

OPEN

Are Specific Early-Life Adversities Associated With Specific Symptoms of Psychosis?

A Patient Study Considering Just World Beliefs as a Mediator

Sophie Wickham, PhD, MSc, and Richard Bentall, PhD, M.Clin Psychol

Abstract: Epidemiological studies have suggested that there may be associations between specific adversities and specific psychotic symptoms. There is also evidence that beliefs about justice may play a role in paranoid symptoms. In this study, we determined whether these associations could be replicated in a patient sample and whether beliefs about a just world played a specific role in the relationship between adversity and paranoia. We examined associations between childhood trauma, belief in justice, and paranoia and hallucinatory experiences in 144 individuals: 72 individuals with a diagnosis of schizophrenia spectrum disorders and 72 comparison controls. There was a dose-response relationship between cumulative trauma and psychosis. When controlling for comorbidity between symptoms, childhood sexual abuse predicted hallucinatory experiences, and experiences of childhood emotional neglect predicted paranoia. The relationship between neglect and paranoia was mediated by a perception of personal injustice. The findings replicate in a patient sample previous observations from epidemiological research.

Key Words: Just world beliefs, paranoia, psychosis, trauma

(J Nerv Ment Dis 2016;00: 00–00)

Childhood adversities have been implicated as risk factors for multiple mental health diagnoses (Chen et al., 2010; Heim et al., 2008; Hill, 2003). The association between childhood adversities and psychosis has taken longer to be accepted, but in the last decade, a wealth of literature has reported evidence of these (Read, 2013). The causal significance of these findings has been questioned by some researchers, for example, on the grounds that there may be a genetic liability for exposure leading to backward causation (Sideli et al., 2012) or because recall of trauma is unreliable in individuals with psychosis (Susser and Widom, 2012). However, there is evidence that recall of traumatic events is reliable across time and can be corroborated against alternate means, such as clinical case notes (Fisher et al., 2011). Some studies have used prospective designs, for example, based on birth cohorts (Mäkikyrö et al., 1998) or samples of youth known to be exposed to trauma (e.g., see Cutajar et al., 2010), and some have used genetically sensitive designs (Alemany et al., 2013) to exclude genetic confounding. Moreover, the consistency of the observed associations has largely been confirmed by meta-analyses, which have identified strong and consistent associations between childhood adversity and psychosis.

In an analysis of epidemiological, case-control, and prospective studies, Varese et al. (2012a) found that childhood sexual abuse (CSA), physical abuse, and emotional abuse were all significantly associated with psychosis. Moreover, they found that 9 of the 10 epidemiological studies

that had tested for dose-response relationships had found them, with more severe trauma exposure being associated with increasing psychosis risk. This latter observation is important as the presence of a dose-response relationship is one of Bradford Hill's (1965) well-known criteria for inferring causality from epidemiological data. Assuming causality, Varese et al. estimated that the number of people with psychosis would be reduced by approximately 33% if their historic experiences of trauma could have been prevented, thus demonstrating the considerable impact of childhood adversity on mental health (see also Read, 2013). Matheson and colleagues' (2013) meta-analysis compared patients with a diagnosis of schizophrenia with other diagnostic groups and found increased rates of childhood adversity (sexual abuse, physical abuse, and neglect) compared with control subjects and patients with anxiety disorders. No significant differences were obtained when comparing schizophrenia patients with patients who received a diagnosis of affective psychosis, depressive disorder, or personality disorders, although patients with posttraumatic stress disorder and dissociative disorders reported even higher rates of childhood adversity. Finally, van Dam et al. (2012) conducted a systematic review and meta-analysis of studies of bullying and concluded from the 4 clinical studies that the findings were mixed, and therefore no definitive conclusions could be drawn (possibly due to the small number of studies included). However, the nonclinical studies reviewed provided strong evidence of associations between school bullying and the development of subclinical psychotic symptoms.

Specific Associations

Recent research suggests that, although childhood adversity is a risk factor for a wide range of psychopathology, within the psychotic domain some specificity can be observed between risk factors and symptoms, raising questions about the mechanisms that might be involved. As hallucinations and paranoid delusions often occur together (van Os and Kapur, 2009), it is important to statistically control for the co-occurrence of these symptoms, and to our knowledge, only 4 epidemiological studies have done this. Bentall et al. (2012) used data from the 2007 Adult Psychiatric Morbidity Survey to assess the association between childhood traumas (including childhood rape, sexual touch, sexual talking, physical abuse, bullying, and being brought up in institutional care and local authority care) and hallucinatory experiences and paranoid ideation. Bivariate analyses suggested that all risk factors were associated with both symptoms. However, childhood rape was associated with only hallucinations once co-occurring paranoia was controlled for. Being brought up in institutional care was specifically associated with paranoia once comorbid hallucinations had been controlled for.

Sitko et al. (2014) replicated this finding using an American epidemiological data set. Childhood traumas investigated included witnessing a killing, rape, sexual molestation, assault, physical abuse, neglect, and being held captive. Once the co-occurrence of symptoms was statistically controlled for, CSA (rape and sexual molestation) was associated with hallucinatory experiences, and neglect was specifically associated with paranoia within the psychotic domain. However, both kinds of adversity also predicted depression.

Department of Psychological Sciences, University of Liverpool, Liverpool, Merseyside, United Kingdom.

Sent reprint request to Sophie Wickham, PhD, MSc, Department of Psychological Sciences, University of Liverpool, Waterhouse Bldg, Second Floor, Liverpool, Merseyside L69 3BX, United Kingdom. E-mail: shw@liverpool.ac.uk.

Copyright © 2016 Wolters Kluwer Health, Inc. All rights reserved. This is an open-access article distributed under the terms of the Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 (CCBY-NC-ND), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially.

ISSN: 0022-3018/16/0000-0000

DOI: 10.1097/NMD.0000000000000511

More recently, Shevlin et al. (2015) further tested the association between adversity and psychosis in survey data collected from a large sample of adult prisoners, who were presumably experiencing considerable adversity at the time of questioning. When participants were grouped according to whether they experienced hallucinations, paranoia, both or neither, reports of sexual abuse were found to be specifically elevated in those who reported hallucinations or both symptoms, whereas a childhood history of institutional care was more prevalent in those who had paranoia alone or both symptoms.

One recent epidemiological study failed to replicate these specific associations. van Nierop et al. (2014) used the NEMESIS (Netherlands Mental Health Survey and Incidence Study) 1 and 2 data and found that associations between childhood trauma (emotional neglect, physical abuse, psychological abuse, and sexual abuse) and psychosis symptoms showed no evidence of specific traumas relating to specific symptoms; rather, they were significantly associated with all psychotic symptoms. This finding may be a result of using a different statistical approach, which was highly conservative. Inspection of the data tables from this study suggests that, when the screening measures in the study were considered, there was an association between neglect and self-reported delusions and a trend toward an association between CSA and self-reported hallucinations (although these associations were not maintained with a subsample of participants who were interviewed in more depth). A second recent study (Longden et al., 2015) reported no specific associations between childhood adversities and symptoms, but this was based on analyses of symptoms and traumas recorded in medical records rather than validated instruments and did not control for the co-occurrence of symptoms and so did not properly test for the effect. Finally, a recent study of first-episode patients by Ajnakina et al. (2016) found that childhood trauma variables with the exception of neglect predicted the positive dimension of psychosis, but did not test for effects specific to hallucinations and paranoia.

Underlying Mechanisms

It is likely that our understanding of causes of severe mental illness will be advanced by investigating possible underlying mechanisms responsible for the observed associations between trauma and symptoms. There is evidence that dissociative responses, which may be particularly common in victims of sexual abuse, are closely associated with hallucinations (Pilton et al., 2015) and hence may explain the association between childhood trauma and this kind of symptom (Perona-Garcelán et al., 2012; Varese et al., 2012b). In the case of paranoia, Sitko et al. (2014) identified insecure attachment styles as an important mediating mechanism, suggesting that there is something specific about experiencing neglect and other attachment-challenging events that impact on how individuals interact with and perceive others, thereby affecting liability to paranoid ideation. This latter hypothesis is consistent with the observation that being brought up in institutional care is a risk factor for paranoia (Bentall et al., 2012) and also with cognitive models that implicate dysfunctional schemas about the self and others in paranoid thinking (Bentall et al., 2001; Freeman et al., 2002).

Of particular relevance to the present study is the finding that beliefs about injustice may play a role in paranoid thinking. A strong belief in a just world (BJW; the belief that people get what they deserve and deserve what they get; Lerner, 1980) appears to have adaptive qualities as it allows individuals to feel in control, motivates striving, and enhances feelings of self-worth (see Furnham, 2003, for a detailed review). Hence, when confronted with evidence that the world is unjust, individuals typically adjust their beliefs to preserve their BJW, for example, by derogating victims (Montada and Lerner, 1998). Valiente et al. (2010) found that individuals who are currently paranoid have a strong belief that the world is unjust for themselves (personal BJW), but their general BJW is maintained (other people generally experience justice). In our recent nonclinical study, poor personal BJW was found to mediate the association between perceived childhood deprivation

and paranoid ideation (Wickham et al., 2014). It seems plausible that experiences of trauma (childhood sexual, physical emotional abuse, neglect, and bullying) would shatter individual's beliefs that the world is just, but potentially only for themselves and not for others in general.

Clinical Context

Research on the relationship between trauma and psychosis has multiple clinical implications. Schizophrenia spectrum disorder (SSD) is a heterogeneous phenomenon, with wide differences in the symptoms experienced by different patients. When clinicians work with individuals with a diagnosis of SSD, it is essential to understand the role of traumatic experiences in order to build accurate individual case formulations. There has been recent interest in the potential of trauma-focused interventions for helping patients with SSD (van den Berg et al., 2016), and research into the underlying mechanisms that lead from trauma to psychosis is likely to enhance their effectiveness.

Aims

Based on the literature described previously, the aims of the present study were to (i) investigate whether there is specificity between childhood adversities (physical abuse, sexual abuse, emotional abuse, emotional neglect, physical neglect, and bullying) and symptoms of psychosis (paranoia and hallucinations) in a sample of individuals who currently have a diagnosis of SSD and a comparison group from the general population. (ii) We also considered whether personal BJW could act as a mediator in the case of paranoia. (iii) Finally, we considered if there was a dose-response relationship between trauma and diagnosis of SSD.

METHODS

Subjects

We recruited 144 participants. All were compensated for their time and had a minimum age of 18 years (for ethical reasons).

Seventy-two participants (46 men, 26 women) were unselected patients with SSD with a mean age of 43.46 (SD, 11.17) years recruited from community-based mental health teams ($n = 40$), inpatient units ($n = 21$), and voluntary organizations ($n = 11$) from the North West of England and North Wales. Diagnoses, which were obtained from the clinical teams or, in the case of those recruited through voluntary services, by self-report (they were asked to say what diagnosis they had received from their clinicians), were checked for consistency against symptom data obtained from the Positive and Negative Symptom Scale (PANSS; Kay et al., 1987; see below) and were paranoid schizophrenia ($n = 17$), schizophrenia ($n = 40$), schizoaffective disorder ($n = 10$), substance-induced psychosis ($n = 3$), and unspecified nonorganic psychosis ($n = 1$). The clinical participants varied in their educational achievement, with 44 leaving school by 16 years of age, 8 leaving school at 18 years of age, 4 completing further vocational training, and 9 completing higher education (data missing for 7 participants). Eight participants were married, 3 were divorced, 1 was widowed, and 4 participants were cohabiting (data missing for 2), whereas the rest were single. All but 3 were in recipient of antipsychotic medication. Patients were excluded if they lacked the capacity to consent or if they had insufficient understanding of the English language to complete the questionnaire items.

We also recruited a comparison sample of 72 individuals, with a mean age of 39.94 (SD, 12.07) years (31 men, 41 women). They were recruited from staff working in local hospital and universities via posters and from acquaintances of the research team using a snowballing method. The comparison participants completed the study in the same way as the clinical sample, directly with the researcher.

Individuals were excluded from the comparison group if they had a lifetime diagnosis of SSD (ascertained by questioning) or if they had insufficient understanding of the English language to complete the

questionnaire items. Fifty-three control participants had received no lifetime diagnosis of any mental health condition, and the rest reported the following historical diagnoses: depression ($n = 12$), anxiety ($n = 1$), anxiety and depression ($n = 4$), and resolved posttraumatic stress disorder ($n = 1$). One individual had a current diagnosis of obsessive-compulsive disorder and Tourette syndrome. Nineteen participants had no education beyond secondary school, 15 had completed further vocational training, and 33 participants had completed higher education (data missing from 4). Twenty-eight participants were single, 24 were married, 8 were divorced, 1 was widowed, and 8 participants were cohabiting (data missing for 3 participants).

There was no difference between the groups in age, $t_{142} = 1.80$, $p = 0.07$. There was an overrepresentation of males in the clinical group and an overrepresentation of females in the comparison group ($\chi^2 = 6.28$, $p < 0.05$). The comparison participants were more likely to have gained higher or further education compared with the clinical sample ($\chi^2_1 = 33.16$, $p < 0.001$) and were also more likely to be either married or cohabiting than single, divorced, or widowed ($\chi^2_1 = 12.81$, $p < 0.001$).

Measures

The Positive and Negative Symptom Scale (Kay et al., 1987) was used to assess the presence and severity of positive symptoms in the week preceding the interview in both samples and was administered by a trained interviewer. Thirty symptoms (positive, negative, and general psychopathology) are scored on a scale ranging from 1 (symptom absent) to 7 (extreme symptom severity). The PANSS subscales have good reliability and validity (Kay et al., 1987). The PANSS scores for suspiciousness/persecution and hallucinations were used in the present analysis to indicate current paranoia and current hallucinatory experiences.

Childhood Trauma Questionnaire–Short Form (CTQ; Bernstein et al., 1994) measures childhood experiences of trauma and maltreatment. There are 5 subscales with 5 items in each subscale: emotional abuse (in this study, $\alpha = 0.91$), physical abuse ($\alpha = 0.88$), sexual abuse ($\alpha = 0.96$), emotional neglect ($\alpha = 0.85$), and physical neglect ($\alpha = 0.68$), and individuals responded by indicating the extent to which an experience had occurred to them while growing up using a 5-point scale ranging from 1 (never true) to 5 (very often true). The measure has good sensitivity and satisfactory specificity when self-reported and has demonstrated convergent and discriminant validity (Bernstein et al., 2003).

Retrospective Bullying Questionnaire (Schäfer et al., 2004) measures experiences of victimization during primary and secondary school. Individuals are asked if they experienced physical (hit/punched and stolen from), verbal (called names and threatened), and indirect (had lies told about them and had been excluded) forms of bullying during school, using yes/no responses. These questions were followed by 5-point scales assessing how often each type of bullying occurred (ranging from 0 = never to 4 = constantly) and the perceived severity of each kind of bullying (ranging from 0 = I wasn't bullied to 4 = extremely serious). The frequency and severity scores were highly correlated ($r = 0.89$ to $r = 0.91$, $p < 0.01$). Therefore, for the purposes of this analysis, the severity of bullying measure was used.

The General Beliefs in a Just World Scale (Dalbert et al., 1987) is a 6-item scale measuring individuals' BJW in general ($\alpha = 0.79$ in the present study), for example, "I believe that, by and large, people get what they deserve." The scale uses a 6-point scale ranging from 1 (strongly disagree) to 6 (strongly agree).

The Personal Belief in a Just World Scale (Dalbert, 1999) has 7 items that measure individuals' belief that the world a just place for the self ($\alpha = 0.84$ in the present study), for example, "I am usually treated fairly." Participants answered using a 6-point scale from 1 (strongly disagree) to 6 (strongly agree).

Statistical Analysis

All analyses were conducted using SPSS version 21 (IBM SPSS Statistics, IBM Corp, Armonk, NY). In order to explore the relationship between the target variables, Spearman correlation analyses were conducted.

In order to test our first hypothesis that there would be specificity between childhood adversities and symptom experiences (hallucinations and paranoia in the clinical and nonclinical samples), we first conducted a hierarchical binary logistic regression with diagnosis as the dependent variables (DVs). The aim was to address the confounding problem of multicollinearity between childhood adversities experienced. Covariates age and sex were entered in the first block. The trauma variables were then entered into the second block (physical abuse, sexual abuse, emotional abuse, physical neglect, emotional neglect, and bullying).

Based on the results of the logistic regression, multiple linear regressions were then conducted with the clinical sample (as the comparison sample had no significant associations with symptom experiences). Covariates age, sex, and co-occurrence between symptoms (paranoia and hallucinations) were entered into the first block. The trauma variables that were significant predictors in the hierarchical logistic regression were entered in the second block (sexual abuse and emotional neglect).

To assess the second hypothesis that a personal BJW could act as a specific mediator between childhood adversity and paranoid experiences, both personal BJW and general BJW mediators were evaluated using the PROCESS macro on SPSS version 21 (Hayes, 2013). The mediation model was estimated using maximum likelihood estimators. The statistical significance of mediating and indirect effects was assessed using bootstrapped bias-corrected percentile-based confidence intervals of 10,000 bootstrap draws. If zero was not within the 95% intervals of the bootstrapped samples, then the mediating/indirect effect was considered statistically significant (Preacher and Hayes, 2008). After examining direct effects, we tested a mediating model using only the clinical sample of 72 individuals (which, after list-wise deletion, reduced to 50), including those variables that showed the expected association with paranoia (see below). The model was estimated twice, using the different DVs (PANSS suspiciousness and hallucinations) to establish if this mediating process also had specificity for paranoia. In all analyses, co-occurrence of paranoia and hallucinations was controlled for, alongside age and sex.

In order to examine our final hypothesis that there would be a cumulative effect of trauma in the diagnosis of SSD, the lowest level of trauma cutoff scores was used, so if participants endorsed low to moderate scores for any of the subscales in the CTQ, that trauma was coded as present (Bernstein et al., 1994; Reichert, 2013). Therefore, binary variables were created for trauma subtypes. Cutoff scores were as follows: 9 or higher for emotional abuse, 8 or higher for physical abuse, 6 or higher for sexual abuse, 10 or higher for emotional neglect, and 8 or higher for physical neglect (Reichert, 2013). A cutoff score for the bullying item was used, with individuals scoring 10 or higher in severity. Trauma experiences were then totaled, and the total scores were divided into 4 categories (0 = no trauma, 1 = 1–2 trauma experiences, 2 = 3–4 trauma experiences, and 3 = 5–6 trauma experiences). These were entered into a binary logistic regression with diagnosis as the DV and cumulative trauma as the independent variable (IV). A simple contrast was used specifying the first level (no trauma) as the reference category. All other categories of the predictor variables were compared with the reference category, providing an estimate of the likelihood of obtaining a diagnosis of SSD for each number of traumas compared with the trauma-free group.

RESULTS

Table 1 shows the correlation matrix between childhood traumas, suspiciousness/persecution (paranoia), and hallucinations for the total sample, comparison sample, and the clinical sample. Table 2

TABLE 1. Spearman Correlation Matrix of the Trauma Variables With Paranoia and Hallucinations, Separated Using the Total Sample, Comparison Sample, and the Clinical Sample

Experiences	Total Sample (n = 144)							Comparison Sample (n = 72)							Clinical Sample (n = 72)							
	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7	
1 Physical abuse	—							—							—							
2 Sexual abuse	0.45*	—						0.21	—						0.55*	—						
3 Emotional abuse	0.66*	0.49*	—					0.48*	0.24**	—					0.80*	0.63*	—					
4 Emotional neglect	0.56*	0.38*	0.68*	—				0.51*	0.15	0.57*	—				0.57*	0.41*	0.73*	—				
5 Physical neglect	0.53*	0.43*	0.51*	0.57*	—			0.56*	0.15	0.41*	0.52*	—			0.49*	0.57*	0.58*	0.62*	—			
6 Bullying	0.45*	0.22*	0.48*	0.35*	0.34*	—		0.40*	0.08	0.46*	0.41*	0.24**	—		0.45*	0.28	0.47*	0.24	0.37*	—		
7 Paranoia	0.41*	0.34*	0.42*	0.41*	0.45*	0.38*	—	0.29**	0.03	0.21	0.14	0.27**	0.12	—	0.37*	0.23	0.47*	0.42*	0.46*	0.56*	—	
8 Hallucinations	0.36*	0.36*	0.37*	0.36*	0.23*	0.19**	0.50*	0.26**	0.10	0.18	0.11	0.08	0.03	0.28**	0.31*	0.25*	0.39*	0.24	0.18	0.28**	0.35**	—

Physical abuse, sexual abuse, emotional neglect, and physical neglect were measured by CTQ; bullying was measured by the Retrospective Bullying Questionnaire (RBQ); paranoia and hallucinations were measured by PANSS.
 * $p < 0.01$.
 ** $p < 0.05$.

shows the means and SDs for both samples. Looking at the total sample, as expected, the trauma variables significantly correlated with each other, suggesting that childhood experiences of trauma co-occur. The highest correlation was between childhood physical and emotional abuse, and the smallest was between childhood emotional neglect (CEN) and bullying. Interestingly, paranoia correlated moderately to highly with each of the trauma variables, as did hallucinations. As anticipated, paranoia and hallucinatory experiences were also highly correlated.

All trauma variables significantly correlated in the clinical sample, with the exception of the relationship between sexual abuse and bullying, which was nonsignificant. Interestingly, paranoia correlated with all trauma variables except for CSA, whereas hallucinatory experiences correlated with all trauma variables except for physical neglect and emotional neglect.

In the comparison sample, CSA did not correlate with bullying, physical neglect, physical abuse, and emotional neglect, possibly reflecting the sample's infrequent experiences of CSA. However, all other trauma variables were significantly correlated. However, very few paranoia or hallucinatory experiences were associated with any of the trauma variables (with weak positive correlations found between both paranoia and hallucinations and physical abuse; and between paranoia and physical neglect). When the total sample was analyzed, it reflected the results found in the clinical sample, and correlations were observed between the traumas and symptoms.

Logistic Regression for Psychosis

Binary logistic regression using diagnosis as the DV revealed CSA ($B = 0.16$; SE, 0.07; $p < 0.05$; odds ratio [OR], 1.18; 95% confidence interval [CI], 1.03–1.35) and CEN ($B = 0.17$; SE, 0.07; $p < 0.05$; OR, 1.19; 95% CI, 1.04–1.36) were significant predictors of lifetime diagnosis of SSD; all other trauma predictors were nonsignificant.

Linear Regression of Paranoia and Hallucinations

Table 3 shows the results of the multiple linear regressions. Childhood emotional neglect significantly predicted paranoia when hallucinations were controlled for but failed to predict hallucinations when paranoia was controlled for. Childhood sexual abuse predicted hallucinations when paranoia was controlled for but failed to predict paranoid beliefs when hallucination was controlled for.

The Role of Belief in Injustice

On investigating the direct paths used in the mediation analysis ($n = 50$ after list-wise deletion), CEN was associated with personal BJW ($B = -0.47$; SE, 0.22; $p < 0.05$) but not general BJW ($B = -0.22$; SE, 0.22; $p = 0.32$) (path a). Interestingly, both personal BJW and general BJW were significantly associated with current

TABLE 2. Means and SDs of the Trauma Variables, Paranoia and Hallucinations, Separated Using the Comparison Sample and the Clinical Sample

Childhood Trauma	Comparison Sample		Clinical Sample	
	Mean	SD	Mean	SD
Physical abuse	6.5	3.5	9.0	5.6
Sexual abuse	5.6	2.8	8.9	6.8
Emotional abuse	7.9	3.5	11.8	5.6
Emotional neglect	6.3	2.2	8.0	4.2
Physical neglect	7.8	4.5	11.2	6.4
Bullying	4.7	4.5	7.8	7.9
Paranoia	1.3	0.7	2.7	1.5
Hallucinations	1.2	0.5	2.8	1.7

TABLE 3. Results From the Multiple Logistic Regression Using the Clinical Sample (n = 72)

		AVH			Paranoia		
		B	SE B	β	B	SE B	β
Step 1	Constant	1.27	1.01		1.97	0.83	
	Age	0.01	0.02	0.08	-0.00	0.02	-0.03
	Sex	-0.07	0.48	-0.02	0.40	0.40	0.13
	Symptom ^a	0.34	0.15	0.30*	0.25	0.11	0.29*
	R ²	0.09			0.10		
Step 2	Constant	0.74	1.04		1.16	0.86	
	Age	0.01	0.02	0.09	-0.00	0.02	-0.03
	Sex	-0.30	0.48	-0.08	0.37	0.40	0.12
	Symptom ^a	0.27	0.16	0.23	0.19	0.12	0.22
	CSA	0.07	0.04	0.30*	-0.00	0.03	-0.01
	CEN	0.00	0.01	0.02	0.08	0.04	0.33*
	R ²	0.17			0.20		

^aThe control for co-occurrence between symptoms; in the first regression (AVH; hallucinations), this was paranoia, and in the second regression (paranoia), this was hallucinations.

**p* < 0.05.

paranoia (path b); however, these associations were in opposite directions, indicating that individuals who are currently paranoid have an excessive belief that the world is just for people in general (*B* = 0.06; SE, 0.03; *p* < 0.05) but, at the same time, that the world is unjust toward themselves (*B* = -0.07; SE, 0.03; *p* < 0.05).

The relationship between CEN and paranoia (mediating path *c'*) was also significant (*B* = 0.11; SE, 0.03; *p* < 0.05). This suggests that the association between CEN and paranoia was partially mediated by a personal BJW (indirect effect of personal BJW: *B* = 0.032; SE, 0.02; 95% CI, 0.00–0.08). General BJW was not a significant mediating variable (Fig. 1).

Interestingly, when the model was recalculated with hallucinations as the DV, and CSA was the IV, the only significant path was the direct path from CSA to hallucinations (*B* = 0.08; SE, 0.04; *p* < 0.05). Personal BJW and general BJW played no mediating role in this case.

Dose-Response Analysis

On considering the effect of cumulative trauma on a diagnosis, Table 4 shows the ORs, which become significant at 3 to 4 types of

TABLE 4. Frequency Distribution of Trauma and Unadjusted ORs for Cumulative Trauma

Traumas	Trauma Frequency, n (%)	Psychosis Cases, n (%)	Unadjusted OR (95% CI) for Psychosis
0	51 (35.4)	15 (20.8)	—
1–2	39 (22.2)	19 (26.4)	2.28 (0.96–5.44)
3–4	29 (18.1)	18 (25.0)	3.93* (1.50–10.28)
5–6	17 (11.1)	13 (18.1)	7.80** (2.19–27.84)

**p* < 0.01.
***p* < 0.001.

trauma (OR, 3.93), increasing to an OR of 7.8 for 5 to 6 types of trauma, indicating a linear dose-response relationship.

DISCUSSION

The primary aim of the present study was to investigate whether there is specificity between different types of adversity in childhood and symptoms in a sample of individuals who currently have a diagnosis of SSD and a comparison group from the general population. We also tested the mediating role of personal BJW in the case of paranoia. Overall, our study supports those larger epidemiological studies (Bentall et al., 2012; Shevlin et al., 2015; Sitko et al., 2014) that have demonstrated specific associations between different kinds of childhood trauma and different symptoms within the psychotic domain. We found specific associations between CSA and hallucinations and between CEN and paranoia when the co-occurrence of symptoms was statistically controlled for.

Interestingly, in our sample, bivariate correlational analysis produced similar findings in the clinical sample as the linear regressions that controlled for comorbidity. Hallucinations and not paranoia correlated with CSA but were not statistically correlated with the neglect variables (emotional and physical), whereas paranoia was. This finding suggests that we can have some confidence in the more sophisticated regression analyses carried out with the clinical sample, but it did not extend to the comparison sample, where no trauma experiences correlated with paranoia and hallucinations, with the exception of physical abuse, which weakly correlated with both symptoms. On inspecting both samples, it was evident that both reported experiences of childhood traumas, but the frequency and severity of childhood trauma were much greater in the clinical sample, underscoring the need for a trauma-based approach to helping patients with psychosis.

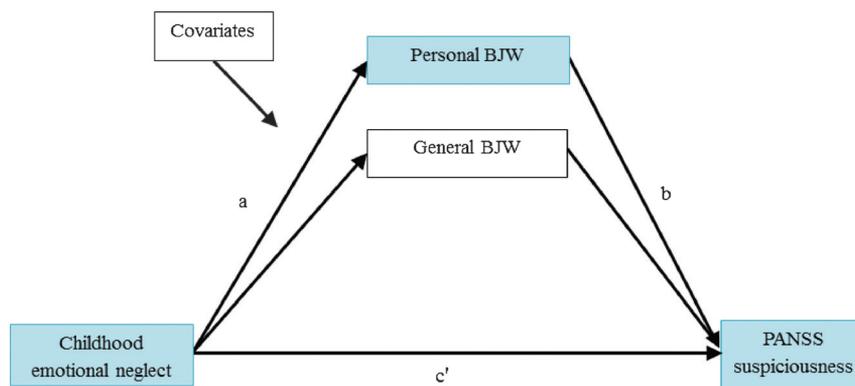


FIGURE 1. Illustration of the model used in the analysis. Covariates included age, sex, sexual abuse, and hallucinatory experiences. The mediating variables (personal BJW and general BJW) were regressed onto the IV—emotional neglect variable (path a). The DVs (paranoia) were regressed onto the mediating variables (path b), and the DVs were also regressed onto the IV (path *c'*) simultaneously. The effects of all model variables were linear regression estimates. Please note the color represents the significant mediator.

We have provided tentative evidence that high personal perceptions of injustice go some way to explain the association between emotional neglect and paranoia. Perhaps more interesting, and somewhat surprising, was the finding that the participants' general BJW was stronger in those who were paranoid. These findings indicate that issues of justice are highly salient to paranoid patients and that paranoia develops when the individual feels uniquely the target of unfair treatment in a world that is very fair to everyone else. As predicted, BJW did not mediate the relationship between CSA and hallucinations. There is already strong evidence that dissociative responses, which may be particularly common in victims of sexual abuse, are closely associated with hallucinations and hence may explain the association between childhood trauma and this kind of symptom (Perona-Garcelán et al., 2012; Varese et al., 2012b).

Finally, as with previous studies (see Varese et al., 2012a) we have found a strong dose-response relationship between trauma exposure and diagnosis of SSD. This observation further demonstrates, if such a demonstration is needed, the importance of rigorous and sensitive trauma assessments and trauma focus in the delivery of services for individuals with diagnoses of SSD.

Several methodological limitations need to be acknowledged. First, we measured childhood trauma using the CTQ, which is a retrospective self-report measure. Although this measure has demonstrated good sensitivity and satisfactory specificity and good convergent and discriminant validity (Bernstein et al., 2003), the use of self-rated measures in individuals with a diagnosis of SSD has been criticized because of potential reporting biases attributable to illness (Sideli et al., 2012). However, studies with nonpsychotic patients have shown that there are many barriers to disclosing abuse (e.g., disbelief, for a recent review, see Tener and Murphy, 2015) and that it can therefore take many years to disclose (Jonzon and Lindblad, 2004), in which case it is possible that our findings may underestimate the levels of childhood trauma experienced by our patient sample; this effect would tend to reduce the possibility of detecting specific associations. Furthermore, several studies have indicated that reports of child abuse by patients are often accurate and have good concurrent validity against other sources of information (Fisher et al., 2011). Moreover, a small number of prospective studies of the association between childhood trauma and psychosis in general have yielded similar results to those obtained from retrospective reports (Varese et al., 2012a), although, to our knowledge, no prospective study has yet tested for associations with specific symptoms.

There were some differences in how diagnosis was determined, through self and clinical report, which may be considered an inconsistent approach; however, it is unlikely that such differences resulted in a bias of disclosing, and our research focus was on specific symptoms, which we assessed by PANSS, rather than diagnoses. The comparison sample of individuals from the general population had some experiences of historic mental health diagnoses, which could be considered a weakness of the design; however, based on the general finding that 1 in 4 individuals will experience a mental health problem in their lifetime, we can consider the comparison group to reasonably represent the general population. The comparison sample was not similar to the clinical sample in terms of sex and education status. However, in many of our analyses, only the patient sample was considered, and we controlled for these variables, making it unlikely that our results were affected either by the characteristics of the comparison group or by age and sex. Nonetheless, sex is a variable that should be explored further in light of evidence that certain kinds of trauma, especially sexual abuse, are more evident in women with psychosis (Shevlin et al., 2013). The present sample was also relatively modest in size and used a convenience sample allowing the possibility of a bias in referral to the study and limiting the generalizability and statistical power of the findings. Nonetheless, our results reflect those found in large-scale epidemiological studies, which, in general, have not suffered from these limitations. Our mediation model, which included 72 participants, was reduced to

50 as PROCESS uses list-wise deletion to handle missing data. We used bootstrapped bias-corrected percentile-based confidence intervals of 10,000 bootstrap draws to ensure that our findings were robust. Nonetheless, the finding that personal BJW partially mediated the relationship between emotional neglect and paranoia must be taken cautiously.

Most importantly, the study was cross-sectional, with childhood trauma, BJW, and patients' symptoms all being measured at the same time point. It is important to note that causation requires the demonstration that the cause precedes the effect (Bradford Hill, 1965). Whereas we have inferred that this was the case from patients' retrospective reports, we have no proof that this was so. Mediation analysis does not protect from other possible interpretations of the data and is also subject to confounding from unmeasured variables. Hence, the best that can be safely concluded is that the findings are consistent with the hypothesis that specific childhood traumas contribute causally to specific psychotic symptoms and that BJW is one of the mediating mechanisms.

Finally, it is worth noting the possibility that different subtypes of psychosis (e.g., substance-induced psychosis) may be less related to trauma than others. We did not attempt to consider this possibility in our analyses because of our limited numbers; however, it should be considered in future studies.

CONCLUSIONS

The findings from this study indicate that paranoia and hallucinations may reflect different kinds of early experiences. In a general sense, they can be understood within the framework of well-known cognitive models of psychosis (e.g., see Garety et al., 2001), which suggest that cognitive processes are the proximal determinant of psychotic experiences and that these processes can be affected by early life adversity. However, they suggest that different cognitive mechanisms may need to be evoked to explain different symptoms, as already proposed by some researchers (e.g., see Bentall, 1990; Bentall et al., 2001; Freeman et al., 2002). The major implication for clinical practice is that clinicians should assess for childhood adversity and consider it in their clinical formulations. There is already evidence that trauma-focused interventions may have some utility in the treatment of psychotic patients (Mueser et al., 2008; van den Berg and van der Gaag, 2012; van den Berg et al., 2016), and further research is required to develop these approaches. The implications of our findings around personal and general BJW may also extend to therapeutic settings. There is currently no systematic intervention targeting these psychological processes during therapy, although cognitive behavior therapy has the potential to do so. Interventions need to be designed to target perceptions of injustice to test the hypothesis that this will reduce paranoid thoughts. It is important to note here that this may not entail an attempt to reduce individual feelings of personal injustice but, depending on circumstances, may potentially validate and normalize those feelings.

It is possible that the discrepancy between personal and general BJW is a special cause of psychological distress to patients, and this discrepancy needs further exploration. The observation that paranoia may partly involve an excessive belief that others are treated fairly has obvious implications for cognitive behavioral strategies to reduce the patient's feeling of being uniquely targeted for injustice; paradoxically perhaps, it may be helpful to encourage recognition that others sometimes receive unfair treatment also but nonetheless prevail over life's difficulties. On a more general note, the last few years has seen emerging evidence that social comparison, and the perception of inequalities between one's own life circumstances and those of others, may play a unique contributing role in psychosis (e.g., see Burns et al., 2008; Kirkbride et al., 2014; Wickham et al., 2014). In future developments of cognitive models for psychosis, it may be fruitful to pay particular attention to the processes underlying these social comparison processes and the environmental circumstances that make them salient.

ACKNOWLEDGMENTS

The authors acknowledge Merseycare NHS trusts, The Cambian Group, and the Hearing Voices Network for helping recruit for this study. They also thank every individual who took part in this study and shared their stories with the researchers.

DISCLOSURE

The authors declare no conflict of interest.

REFERENCES

- Ajnakina O, Trotta A, Oakley-Hannibal E, di Forti M, Stilo SA, Kolliakou A, Gardner-Sood P, Gaughran F, David AS, Dazzan P, Pariante C, Mondelli V, Morgan C, Vassos E, Murray RM, Fisher HL (2016) Impact of childhood adversities on specific symptom dimensions in first-episode psychosis. *Psychol Med* 46:317–26.
- Alemayehu S, Goldberg X, van Winkel R, Gastó C, Peralta V, Fañanás L (2013) Childhood adversity and psychosis: Examining whether the association is due to genetic confounding using a monozygotic twin differences approach. *Eur Psychiatry*. 28: 207–212.
- Bentall RP (1990) The illusion of reality: A review and integration of psychological research on hallucinations. *Psychol Bull*. 107:82–95.
- Bentall RP, Corcoran R, Howard R, Blackwood N, Kinderman P (2001) Persecutory delusions: A review and theoretical integration. *Clin Psychol Rev*. 21: 1143–1192.
- Bentall RP, Wickham S, Shevlin M, Varese F (2012) Do specific early-life adversities lead to specific symptoms of psychosis? A study from the 2007 the Adult Psychiatric Morbidity Survey. *Schizophr Bull*. 38:734–740.
- Bernstein DP, Fink L, Handelsman L, Foote J, Lovejoy M, Wenzel K, Ruggiero J (1994) Initial reliability and validity of a new retrospective measure of child abuse and neglect. *Am J Psychiatry*. 151:1132–1136.
- Bernstein DP, Stein JA, Newcomb MD, Walker E, Pogge D, Ahluvalia T, Zule W (2003) Development and validation of a brief screening version of the childhood trauma questionnaire. *Child Abuse Neglect*. 27:169–190.
- Bradford Hill A (1965) The Environment and Disease: Association or Causation. *Proc R Soc Med: Section of Occupational Medicine*. 58:295–300.
- Burns JK, Esterhuizen T (2008) Poverty, inequality and the treated incidence of first-episode psychosis: An ecological study from South Africa. *Soc Psychiatry Psychiatr Epidemiol*. 4:331–335.
- Chen LP, Murad MH, Paras ML, Colbenson KM, Sattler AL, Goranson EN, Zirakzadeh A (2010) Sexual abuse and lifetime diagnosis of psychiatric disorders: Systematic review and meta-analysis. *Mayo Clin Proc*. 85:618–629.
- Cutajar MC, Mullen PE, O'gloff JRP, Thomas SD, Wells DL, Spataro J (2010) Schizophrenia and other psychotic disorders in a cohort of sexually abused children. *Arch Gen Psychiatry*. 67:1114–1119.
- Dalbert C (1999) The world is more just for me than generally: About the personal belief in a just world scale's validity. *Soc Just Res*. 12:79–98.
- Dalbert C, Montada L, Schmitt M (1987) Glaube an eine gerechte Welt als Motiv: Validierungskorrelate zweier skalen [Belief in a just world: Validation correlates of two scales]. *Psychol Beitr*. 29:596–615.
- Fisher HL, Craig TK, Fearon P, Morgan K, Dazzan P, Lappin J, Morgan C (2011) Reliability and comparability of psychosis patients' retrospective reports of childhood abuse. *Schizophr Bull*. 37:546–553.
- Freeman D, Garety P, Kuipers E, Fowler D, Bebbington PE (2002) A cognitive model of persecutory delusions. *Br J Clin Psychol*. 41:331–347.
- Furnham A (2003) Belief in a just world: Research progress over the past decade. *Pers Individ Differ*. 34:795–817.
- Garety PA, Kuipers E, Fowler D, Freeman D, Bebbington PE (2001) A cognitive model of positive symptoms of psychosis. *Psychol Med*. 31:189–195.
- Hayes A (2013) *Introduction to mediation, moderation and conditional process analysis*. In Kenny D, Little T (Eds). New York: The Guilford Press.
- Heim C, Newport DJ, Mletzko T, Miller AH, Nemeroff CB (2008) The link between childhood trauma and depression: Insights from HPA axis studies in humans. *Psychoneuroendocrinology*. 33:693–710.
- Hill J (2003) Childhood trauma and depression. *Curr Opin Psychiatry*. 16:3–6.
- Jonzon E, Lindblad F (2004) Disclosure, reactions, and social support: Findings from a sample of adult victims of child sexual abuse. *Child Maltreat*. 9:190–200.
- Kay SR, Flszbein A, Opfer LA, Fiszbein A, Opler LA (1987) The Positive and Negative Syndrome Scale (PANSS) for schizophrenia. *Schizophr Bull*. 13:261–276.
- Kirkbride J, Jones PB, Ullrich S, Coid JW (2014) Social deprivation, inequality, and the neighborhood-level incidence of psychotic syndromes in East London. *Schizophr Bull*. 40:169–180.
- Lerner MJ (1980) *The belief in a just world: A fundamental delusion*. New York: Plenum Press.
- Longden E, Sampson M, Read J (2015) Childhood adversity and psychosis: Generalised or specific effects? *Epidemiol Psychiatr Sci*. doi: 10.1017/S204579601500044X [Epub ahead of print].
- Mäkikyrö T, Sauvola A, Moring J, Veijola J, Nieminen P, Järvelin MR, Isohanni M (1998) Hospital-treated psychiatric disorders in adults with a single-parent and two-parent family background: A 28-year follow-up of the 1966 northern Finland birth cohort. *Fam Proc*. 37:335–344.
- Matheson SL, Shepherd AM, Pinchbeck RM, Laurens KR, Carr VJ (2013) Childhood adversity in schizophrenia: A systematic meta-analysis. *Psychol Med*. 43(2):225–238.
- Montada L, Lerner M (1998) *Responses to victimizations and belief in a just world*. New York: Plenum.
- Mueser KT, Rosenberg SD, Xie H, Jankowski MK, Bolton EE, Lu W, Wolfe R (2008) A randomized controlled trial of cognitive-behavioral treatment for posttraumatic stress disorder in severe mental illness. *J Consult Clin Psychol*. 76:259–271.
- Perona-Garcelán S, Carrascoso-López F, García-Montes JM, Ductor-Recuerda MJ, López Jiménez AM, Vallina-Fernández O, Gómez-Gómez MT (2012) Dissociative experiences as mediators between childhood trauma and auditory hallucinations. *J Trauma Stress*. 25:323–329.
- Pilton M, Varese F, Berry K, Bucci S (2015) The relationship between dissociation and voices: A systematic literature review and meta-analysis. *Clin Psychol Rev*. 40: 138–55.
- Preacher K, Hayes A (2008) Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behav Res Methods*. 40:879–891.
- Read J (2013) Childhood adversity and psychosis. In Read J, Dillon J (Eds), *Models of Madness* (pp 249–275). London: Routledge.
- Reichert E (2013) *Childhood maltreatment, posttraumatic cognitions, and health outcomes among young adults*. University of Rhode Island: doctoral thesis. Available at: http://digitalcommons.uri.edu/oa_diss/14/. Accessed May 26, 2014.
- Schäfer M, Korn S, Smith PK, Hunter SC, Mora-mercha A, Singer MM, van der Meulen K (2004) Lonely in the crowd: Recollections of bullying. *Br J Dev Psychol*. 22:379–394.
- Shevlin M, McAnee G, Bentall RP, Murphy J (2015) Specificity of association between adversities and the occurrence and co-occurrence paranoia and hallucinations: Evaluating the stability of risk in an adverse adult environment. *Psychosis*. 7:206–216.
- Shevlin M, O'Neill T, Houston JE, Read J, Bentall RP, Murphy J (2013) Patterns of lifetime female victimisation and psychotic experiences: A study based on the UK Adult Psychiatric Morbidity Survey 2007. *Soc Psychiatry Psychiatr Epidemiol*. 48:15–24.
- Sideli L, Mule A, La Barbera D, Murray RM (2012) Do child abuse and maltreatment increase risk of schizophrenia? *Psychiatry Invest*. 9:87–99.
- Sitko K, Bentall RP, Shevlin M, O'Sullivan N, Sellwood W (2014) Associations between specific psychotic symptoms and specific childhood adversities are mediated by attachment styles: An analysis of the national comorbidity survey. *Psychiatry Res*. 217:202–209.
- Susser E, Widom C (2012) Still searching for lost truths about the bitter sorrows of childhood. *Schizophr Bull*. 38:672–675.

- Tener D, Murphy S. B (2015) Adult disclosure of child sexual abuse: A literature review. *Trauma Violence Abuse* 16: 391–400.
- Valiente C, Espinosa R, Vazquez C, Cantero D, Fuentenebro F, Vázquez C (2010) World assumptions in psychosis: Do paranoid patients believe in a just world? *J Nerv Mental Dis*. 198:802–806.
- van Dam DS, van der Ven E, Velthorst E, Selten JP, Morgan C, de Haan L (2012) Childhood bullying and the association with psychosis in non-clinical and clinical samples: A review and meta-analysis. *Psychol Med*. 42:2463–2474.
- van den Berg DPG, de Bont PAJ, van der Vleugel BM, de Roos C, de Jongh A, Van Minnen A, van der Gaag M (2016) Prolonged exposure vs eye movement desensitization and reprocessing vs waiting list for posttraumatic stress disorder in patients with a psychotic disorder: A randomized clinical trial. *JAMA Psychiatry*. 72:259–267.
- van den Berg DPG, van der Gaag M (2012) Treating trauma in psychosis with EMDR: A pilot study. *J Behav Ther Exp Psychiatry*. 43:664–671.
- van Nierop M, Lataster T, Smeets F, Gunther N, van Zelst C, de Graaf R, van Winkel R (2014) Psychopathological mechanisms linking childhood traumatic experiences to risk of psychotic symptoms: Analysis of a large, representative population-based sample. *Schizophr Bull*. 40(suppl 2):S123–S1230.
- van Os J, Kapur S (2009) Schizophrenia. *Lancet*. 374:635–645.
- Varese F, Barkus E, Bentall RP (2012b) Dissociation mediates the relationship between childhood trauma and hallucination proneness. *Psychol Med*. 42:1025–1036.
- Varese F, Smeets F, Drukker M, Lieverse R, Lataster T, Viechtbauer W, Bentall RP (2012a) Childhood adversities increase the risk of psychosis: A meta-analysis of patient-control, prospective and cross-sectional cohort studies. *Schizophr Bull*. 38:661–671.
- Wickham S, Lyons M, Dickins T, Shyrane N, Bentall RP (2014) Why does relative deprivation affect mental health? The role of justice, trust and social rank in psychological wellbeing and paranoid ideation. *J Public Ment Health*. 13:114–126.