: www.frontiersin.org

34. Griffiths H, McLeod H. Promoting recovery from negative symptoms: An attachment theory perspective. In: Berry K, Bucci S, Danquah AN, editors. Attachment theory and psychosis: Current perspectives and future directions [Internet]. Routledge/Taylor & Francis Group; 2020 [cited 2021 Jun 12]. p. 62–83. Available from: https://psycnet.apa.org/record/2020-09859-004

35. Correll CU, Schooler NR. Negative symptoms in schizophrenia: A review and clinical guide for recognition, assessment, and treatment. Neuropsychiatr Dis Treat [Internet]. 2020 [cited 2021 Jun 12];16:519–34. Available from: https://pubmed.ncbi.nlm.nih.gov/32110026/

36. Wilson RS, Yung AR, Morrison AP. Comorbidity rates of depression and anxiety in first episode psychosis: A systematic review and meta-analysis. Schizophr Res. 2020 Feb 1;216:322–9.

37. Hartley S, Barrowclough C, Haddock G. Anxiety and depression in psychosis: a systematic review of associations with positive psychotic symptoms. Acta Psychiatr Scand [Internet]. 2013 Nov 1 [cited 2021 Sep 22];128(5):327–46. Available from: https://onlinelibrary.wiley.com/doi/full/10.1111/acps.12080

38. Nevarez-Flores AG, Sanderson K, Breslin M, Carr VJ, Morgan VA, Neil AL. Systematic review of global functioning and quality of life in people with psychotic disorders. Epidemiol Psychiatr Sci [Internet]. 2019 Feb 1 [cited 2021 Sep 22];28(1):31–44. Available from: https://www.cambridge.org/core/journals/epidemiology-and-psychiatric-sciences/article/abs/systematic-review-of-global-functioning-and-quality-of-life-in-people-with-psychotic-disorders/E443D14142724193384F3B17DD2DAE5F

39. Spinhoven P, Penninx BW, van Hemert AM, de Rooij M, Elzinga BM. Comorbidity of PTSD in anxiety and depressive disorders: Prevalence and shared risk factors. Child Abuse Negl.

2014 Aug 1;38(8):1320–30.

40. Karatzias T, Hyland P, Bradley A, Cloitre M, Roberts NP, Bisson JI, et al. Risk factors and comorbidity of ICD-11 PTSD and complex PTSD: Findings from a trauma-exposed population based sample of adults in the United Kingdom. Depress Anxiety. 2019 Sep 1;36(9):887–94.

41. Lysaker PH, LaRocco VA. The prevalence and correlates of trauma-related symptoms in schizophrenia spectrum disorder. Compr Psychiatry [Internet]. 2008 Jul [cited 2021 Aug 11];49(4):330–4. Available from: https://pubmed.ncbi.nlm.nih.gov/18555051/

42. DeTore NR, Gottlieb JD, Mueser KT. Prevalence and correlates of PTSD in first episode psychosis: Findings from the RAISE-ETP study. Psychol Serv [Internet]. 2021 [cited 2021 Aug 11];18(2):147–53. Available from: https://pubmed.ncbi.nlm.nih.gov/31343188/

43. Liu Y, Mendonça M, Johnson S, O'Reilly H, Bartmann P, Marlow N, et al. Testing the neurodevelopmental, trauma and developmental risk factor models of psychosis using a naturalistic experiment. Psychol Med [Internet]. 2021 Feb 1 [cited 2021 Aug 11];51(3):460–9. Available from: https://pubmed.ncbi.nlm.nih.gov/31813397/

44. Shafer A, Dazzi F. Meta-analysis of the positive and Negative Syndrome Scale (PANSS) factor structure. J Psychiatr Res [Internet]. 2019 Aug 1 [cited 2021 Aug 5];115:113–20. Available from: https://pubmed.ncbi.nlm.nih.gov/31128501/

45. Lim K, Peh OH, Yang Z, Rekhi G, Rapisarda A, See YM, et al. Large-scale evaluation of the Positive and Negative Syndrome Scale (PANSS) symptom architecture in schizophrenia. Asian J Psychiatr. 2021 Aug 1;62:102732.

46. Wallwork RS, Fortgang R, Hashimoto R, Weinberger DR, Dickinson D. Searching for a consensus five-factor model of the Positive and Negative Syndrome Scale for schizophrenia. Schizophr Res [Internet]. 2012 May [cited 2021 Aug 5];137(1–3):246–50. Available from: https://pubmed.ncbi.nlm.nih.gov/22356801/

47. Nakayama M, Hori H, Itoh M, Lin M, Niwa M, Ino K, et al. Possible Long-Term Effects of Childhood Maltreatment on Cognitive Function in Adult Women With Posttraumatic Stress

673 Disorder. Front Psychiatry. 2020 Apr 24;0:344.

674 48. Reinhard MJ, Wolf G, Cozolino L. Using the MMPI to assess reported cognitive disturbances
675 and somatization as a core feature of complex PTSD. J Trauma Dissociation [Internet]. 2010
676 Jan [cited 2021 Sep 22];11(1):57–72. Available from:
677 https://www.tandfonline.com/doi/abs/10.1080/15299730903318475

678 49. Vargas T, Lam PH, Azis M, Osborne KJ, Lieberman A, Mittal VA. Childhood Trauma and
679 Neurocognition in Adults With Psychotic Disorders: A Systematic Review and Meta-analysis.
680 Schizophr Bull [Internet]. 2019 Oct 24 [cited 2021 Dec 18];45(6):1195–208. Available from:
681 https://pubmed.ncbi.nlm.nih.gov/30376115/

682 50. Bechdolf A, Knost B, Kuntermann C, Schiller S, Klosterkötter J, Hambrecht M, et al. A
683 randomized comparison of group cognitive-behavioural therapy and group psychoeducation in
684 patients with schizophrenia. Acta Psychiatr Scand [Internet]. 2004 Jul [cited 2021 Aug
685 11];110(1):21–8. Available from: https://pubmed.ncbi.nlm.nih.gov/15180776/

686 51. Crawford MJ, Killaspy H, Barnes TRE, Barrett B, Byford S, Clayton K, et al. Group art
687 therapy as an adjunctive treatment for people with schizophrenia: multicentre pragmatic
688 randomised trial. BMJ [Internet]. 2012 Feb 28 [cited 2021 Aug 11];344(7847). Available
689 from: https://www.bmj.com/content/344/bmj.e846

690 52. Dobson DJG, McDougall G, Busheikin J, Aldous J. Effects of social skills training and social
691 milieu treatment on symptoms of schizophrenia. Psychiatr Serv [Internet]. 1995 [cited 2021
692 Aug 11];46(4):376–80. Available from: https://pubmed.ncbi.nlm.nih.gov/7788460/

693 53. Farreny A, Aguado J, Ochoa S, Huerta-Ramos E, Marsà F, López-Carrilero R, et al.
694 REPYFLEC cognitive remediation group training in schizophrenia: Looking for an integrative
695 approach. Schizophr Res [Internet]. 2012 Dec [cited 2021 Aug 11];142(1–3):137–44.
696 Available from: https://pubmed.ncbi.nlm.nih.gov/23017827/

697 54. Keefe RSE, Vinogradov S, Medalia A, Buckley PF, Caroff SN, D'Souza DC, et al. Feasibility
698 and Pilot Efficacy Results from the Multi-site Cognitive Remediation in the Schizophrenia
699 Trials Network (CRSTN) Study. J Clin Psychiatry [Internet]. 2012 [cited 2021 Aug
700 11];73(7):1016. Available from: /pmc/articles/PMC3746329/

55. Abdel-Hamid M, Lehmkämper C, Sonntag C, Juckel G, Daum I, Brüne M. Theory of mind in schizophrenia: The role of clinical symptomatology and neurocognition in understanding other people's thoughts and intentions. Psychiatry Res [Internet]. 2009 Jan 30 [cited 2021 Aug 5];165(1–2):19–26. Available from: https://pubmed.ncbi.nlm.nih.gov/19073346/

56. Resnick SG, Bond GR, Mueser KT. Trauma and posttraumatic stress disorder in people with schizophrenia. J Abnorm Psychol [Internet]. 2003 [cited 2021 Aug 11];112(3):415–23. Available from: /record/2003-05990-012

57. Varese F, Sellwood W, Aseem S, Awenat Y, Bird L, Bhutani G, et al. Eye movement desensitization and reprocessing therapy for psychosis (EMDRp): Protocol of a feasibility randomized controlled trial with early intervention service users. Early Interv Psychiatry [Internet]. 2020 [cited 2021 Jun 12]; Available from: https://onlinelibrary.wiley.com/doi/full/10.1111/eip.13071

58. Campodonico C, Berry K, Haddock G, Varese F. Protective Factors Associated With Post-traumatic Outcomes in Individuals With Experiences of Psychosis. Front Psychiatry. 2021 Nov 29;12:2164.

59. Carr S, Hardy A, Fornells-Ambrojo M. The Trauma and Life Events (TALE) checklist: development of a tool for improving routine screening in people with psychosis. Eur J Psychotraumatol [Internet]. 2018 Jan 1 [cited 2021 Jun 12];9(1). Available from: /pmc/articles/PMC6136359/

60. Cloitre M, Shevlin M, Brewin CR, Bisson JI, Roberts NP, Maercker A, et al. The International Trauma Questionnaire: development of a self-report measure of ICD-11 PTSD and complex PTSD. Acta Psychiatr Scand. 2018;138(6):536–46.

61. Kay SR, Fiszbein A, Opler LA. The positive and negative syndrome scale (PANSS) for schizophrenia. Schizophr Bull [Internet]. 1987 [cited 2021 Jun 12];13(2):261–76. Available from: https://pubmed.ncbi.nlm.nih.gov/3616518/

62. Peralta V, Cuesta MJ. Psychometric properties of the Positive and Negative Syndrome Scale (PANSS) in schizophrenia. Psychiatry Res [Internet]. 1994 [cited 2021 Jul 30];53(1):31–40. Available from: https://pubmed.ncbi.nlm.nih.gov/7991730/

729 63. Baron RM, Kenny DA. The Moderator-Mediator Variable Distinction in Social Psychological
730 Research. Conceptual, Strategic, and Statistical Considerations. J Pers Soc Psychol [Internet].
731 1986 Dec [cited 2021 Sep 22];51(6):1173–82. Available from: /record/1987-13085-001

732 64. Mahalanobis PC. On the generalised distance in statistics. Proc Natl Inst Sci India.
733 1936;2(1):49–55.

734 65. Cook RD. Detection of Influential Observation in Linear Regression. Technometrics. 1977
735 Feb;19(1):15.

736 66. Curran PJ, West SG, Finch JF. The Robustness of Test Statistics to Nonnormality and
737 Specification Error in Confirmatory Factor Analysis. Psychol Methods [Internet]. 1996 [cited
738 2021 Jun 12];1(1):16–29. Available from: https://asu.pure.elsevier.com/en/publications/the-
739 robustness-of-test-statistics-to-nonnormality-and-specificati

740 67. Hayes AF. Introduction to Mediation, Moderation, and Conditional Process Analysis: Second
741 Edition: A Regression-Based Approach. 2nd ed. Guilford Press; 2018.

742 68. Beck AT, Himelstein R, Grant PM. In and out of schizophrenia: Activation and deactivation of
743 the negative and positive schemas. Schizophr Res [Internet]. 2019 Jan 1 [cited 2021 Jun
744 12];203:55–61. Available from: https://pubmed.ncbi.nlm.nih.gov/29169775/

745 69. Murphy D, Shevlin M, Pearson E, Greenberg N, Wessely S, Busuttil W, et al. A validation
746 study of the International Trauma Questionnaire to assess post-traumatic stress disorder in
747 treatment-seeking veterans. Br J Psychiatry [Internet]. 2020 Mar 1 [cited 2021 Jun
748 12];216(3):132–7. Available from: https://pubmed.ncbi.nlm.nih.gov/32345413/

749 70. Hardy A. Pathways from trauma to psychotic experiences: A theoretically informed model of
750 posttraumatic stress in psychosis. Front Psychol [Internet]. 2017 May 23 [cited 2021 Jun
751 12];8(MAY):697. Available from: /pmc/articles/PMC5440889/

752 71. Dorrepaal E, Thomaes K, Smit JH, Hoogendoorn A, Veltman DJ, van Balkom AJLM, et al.
753 Clinical Phenomenology of Childhood Abuse-Related Complex PTSD in a Population of
754 Female Patients: Patterns of Personality Disturbance. J Trauma Dissociation [Internet]. 2012
755 May [cited 2021 Jun 12];13(3):271–90. Available from:

https://pubmed.ncbi.nlm.nih.gov/22545563/

72. Hamner MB, Frueh BC, Ulmer HG, Arana GW. Psychotic features and illness severity in combat veterans with chronic posttraumatic stress disorder. Biol Psychiatry. 1999 Apr 1;45(7):846–52.

73. Hardy A, O'Driscoll C, Steel C, Van Der Gaag M, Van Den Berg D. A network analysis of post-traumatic stress and psychosis symptoms. Psychol Med [Internet]. 2020 [cited 2021 Jun 12];1–8. Available from: https://www.cambridge.org/core/journals/psychological-medicine/article/abs/network-analysis-of-posttraumatic-stress-and-psychosis-symptoms/B525649EDB1DA42741E41FDFD602B24B

74. Karatzias T, Shevlin M, Hyland P, Brewin CR, Cloitre M, Bradley A, et al. The role of negative cognitions, emotion regulation strategies, and attachment style in complex post-traumatic stress disorder: Implications for new and existing therapies. Br J Clin Psychol [Internet]. 2018 Jun 1 [cited 2021 Jun 12];57(2):177–85. Available from: https://pubmed.ncbi.nlm.nih.gov/29355986/

75. Hyland P, Shevlin M, Fyvie C, Karatzias T. Posttraumatic Stress Disorder and Complex Posttraumatic Stress Disorder in DSM-5 and ICD-11: Clinical and Behavioral Correlates. J Trauma Stress [Internet]. 2018 Apr 1 [cited 2021 Aug 11];31(2):174–80. Available from: https://pubmed.ncbi.nlm.nih.gov/29577450/

76. Karatzias T, Hyland P, Bradley A, Cloitre M, Roberts NP, Bisson JI, et al. Risk factors and comorbidity of ICD-11 PTSD and complex PTSD: Findings from a trauma-exposed population based sample of adults in the United Kingdom. Depress Anxiety [Internet]. 2019 Sep 1 [cited 2021 Jul 30];36(9):887–94. Available from: https://pubmed.ncbi.nlm.nih.gov/31268218/

77. Fisher HL, Schreier A, Zammit S, Maughan B, Munafò MR, Lewis G, et al. Pathways between childhood victimization and psychosis-like symptoms in the ALSPAC birth cohort. Schizophr Bull [Internet]. 2013 Sep [cited 2021 Aug 11];39(5):1045–55. Available from: https://pubmed.ncbi.nlm.nih.gov/22941743/

78. Myin-Germeys I, van Os J. Stress-reactivity in psychosis: Evidence for an affective pathway

to psychosis. Clin Psychol Rev [Internet]. 2007 May [cited 2021 Aug 11];27(4):409–24. Available from: https://pubmed.ncbi.nlm.nih.gov/17222489/

79. Kuipers E, Garety P, Fowler D, Freeman D, Dunn G, Bebbington P. Cognitive, Emotional, and Social Processes in Psychosis: Refining Cognitive Behavioral Therapy for Persistent Positive Symptoms. Schizophr Bull [Internet]. 2006 Oct [cited 2021 Aug 11];32(Suppl 1):S24. Available from: /pmc/articles/PMC2632539/

80. Bailey T, Alvarez-Jimenez M, Garcia-Sanchez AM, Hulbert C, Barlow E, Bendall S. Childhood trauma is associated with severity of hallucinations and delusions in psychotic disorders: A systematic review and meta-analysis. Schizophr Bull [Internet]. 2018 Aug 20 [cited 2021 Jun 12];44(5):1111–22. Available from: https://pubmed.ncbi.nlm.nih.gov/29301025/

81. Isvoranu AM, Van Borkulo CD, Boyette L Lou, Wigman JTW, Vinkers CH, Borsboom D, et al. A network approach to psychosis: Pathways between childhood trauma and psychotic symptoms. Schizophr Bull [Internet]. 2017 Jan 1 [cited 2021 Jun 12];43(1):187–96. Available from: https://academic.oup.com/schizophreniabulletin/article/43/1/187/2503393

82. Brian Kirkpatrick BK. Developing concepts in negative symptoms: Primary vs secondary and apathy vs expressio. J Clin Psychiatry [Internet]. 2014 [cited 2021 Jun 12];75(SUPPL. 1):3–7. Available from: https://pubmed.ncbi.nlm.nih.gov/24581452/

83. Andreasen NC. The Scale for the Assessment of Negative Symptoms (SANS): Conceptual and theoretical foundations. Br J Psychiatry [Internet]. 1989 [cited 2021 Jun 12];155(NOV. SUPPL. 7):49–52. Available from: https://www.cambridge.org/core/journals/the-british-journal-of-psychiatry/article/abs/scale-for-the-assessment-of-negative-symptoms-sans-conceptual-and-theoretical-foundations/18566559C72FE6F9F39EF33D11BDB284

84. Cohen J. Statistical Power Analysis for the Behavioral Sciences [Internet]. 2nd ed. Statistical Power Analysis for the Behavioral Sciences. Routledge; 1988 [cited 2021 Aug 11]. Available from: https://www.taylorfrancis.com/books/mono/10.4324/9780203771587/statistical-power-analysis-behavioral-sciences-jacob-cohen

85. Maercker A, Brewin CR, Bryant RA, Cloitre M, Van Ommeren M, Jones LM, et al. Diagnosis

and classification of disorders specifically associated with stress: Proposals for ICD-11. World Psychiatry [Internet]. 2013 Oct [cited 2021 Jun 12];12(3):198–206. Available from: https://pubmed.ncbi.nlm.nih.gov/24096776/

86. Ben-Ezra M, Karatzias T, Hyland P, Brewin CR, Cloitre M, Bisson JI, et al. Posttraumatic stress disorder (PTSD) and complex PTSD (CPTSD) as per ICD-11 proposals: A population study in Israel. Depress Anxiety [Internet]. 2018 Mar 1 [cited 2021 Jun 12];35(3):264–74. Available from: https://pubmed.ncbi.nlm.nih.gov/29451956/

87. Bennett DC, Modrowski CA, Kerig PK, Chaplo SD. Investigating the dissociative subtype of posttraumatic stress disorder in a sample of traumatized detained youth. Psychol Trauma Theory, Res Pract Policy [Internet]. 2015 Sep 1 [cited 2021 Jun 12];7(5):465–72. Available from: https://pubmed.ncbi.nlm.nih.gov/26010107/

88. Lechner-Meichsner F, Steil R. A clinician rating to diagnose CPTSD according to ICD-11 and to evaluate CPTSD symptom severity: Complex PTSD Item Set additional to the CAPS (COPISAC). Eur J Psychotraumatol [Internet]. 2021 [cited 2021 Dec 18];12(1). Available from: https://www.tandfonline.com/doi/abs/10.1080/20008198.2021.1891726

89. Ayres TC. Childhood Trauma, Problematic Drug Use and Coping. https://doi.org/101080/0163962520201746132 [Internet]. 2020 [cited 2021 Jul 27];42(5):578–99. Available from: https://www.tandfonline.com/doi/abs/10.1080/01639625.2020.1746132

90. Arseneault L, Cannon M, Poulton R, Murray R, Caspi A, Moffitt TE. Cannabis use in adolescence and risk for adult psychosis: longitudinal prospective study. BMJ [Internet]. 2002 Nov 23 [cited 2021 Jul 27];325(7374):1212–3. Available from: https://www.bmj.com/content/325/7374/1212

91. Pastore A, de Girolamo G, Tafuri S, Tomasicchio A, Margari F. Traumatic experiences in childhood and adolescence: a meta-analysis of prospective studies assessing risk for psychosis. Eur Child Adolesc Psychiatry [Internet]. 2020 [cited 2021 Jun 12]; Available from: https://pubmed.ncbi.nlm.nih.gov/32577908/

92. Kimhy D, Lister A, Liu Y, Vakhrusheva J, Delespaul P, Malaspina D, et al. The impact of emotion awareness and regulation on psychotic symptoms during daily functioning. npj

Schizophr [Internet]. 2020 Dec 1 [cited 2021 Jun 17];6(1):1–7. Available from: https://doi.org/10.1038/s41537-020-0096-6

93. Qassem T, Bebbington P, Spiers N, McManus S, Jenkins R, Dein S. Prevalence of psychosis in black ethnic minorities in Britain: analysis based on three national surveys. Soc Psychiatry Psychiatr Epidemiol [Internet]. 2015 Jul 13 [cited 2021 Jun 12];50(7):1057–64. Available from: /pmc/articles/PMC4464643/

94. Kogan SM, Yu T, Allen KA, Brody GH. Racial Microstressors, Racial Self-Concept, and Depressive Symptoms Among Male African Americans During the Transition to Adulthood. J Youth Adolesc [Internet]. 2015 Apr 1 [cited 2021 Aug 11];44(4):898. Available from: /pmc/articles/PMC4391463/

95. Cicero DC, Martin EA, Becker TM, Kerns JG. Decreased self-concept clarity in people with schizophrenia. J Nerv Ment Dis [Internet]. 2016 [cited 2021 Jun 12];204(2):142–7. Available from: /pmc/articles/PMC4733645/

96. Morgan C, Charalambides M, Hutchinson G, Murray RM. Migration, ethnicity, and psychosis: Toward a sociodevelopmental model. Schizophr Bull [Internet]. 2010 Jul [cited 2021 Jun 12];36(4):655–64. Available from: https://pubmed.ncbi.nlm.nih.gov/20513653/

97. Aas M, Henry C, Andreassen OA, Bellivier F, Melle I, Etain B. The role of childhood trauma in bipolar disorders. Int J Bipolar Disord [Internet]. 2016 Dec 1 [cited 2021 Jun 12];4(1):1–10. Available from: https://pubmed.ncbi.nlm.nih.gov/26763504/

98. Van Den Berg DPG, De Bont PAJM, Van Der Vleugel BM, De Roos C, De Jongh A, Van Minnen A, et al. Prolonged exposure vs eyemovement desensitization and reprocessing vs waiting list for posttraumatic stress disorder in patients with a psychotic disorder: A randomized clinical trial. JAMA Psychiatry [Internet]. 2015 Mar 1 [cited 2021 Aug 11];72(3):259–67. Available from: https://pubmed.ncbi.nlm.nih.gov/25607833/

99. Valentine SE, Bankoff SM, Poulin RM, Reidler EB, Pantalone DW. The Use of Dialectical Behavior Therapy Skills Training as Stand-Alone Treatment: A Systematic Review of the Treatment Outcome Literature. J Clin Psychol [Internet]. 2015 Jan 1 [cited 2021 Jun 12];71(1):1–20. Available from: https://pubmed.ncbi.nlm.nih.gov/25042066/

100. Bohus M, Kleindienst N, Hahn C, Müller-Engelmann M, Ludäscher P, Steil R, et al. Dialectical Behavior Therapy for Posttraumatic Stress Disorder (DBT-PTSD) Compared With Cognitive Processing Therapy (CPT) in Complex Presentations of PTSD in Women Survivors of Childhood Abuse: A Randomized Clinical Trial. JAMA Psychiatry [Internet]. 2020 Dec 1 [cited 2021 Aug 11];77(12):1235–45. Available from: https://jamanetwork.com/journals/jamapsychiatry/fullarticle/2768029

Tables

Table 1. Bivariate Pearson correlations between PANSS subscales and trauma variables

	Positive	Negative	Cognitive	Affective	Excitative	TALE score	PTSD	DSO	*M*	*SD*
Positive	-	.13	.21*	.46**	.12	.26**	.45**	.38**	15.4	4.8
Negative		-	.17	.39**	-.03	.06	.28**	.28**	13.8	4.9
Cognitive			-	.12	.52**	-.09	-.17*	-.15	13.1	4.3
Affective				-	-.05	.32**	.55**	.61**	14.5	5.2
Excitative					-	-.13	-.13	-.10	4.9	2.3
TALE score						-	.38**	.37**	9.7	3.6
PTSD							-	.59**	13.2	6.9
DSO								-	14.5	6.8

Note: PANSS = Positive and Negative Syndrome Scale, TALE = Trauma and Life Events Checklist, PTSD = Post-traumatic Stress Disorder, DSO = Disturbances of Self-Organisation, M = mean, SD = standard deviation.

**Significant at the p < .05 level*

***Significant at the p < .01 level*

881 **Table 2.** Standardised coefficients of hierarchical regressions predicting PANSS scores

Predictor	Positive	Negative	Cognitive	Affective
Step 1				
DSOs	.383**	.284*	-.154	.606**
F	23.737	11.501	3.138	76.773
R^2	.212	.086	.016	.363
Step 2				
DSOs	.178	.184	-.079	.436**
PTSD	.344**	.171	-.125	.295**
ΔF	13.533	2.761	1.349	13.267
ΔR^2	.077	.019	.010	.058

882 *Note: DSOs = Disturbance of Self Organisation; PTSD = Post-Traumatic Stress Disorder*

883 **p* < .01

884 ***p* < .001

885

886

887

888

889

Table 3. Regression statistics for the mediation pathways predicting psychotic symptoms

	Positive symptoms			Affective symptoms		
Path	R^2	F	p	R^2	F	p
a_1	.201	17.274	< .001	.177	27.456	< .001
b_1	.211	18.351	< .001	.139	20.596	< .001
c'	.063	10.496	.001	.097	15.505	< .001
c	.257	11.687	< .001	.224	12.125	< .001

Note: a1 = TALE → PTSD, *a2* = TALE → DSO, *c'* = TALE → PANSS-Positive, *c* = TALE → PTSD + DSO → PANSS-Positive. Positive symptom coefficients include dataset as a covariate.

Figure 1.JPEG

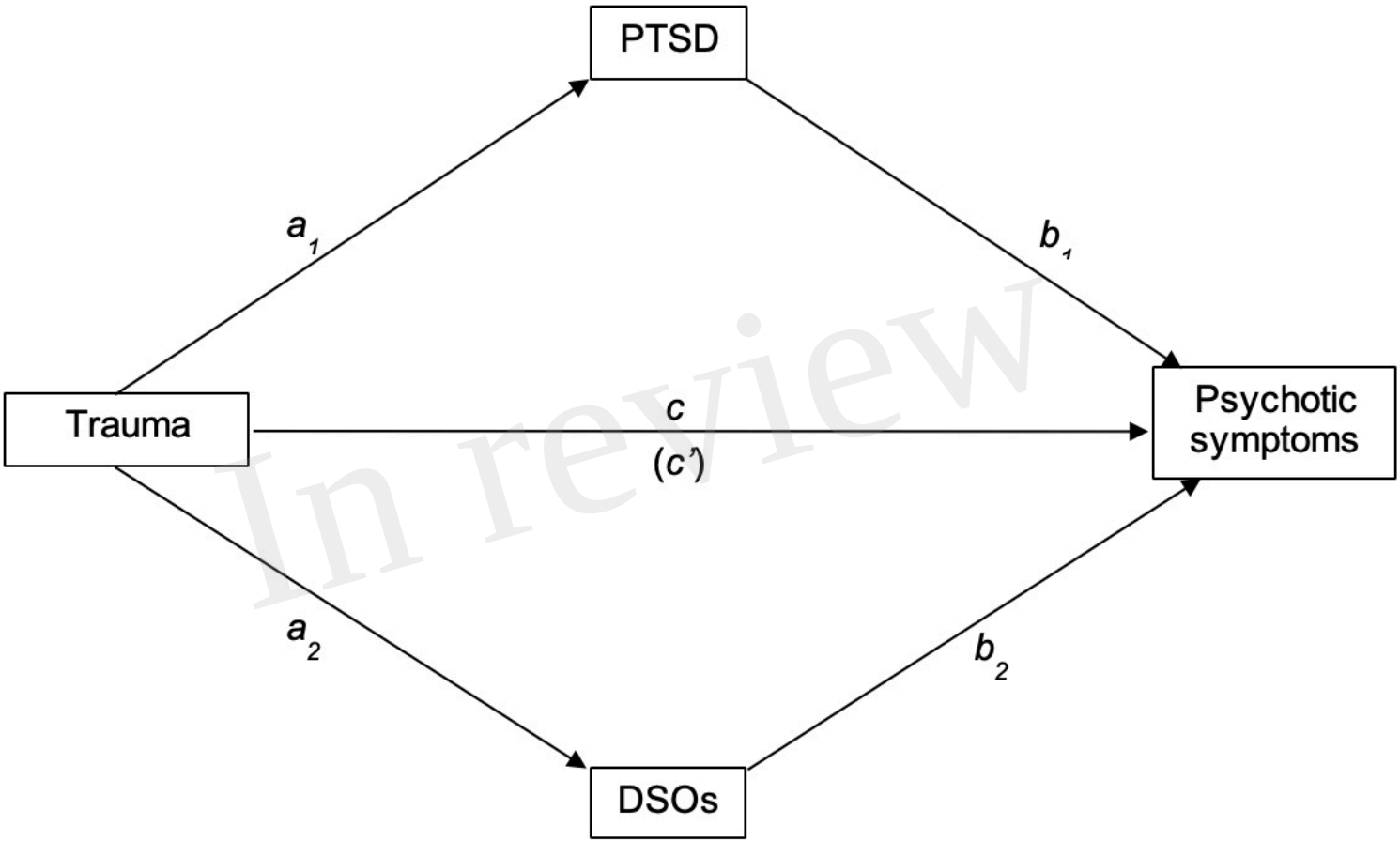

Figure 1. Proposed path of the relationships between trauma, PTSD, DSOs and psychotic symptoms.

Note: PTSD = Post-Traumatic Stress Disorder, DSOs = Disturbances of Self-Organisation

Figure 2.JPEG

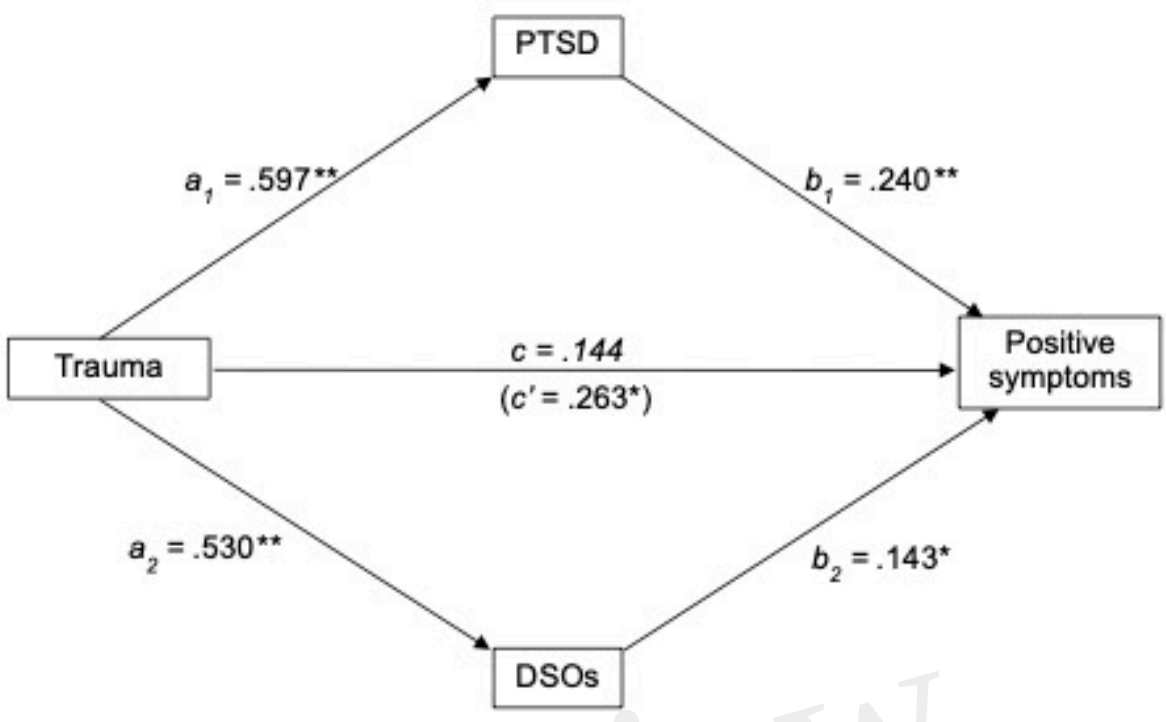

Figure 2. Standardised regression coefficients for the relationship between trauma and positive symptoms, mediated by PTSD and DSOs, including dataset as a covariate.

**$p < .005$

*$p < .05$

Note: PTSD = Post-Traumatic Stress Disorder, DSOs = Disturbances of Self-Organisation

Figure 3.JPEG

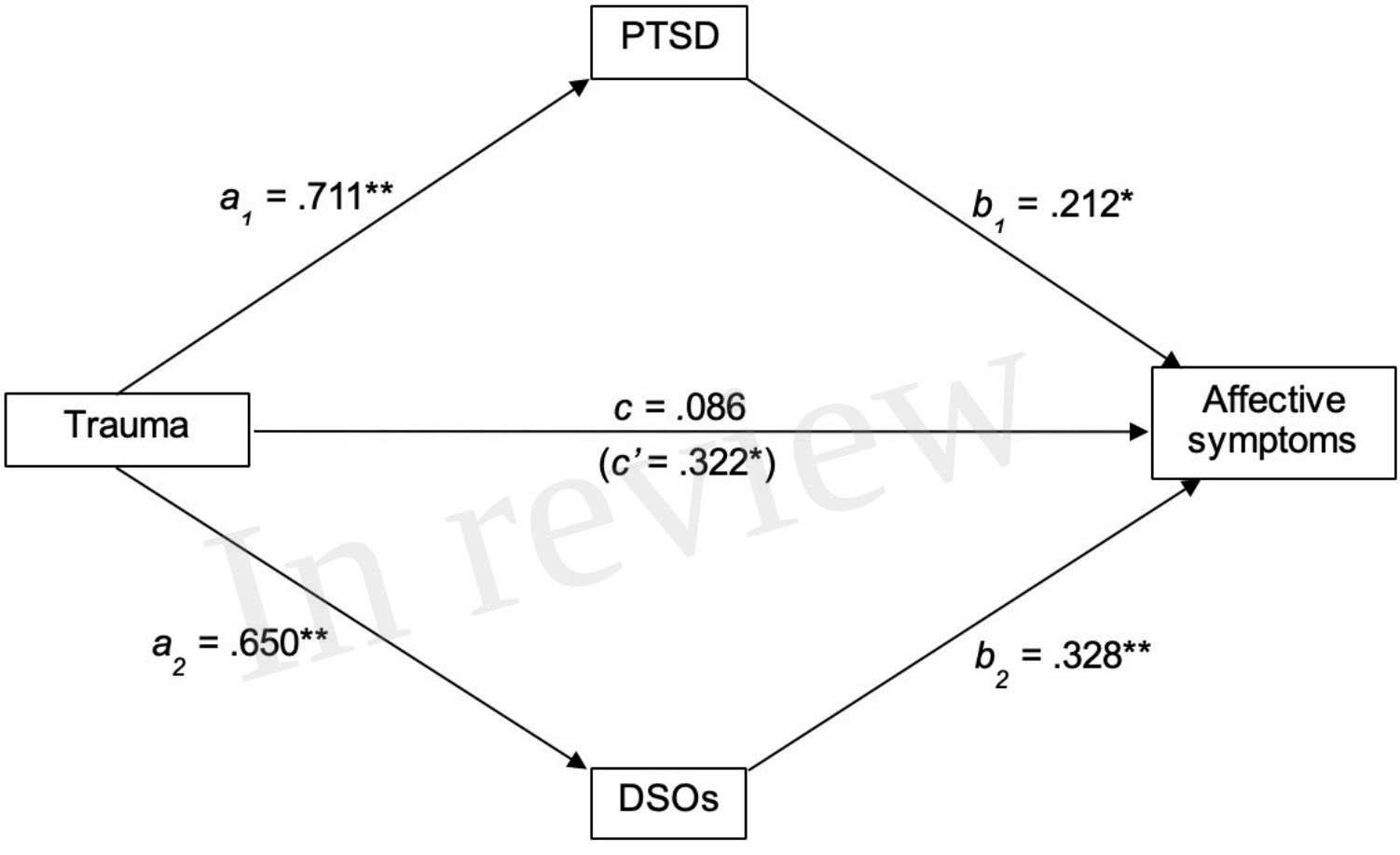

Figure 3. Standardised regression coefficients for the relationship between trauma and affective symptoms, mediated by PTSD and DSOs.

**$p < .005$

*$p < .05$

Note: PTSD = Post-Traumatic Stress Disorder, DSOs = Disturbances of Self-Organisation