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Histories of childhood maltreatment in schizophrenia: Relationships with premorbid functioning, symptomatology, and cognitive deficits

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Abstract: A number of studies have demonstrated an increased rate of histories of childhood maltreatment among adults with serious mental illness. The present investigation documented the presence of childhood maltreatment in a sample of 40 psychiatric inpatients with schizophrenia spectrum disorders. The type (neglect, physical abuse, sexual abuse), duration, and severity of childhood maltreatment was examined along with measures of premorbid functioning, current symptomatology, and cognitive functioning. Participants with histories of maltreatment were significantly more likely to have poorer peer relationships in childhood, more difficulty in school, an earlier age at first hospitalization, more previous hospitalizations, elevated symptoms of anxiety, depression, and suicidality on the Brief Psychiatric Rating Scale (BPRS), and more impaired performance on a task of visual-perceptual organization. Severity and frequency of childhood maltreatment were both positively correlated with hallucinations and delusions on the BPRS. Linear trend analysis indicated a pattern of more severe impairment as the number of types of maltreatment increased. No relationships were found between maltreatment and measures of executive functioning, verbal fluency, or verbal processing speed. A history of childhood maltreatment appears to be a significant determinant of premorbid functioning, illness-related symptom expression, and specific forms of cognitive dysfunction.

Keywords: Schizophrenia, Childhood abuse, Neurocognition, Perceptual organization, Premorbid functioning

I. Introduction

A history of maltreatment during childhood has been associated with an increased probability of having a psychiatric disorder in adulthood (Cicchetti et al., 2000; Weiss et al., 1999). Previous investigations have shown

that histories of childhood maltreatment have been observed in a large percentage of adults with severe and persistent mental illness (Herman, 1992; Read, 1997; Read et al., 2004; Muenzenmaier et al., 1993). In a recent review of the literature, Read et al. (2004), reported that 69% of female and 60% of male psychiatric inpatients reported histories of physical or sexual abuse. These rates far exceed the rates of child maltreatment found in the general population which average 1.22% (U.S. Department of Health and Human Services, 2000). Several studies have also found that the more severe the abuse in childhood, the greater the likelihood of adult psychopathology (Bryer et al., 1987; Fergusson et al., 1996; Fleming et al., 1999; Mullen et al., 1993; Pettigrew and Burcham, 1997; Read, 1998). Adult psychiatric patients with histories of childhood maltreatment have been shown to have an earlier age at first hospitalization, an increased number of hospitalizations, higher rates of relapse, higher instances of seclusion and/or restraints, and have been shown to be at greater risk for suicide (Beck and Van der Kolk, 1987; Beictchman et al., 1992; Goff et al., 1991; Pettigrew and Burcham, 1997; Read et al., 2001a).

Increased rates of symptomatology have also been demonstrated among psychiatric patients with histories of abuse (Bryer et al., 1987; Margo and McLees, 1991; Swett et al., 1990). Specifically, a number of investigations have demonstrated associations between childhood abuse and increased hallucinations and delusions in adulthood (Beck and Van der Kolk, 1987; Goff et al., 1991; Lysaker et al., 2001; Read et al., 2003). Read and Argyle (1999) found that 77% of psychiatric inpatients with histories of physical and/or sexual abuse experienced hallucinations, delusions, or thought disorder. Moreover, in 54% of the cases, the content of the psychotic symptomatology was related to the abuse. More recently, a number of large-scale investigations have replicated earlier findings linking childhood trauma with adult psychosis. Using data from a large national survey in Great Britain, Bebbington et al. (2004) reported a significant relationship between the occurrence of early adverse experiences (most notably for sexual abuse) and the development of psychotic disorders in adulthood. Similarly, using a large sample from the Netherlands v Mental Health Survey, Janssen et al. (2004) reported a significant relationship between the occurrence of childhood abuse and adult psychotic symptoms.

A number of investigations have demonstrated associations between childhood maltreatment and poorer cognitive functioning in adulthood, including reduced intellectual and academic functioning (Perez and Widom, 1994), deficits on tasks of verbal learning and memory (Bremner et al., 1995), working memory (Raine et al., 2001), and executive control (Mezzacappa et al., 2001), impaired eye-tracking (Irwin et al., 1999), and a higher rate of neurological soft signs (Gurvits et al., 2000). Fewer investigations have examined the relationship between maltreatment during childhood and neurocognitive functioning in schizophrenia spectrum disorders. Lysaker et al. (2001) investigated childhood sexual abuse and neurocognitive functioning in a group of individuals with schizophrenia spectrum disorders and found that after controlling for age and premorbid IQ, a history of childhood sexual abuse was associated with more impaired performance on tasks of executive functioning, working memory, and processing speed.

Despite the above findings, relatively little is known about the relationship between childhood maltreatment and the developmental course, clinical presentation, and cognitive functioning of individuals with schizophrenia spectrum disorders. This is surprising, particularly because many of the psychiatric symptoms and cognitive deficits observed in both children and adults with histories of childhood maltreatment overlap with many of those seen in schizophrenia. Deficits in verbal learning and memory, working memory, short-term memory, attention and concentration, smooth pursuit eye-tracking, and .executive functioning, as well as neurological soft signs and psychotic symptomatology are found in both conditions (Heinrichs, 2001; Palmer et al., 1997; Read et al., 2001b).

In the present study, we examined childhood neglect, and physical and sexual abuse in a sample of psychiatric inpatients with a diagnosis of schizophrenia or schizoaffective disorder. Based on previous investigations of childhood maltreatment, we hypothesized that among individuals with schizophrenia spectrum disorders, a history of neglect, physical abuse, or sexual abuse during childhood (age 0–16) would be associated with (1) poorer premorbid functioning, (2) elevated symptoms on the Anxiety/ Depression and Hallucinations/Delusions factors of the Brief Psychiatric Rating Scale (BPRS), and

(3) greater cognitive impairments on tasks of executive functioning, verbal processing speed, and perceptual organization.

2. Method

2.1. Subjects

The sample consisted of 40 patients (15 females and 25 males) recruited from an inpatient psychiatric rehabilitation research unit at a state psychiatric hospital. All subjects met DSM-IV (American Psychiatric Association, 1994) criteria for schizophrenia (n = 21) or schizoaffective disorder (n = 19) and gave informed consent to participate in the research study. Patients were between the ages of 20 and 62 (average age = 41.9 years; SD = 10.7).

2.2. Clinical assessment

DSM-IV (American Psychiatric Association, 1994) diagnoses for patients with schizophrenia and schizoaffective disorder were confirmed at the time of the study by a clinical interview with the patient, chart reviews, consultation with the program director (W.D.S., a clinical psychologist), the treating psychiatrist, and the treatment team on the unit. Patient data was used only in cases where independent ratings produced the same diagnosis. All of the 40 patients were on atypical antipsychotic medication at the time of testing.

The Brief Psychiatric Rating Scale (BPRS; Ventura et al., 1993) was used to assess the presence of current symptoms and their severity. The BPRS is a semistructured interview, consisting of 24 items that rate symptom presentation and severity on a seven-point scale, with higher scores reflecting more severe pathology. Symptom ratings were classified according to a six-factor symptom model, derived from a large sample of prior patients in the same program that includes Emotional Blunting, Psychotic Disorganization, Hallucinations/Delusions, Paranoia, Agitation/ Elation, and Anxiety/Depression (Spaulding et al., 1999). The formulas used to calculate the factor scores are reported in Table I. Because the six-factor model was derived from inpatient symptom ratings at the same treatment site as the current investigation, and because the original group of patients closely resembled participants in the current sample (i.e., levels of symptomatology, illness chronicity, etc.) it was chosen for this investigation. Interviews were completed by the first author (L.S.S.) and two research personnel working on the project. Reliability ratings were completed on five of the 40 participants using interclass correlation (ICC) procedures. The average ICC was .93.

2.3. Chart review

Demographic and premorbid functioning information was gathered from medical chart reviews. This information consisted of interviews and reports from nursing, psychiatry, psychology, and social work staff. A large amount of information was gathered from a comprehensive and detailed structured social history interview that is completed with all patients upon admission to the unit. For this investigation, we used information from the interview that inquired specifically about the age at first diagnosis, number of previous hospitalizations, educational attainment (highest grade completed), a history of school difficulty and/or poor academic functioning, a history of poor childhood social functioning with peers, and a history of childhood abuse or neglect. As part of the interview, all participants were asked screening questions about past physical abuse, sexual abuse, and neglect. If these questions were endorsed, more detailed information was gathered (described below).

"A history of school difficulty" was coded as being either present or absent, and was scored if any of the following were reported: grades that were below average (below "C"), special education classes and/or special school services (i.e., IEP), or repeating a grade. Poor childhood social functioning was also scored as being present or absent. Initially, childhood social functioning was broken down into two categories: 1) whether or not participants had few friends, and 2) whether or not participants had problems getting along with other children. "Few friends in childhood" was scored if participants had two or less friends at anyone time before the age of 16 years. "Peer problems in childhood" was scored if any of the following were reported before the age of 16 years: being picked on by other children, getting into fights on more than one occasion with other children, or

Table 1

Means, standard deviations (SD), percentages, and significance values of clinical and premorbid functioning variables in subjects with and without histories of maltreatment

	Participants with a history of childhood maltreatment	Participants with no history of childhood maltreatment	t or X^2 value	p value
Demographic variables				
Gender (males, females)	10, 8	15, 7	0.67	.41
Diagnosis (schizophrenia, schizoaffective disorder)	10, 8	11, 11	0.12	.73
Premorbid and clinical variables				
Age at first hospitalization	18.33 (6.99)	25.82 (9.55)	2.77	<.01
# of previous hospitalizations	14.11 (9.07)	8.82 (5.53)	2.72	<.05
Education level	11.44 (1.38)	12.64 (1.92)	2.21	<.05
History of school difficulties	78%	36%	6.86	<.01
History of childhood peer problems	67%	27%	6.21	<.05
BPRS Factors				
Psychotic disorganization	6.14 (2.01)	5.79 (1.80)	0.59	.56
Emotional blunting	6.17 (2.42)	5.09 (3.98)	1.00	.32
Paranoia	8.00 (2.78)	7.24 (2.53)	0.85	.40
Anxiety/depression	11.76 (4.77)	9.02 (3.63)	2.03	<.05
Hallucinations/delusions	6.10 (3.61)	6.90 (4.75)	0.61	.54
Agitation/elation	3.65 (1.44)	3.80 (1.58)	0.30	.76
Cognitive variables				
Contour integration task (% correct)	69%	62%	2.29	<.05
Hayling–part one–total seconds	15.05 (12.42)	23.40 (19.00)	1.60	.12
Hayling–part two–total seconds	50.83 (46.99)	68.40 (48.29)	1.16	.25
Brixton test errors	26.89 (12.04)	23.95 (10.32)	0.83	.41
COWAT	22.83 (12.64)	27.77 (9.76)	1.39	.17
Shipley IQ	89.66 (13.50)	89.68 (13.11)	0.01	.98

Psychotic disorganization = (bizarre behavior * .8) + (distractibility * .8) + (conceptual disorganization * .7) + (self neglect * .6) + (mannerisms and posturing * .6); a rating of 3 on each of the items generates a factor score of 10.5.

Emotional blunting = blunted affect + motor retardation + emotional withdrawal—(excitement * .5); a rating of 3 on each of the items generates a factor score of 7.5.

Paranoia = hostility + suspiciousness + uncooperative + (tension * .6) + (excitement * .5); a rating of 3 on each of the items generates a factor score of 12.3.

Anxiety/depression = depression + anxiety + guilt + tension + (suicidality * .5); a rating of 3 on each of the items generates a factor score of 13.5.

Hallucinations/delusions = hallucinations + grandiosity + unusual thought content; a rating of 3 on each of the items generates a factor score of 9.

Agitation/elation = elated mood + motor hyperactivity + (suicidality * .5); a rating of 3 on each of the items generates a factor score of 7.5.

having a difficult time keeping friends. In an effort to reduce the number of dependent variables, "few friends" and "peer problems" were combined into one score for an overall measure of poor premorbid social functioning. Participants received a score of "l" if they reported few friends in childhood and/or childhood peer problems, and a "0" if no history was reported.

Histories of childhood physical abuse, sexual abuse, and neglect were coded as being either present or absent based on information from the medical chart and from the clinical interview. Charts were also coded for whether or not the patient was removed from the home due to abuse or neglect. Physical abuse was defined as the presence of excessive physical force inflicted on the child,

which may have resulted in any number of the following: bruises, welts, bums, abrasions, lacerations, cuts, bone or skull fractures or any other evidence of physical injury. Sexual abuse cases varied from those involving nonspecific instances of "sexual behavior" to more specific reports such as touching, fondling, sodomy, intercourse, rape, and incest. In some cases, the specifics of the abuse were not documented and therefore could not be coded.

Severity of abuse was coded on a scale ranging from 1 (low intensity) to 3 (high intensity). Low intensity physical abuse included instances of no reports of a specific type of physical injury, but a report that "physical abuse" had occurred. Moderate physical abuse included instances where there was some sort of physical injury (bruises, cuts, etc.), but the injury did not require medical attention. High intensity physical abuse included more serious physical injuries such as bone fractures, burns, lacerations, and welts, many of which resulted in medical attention. Low intensity sexual abuse included instances such as mild touching, kissing, and fondling over clothes. Moderate sexual abuse included more intense physical contact such as fondling under the clothes, kissing and licking in private areas, and exposure of the child to pornography for the sexual gratification of the adult. Severe sexual abuse included oral sex, sexual intercourse, anal sex, and incest.

The frequency of abuse was coded as being 1 (low = one time), 2 (moderate = 2–10 times), and 3 (high = more than 10 times).

2.4. Instruments

The Shipley Institute of Living Scale Vocabulary subtest (Zachary, 1991) was administered to assess verbal intelligence. This subtest consists of 40 multiple-choice questions in which the participant is asked to choose which of four words is closest in meaning to a target word. The participant is required to complete each of the sequences. A vocabulary score is computed from the total number of correct responses out of 40 which can be converted into an estimated full-scale WAIS-R IQ score (Zachary, 1991).

The Hayling Sentence Completion Test from the Hayling and Brixton Tests (Burgess and Shallice, 1997) was given to all participants as a measure of verbal processing speed and verbal inhibition. During the first portion of the test, participants were read aloud 15 sentences with the last word missing, and were instructed to complete the sentence with the most appropriate word as quickly as they could (e.g., he mailed a letter without a -). Shorter response times reflected better performance. The second portion of the Hayling Sentence Completion Test involved reading a second set of 15 sentences to participants. Here, however, participants had to complete the sentence with an inappropriate word, which did not fit with the sentence (e.g., the captain wanted to stay with the sinking -). Therefore, in addition to word generating, this measured the participant's ability to inhibit a dominant response (e.g., the answer "ship"), and utilize problem-solving strategies to quickly generate a new and different response. Like the first component, shorter response times reflected better performance.

The Brixton Spatial Anticipation Test (Burgess and Shallice, 1997) was administered to assess non-verbal problem-solving and sequencing skills (Burgess and Shallice, 1996, 1997). Participants were presented with test stimuli that consisted of 54 cards. Each card contained nine open circles and one colored blue circle presented in a 5×2 pattern. The location of the blue circle changed on each succeeding card according to various implicit patterns that could change without warning. The participant was instructed to guess where he or she thought the blue circle would be on the next .card based on the current pattern (e.g., position 10-6- 10-6; or position 1, 5, 2, 6, etc.). There were 9 patterns in total. Increased numbers of errors reflected poorer performance. The Brixton Test has been shown to be sensitive to problems not only with rule detection but also to tendencies toward impulsivity and bizarre behavior (Burgess and Shallice, 1996).

Controlled Oral Word Association Test (COWAT). The COWAT (Spreen and Benton, 1997) measures verbal fluency and word generating ability, or the ability to rapidly generate and organize verbal information. In a series of 60-s trials, participants were asked to name as many words as possible that began with specified letters of the alphabet F, A, and S. Total number of words generated was scored.

The Contour Integration Test. The Contour Integration Test (Kovacs et al., 1999) was administered on

three consecutive days as an index of learning and visual context processing. It consists of 15 cards which contain varying numbers of Gabor elements against a uniform gray background (see Fig. 1). Contour integration is a basic process of the visual system, involving the linking of correlated visual features (in this case, based on orientation information) so they are perceived as coherent wholes. The test is thought to involve long-range horizontal connections between spatial filters in the visual system that are thought to be identical to the long-range connections necessary to dynamically group contextually-related bits of information together in other areas of cognition such as selective attention, memory, and learning (Phillips and Singer, 1997). Therefore, contour integration is a basic measure of context processing. In non-clinical populations, contour integration ability gradually develops throughout childhood and adolescence (Kovacs et al., 1999). In schizophrenic populations, impaired task performance has been correlated with higher levels of disorganized symptomatology (Silverstein et al., 2000). The participant's task was to detect and trace the circular contour that is formed

Fig. 1. Example of a test card. A closed path of Gabor signals is embedded in noise. The observer is asked to locate the position of the contour. The ratio of element spacing in the noise background to spacing along the contour (*D*) is 1.0 in this example.

by a subset of the elements. The stimuli increase in difficulty level incrementally throughout the task. At the easiest levels, the contour elements were closer together than the background elements, and the contour could be detected solely by density cues (see Fig. 2). At more difficult levels, however, the density of the background elements increased while the spacing of contour elements remained the same, forcing the observer to rely on the activity of long-range horizontal connections to perceive the gestalt. There was a 30-s limit for each card.

2.5. Data analysis

T-tests were used in cases that involved continuous variables and Pearson chi-square analyses were used in cases that involved categorical variables. Initially, analyses for this study involved comparisons between participants with and without histories of childhood abuse/neglect on the premorbid functioning, symptom, and cognitive variables. Comparisons also examined the effects of abuse frequency and severity using the same dependent variables. All of the significant dependent variables were then entered into a factor analysis to reduce the number of dependent variables. Subjects were divided into three groups based on the number of types of abuse they experienced (i.e., zero, one type, two or more). A MANOVA and linear trend analysis were used to examine relationships between the number of different types of abuse and factor score performance. All significance tests were two-tailed.

3. Results

Of the 40 participants, 18 (45%) had childhood histories of neglect, physical, and/or sexual abuse (8 females and 10 males). The numbers of participants who fell into each of the maltreatment categories was as follows: neglect only (*n* = 0), physical abuse only (*n* = 6), sexual abuse only (*n* = 4), neglect and physical abuse (*n* = 1), neglect and sexual abuse (*n* = 1), physical and sexual abuse (*n* = 4), and neglect, physical and sexual abuse (*n* =2). Data on the age of onset for abuse was documented for 11 of the 18 participants and ranged from 2 months to 16 years of age (mean age of onset= 5.55 years ± 4.61).
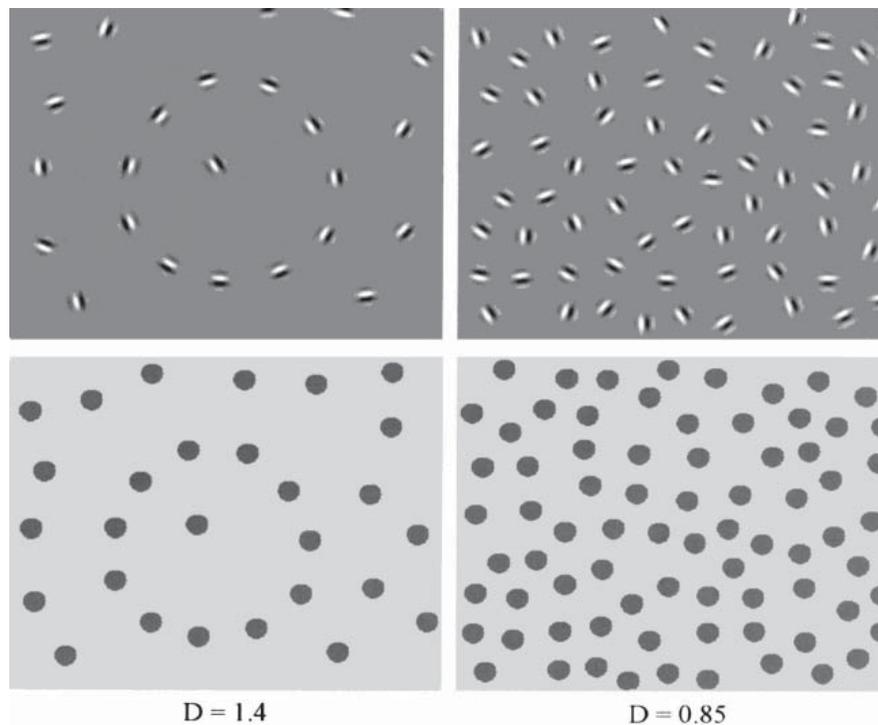
Fig. 2. Examples of Gabor-defined contours with different *D* values (left: *D* = 1.4, right: *D* = 0.85.). In the bottom panels, Gabor elements are replaced by round disks. Without orientation cues, the contour remains invisible at *D* < 1, and this is the range where perceptual organization depends on long-range, horizontal, excitatory interactions between feature detectors. The Contour Integration Test stimuli consisted of panels like those at the top, but the actual stimuli were approximately eight times larger than those presented in the figure, while the contour was only slightly larger than depicted.

Abuse frequency was documented for 16 of the 18 cases. There were no participants that reported only one incident of abuse. Ten participants reported abuse/neglect that occurred 2–10 times, and six participants reported abuse that occurred more than 10 times. In terms of abuse severity, 16 ratings were available with two instances of low, eight instances of moderate, and six instances of high severity. Four of the participants had been removed from the home due to abuse.

A history of childhood abuse was associated with a greater number of previous hospitalizations, an earlier age at first hospitalization, lower educational attainment, a history of school difficulty, and a history of problems with childhood peers. Childhood abuse was not associated with gender or diagnosis of schizophrenia verses schizoaffective disorder. See Table 1 for means, standard deviations, percentages, and significance values.

History of childhood abuse was associated with elevated scores on the Anxiety/Depression factor of the BPRS. No other significant relationships were observed between BPRS factor scores and abuse history (Table 1).

On the contour integration task, patients with a history of abuse performed more poorly compared to controls (i.e., were characterized by a higher detection threshold). There were no significant associations between history of abuse and Shipley estimated verbal IQ, or any indices on the Hayling and Brixton Neuropsychological Assessment, including time to generate a word in order to completed a sentence, time to generate a word that did not fit with a sentence, or nonverbal problem solving on the Brixton Spatial Anticipation Test. There were also no significant associations between history of abuse and total words generated on the COWAT (Table 1).

In terms of abuse frequency, participants who experienced more instances of abuse (> 10 times) had significantly higher symptom ratings on the BPRS Hallucinations/Delusions factor ($t(14) = -4.07$, $p < .05$) than par-

ticipants who experienced fewer instances. Differences in the severity of abuse were also examined. Because only two participants reported low severity, the low and moderate severity groups were combined into one. Participants with high abuse severity also had significantly higher symptom ratings on the Hallucinations/Delusions factor from the BPRS ($t(14) = -5.43, p < .01$) than participants with low/ moderate abuse severity. No other BPRS factors were associated with abuse frequency or severity.

A factor analysis was performed using all of the dependent variables on which the groups differed (BPRS items on which the groups differed significantly were used in place of factor scores). Items entered into the factor analysis included number of previous hospitalizations, Contour Integration Test score, the childhood peer problems variable, educational attainment, history of school difficulty, age at first hospitalization, and BPRS suicide, BPRS depression, BPRS motor hyperactivity, and BPRS excitement. Using varimax rotation, a loading cutoff value of .4, and an eigenvalue of 1, a two-factor solution emerged that accounted for 46% of the total variance (Table 2). The first factor was characterized as a developmental factor that represented poor premorbid functioning (peer problems in childhood, history of school difficulty, lower education attainment, and earlier age at first hospitalization). The second factor was characterized as a clinical factor that represented greater symptomatology and more impaired cognitive functioning (greater number of previous hospitalizations, an increase in suicidality,

an increase in depression, a decrease in motor hyperactivity, a decrease in excitement, and a decrease in visual-perceptual organization).

Due to the small number of participants that ended up comprising each of the abuse categories (neglect, physical and sexual abuse), group classifications were divided according to the number of types of abuse each participant experienced. Ten participants reported one type of abuse (either physical or sexual abuse) and eight participants reported two or more types of abuse/neglect (some combination of neglect, physical abuse, or sexual abuse).

Proper factor scores were derived for each participant on each of the two factors and were used in a MANOVA to examine relationships between the number of types of abuse each participant experienced in childhood (i.e., zero, one, or two or more) and scores on each of the two factors (premorbid functioning and clinical/cognitive functioning). A MANOVA revealed a significant group effect (Wilks' Lambda = .39, $F(4, 72) = 10.73$, $p < .001$) and between-subjects effects tests indicated significant differences between the groups on both factors. Post hoc multiple comparison testing was performed using Tukey's HSD (Table 3). On the premorbid functioning factor, participants with two or more types of childhood maltreatment had significantly higher scores compared to participants with no maltreatment history. There was a trend toward significance for participants who had one type of maltreatment to have higher scores compared to participants with no maltreatment history ($p < .1$). On the clinical/cognitive factor, participants with one type of maltreatment, as well as participants with two or more types of maltreatment scored significantly higher compared to participants with no maltreatment. On neither factor, were there significant differences between participants with one type of childhood maltreatment and participants with two or more types.

While not all post hoc comparisons were significant, the observed pattern of scores is in the predicted direction, suggesting that exposure to multiple forms of abuse leads to greater impairment than exposure to a single form of abuse, which is associated with greater impairment than in cases of no abuse. In support of this hypothesis, tests for a linear trend across groups indicated significant effects for both the premorbid ($F(1, 39) =$

Table 2
Factor pattern matrix

Variable	Factor 1: Developmental/ premorbid	Factor 2: Clinical/ cognitive
Peer problems in childhood	.78*	.02
Hx of school difficulty	.72*	−.06
Educational attainment	−.69*	−.03
Age at first hospitalization	−.67*	−.30
# of previous hospitalizations	.27	.47*
BPRS depression	−.13	.76*
BPRS suicide	.22	.72*
BPRS motor hyperactivity	.39	−.58*
BPRS excitement	−.05	−.51*
Contour day 2	−.12	−.44*

* Loadings > .4.

Table 3
Average factor scores, standard deviations (SD), and post hoc analyses of participants with zero, one, and two or more types of childhood maltreatment

	No childhood maltreatment (group A)	One type of childhood maltreatment (group B)	≥2 Types of childhood maltreatment (group C)	Post hoc comparisons
Developmental/ premorbid factor	−.39 (.95)	.37 (.96)	.60 (.75)	$A<B^t$ $A<C^*$ $B=C$
Clinical/cognitive factor	−.55 (.63)	.43 (.91)	.98 (.99)	$A<B^{**}$ $A<C^{***}$ $B=C$

Higher scores reflect greater impairment.
$t=p<.1$; $*p<.05$; $**p<.01$; $***p<.0001$.

6.73, $p <.05$) and clinical cognitive ($F(1, 39) = 22.28$, $p < .001$) factor scores (both tests using unweighted estimates).

4. Discussion

The present investigation replicated past findings that a history of childhood maltreatment is associated with greater academic difficulties, lower educational attainment, poorer peer relationships, an earlier age at first hospitalization, and a greater number of psychiatric hospitalizations (Bryer et al., 1987; Carrey et al., 1995; Erickson et al., 1989; Goff et al., 1991; Perez and Widom, 1994; Read, 1998; Vondra et al., 1990). Moreover, this investigation replicated these findings using a sample of adult patients at a state hospital diagnosed with schizophrenia spectrum disorders, and is the first investigation using this population to systematically investigate the type, frequency, severity, and age of onset of childhood maltreatment.

As hypothesized, participants with histories of childhood maltreatment exhibited more depression and suicidality, which is consistent with results from previous investigations with general psychiatric populations (Fergusson et al., 1996; Pettigrew and Burcham, 1997; Read, 1998; Weiss et al., 1999). Past studies have reported associations between childhood abuse and psychotic symptomatology in adulthood, most notably increased hallucinations and delusions (Lysaker et al., 2001; Read and Argyle, 1999; Read et al., 2003). Although we did not find a direct association between the presence of childhood maltreatment and an increased overall positive symptom factor score, we did find a significant relationship between both the frequency, as well as the severity of childhood maltreatment and elevated hallucinations and delusions on the BPRS, replicating past re-

ports. Such findings highlight the significance of both the number of times childhood maltreatment occurs, as well the intensity with which it occurs, as meaningful factors in the development of later psychotic symptomatology. Moreover, these data appear to be consistent with the traumagenic neurodevelopmental model of schizophrenia proposed by Read et al. (2001b), which views the effects of early traumatic experience on the developing brain as the mechanism for increased risk of psychotic symptoms later in life. Specifically, early trauma and resulting neurodevelopmental changes in the brain, particularly in the hypothalamic–pituitary–adrenal (APA) axis and related systems, are hypothesized to result in an oversensitivity to stress, and a heightened risk for the development of psychotic symptomatology (Read et al., 2001b, 2004).

This investigation found a relationship between childhood abuse and deficits on the contour integration task. This finding provides further evidence for perceptual dysfunction in schizophrenia (Phillips and Silverstein, 2003), and suggests that schizophrenia participants with histories of childhood maltreatment show significantly greater impairment in perceptual grouping than those without maltreatment histories. It is worth noting that contour integration ability is known to develop gradually during childhood, and does not develop fully until late adolescence as neural connections in the cortex strengthen. Developmentally, contour integration ability appeared to be delayed, as participants with schizophrenia with a history of abuse performed much like 5–6 year old children in previous investigations (Kovacs et al., 1999).

This investigation did not find an association between history of maltreatment and deficits on tasks of executive functioning, verbal fluency, or verbal processing speed. Differences on these tasks would have

been expected based on recent theories suggesting that childhood trauma may serve to exacerbate the occurrence of cognitive deficits in schizophrenia populations (Lysaker et al., 2001; Read et al., 2001a,b). Evidence for this theory comes from recent findings indicating more impaired neurocognitive functioning in people with schizophrenia with histories of childhood sexual abuse compared to those with no abuse history (Lysaker et al., 2001). One possible explanation for the lack of significant findings in the present investigation may have been that the neuropsychological tests were not sensitive enough and/or there was not sufficient power to detect differences between the two schizophrenia groups. Future investigations using larger samples, and a more comprehensive battery of cognitive tasks are needed to investigate relationships between childhood maltreatment and cognitive functioning in schizophrenia populations.

There were no differences between participants who experienced one type of childhood maltreatment and those who experienced two or more types on the premorbid functioning factor or the clinical/cognitive factor. On the clinical/cognitive factor, the presence of just one type of abuse was enough to differentiate the maltreatment group from the no maltreatment group. Participants with one type of childhood maltreatment, as well as participants with two or more types of childhood maltreatment, were significantly more impaired on the clinical/cognitive factor than participants with no history of childhood maltreatment. However, on the premorbid functioning factor, it took two or more "hits" or types of childhood maltreatment before significant differences between the groups emerged. Although those with only one type of maltreatment were not significantly different from those with no history of maltreatment on post hoc tests, tests for a linear trend indicated a significant effect across the 0, 1, and 2-or-more types of abuse groups. Unlike individuals with histories of multiple forms of childhood maltreatment, individuals with histories of just one type may not have reached a level of maltreatment severity required to produce measurable effects on the premorbid variables. For example, in the present study, 71% of participants who reported just one type of abuse also reported low/moderate abuse severity.

In addition, it might be that some of the effects of childhood maltreatment are cumulative and become more evident later in adulthood, and/or after illness onset. A number of studies have shown an increased risk for adult trauma and/or victimization among individuals who were maltreated as children (Briere and Elliott, 2003; Cloitre et al., 1996; Gladstone et al., 2004; Lang et al., 2004; Messman-Moore and Brown, 2004). Moreover, investigations have also demonstrated that psychiatric patients with serious mental illness are at an increased risk for victimization (Goodman et al., 1997,2001; Fitzgerald et al., 2005). For example, among chronically mentally ill outpatients, Goodman et al. (2001) reported a 90% rate of physical abuse and a 79% rate of sexual abuse among women, and a 71 % rate of physical abuse and a 19% rate of sexual abuse for men in adulthood. Read et al. (2003, 2004) has suggested that, among individuals who experienced childhood trauma, retraumatization later in life could play an important role in the development of psychosis by way of increased vulnerability to stress. This theory is supported by a recent investigation which found that the relationship between childhood sexual abuse and later hallucinations among psychiatric patients became stronger when patients had also suffered adult sexual abuse (Read et al., 2003).

There are a number of limitations to this study. The sample size of participants was small ($n = 40$) compared to the overall number of analyses that were performed. In light of this, therefore, our findings must be interpreted with caution. Additionally, this investigation found relatively lower rates of childhood abuse (45%) compared to previous studies of inpatient psychiatric populations (60–69%, Read et al., 2004). The relatively lower rates found in this study may have been the result of the way in which participants were asked about maltreatment history. Subjects in this study were asked more general questions of whether or not "abuse and/or neglect" had occurred in the past, as opposed to being asked specific questions about abuse or neglect (e.g., "did anyone do anything sexual to you as a child that made you feel uncomfortable?"), as the later has been shown to produce higher rates of disclosure (Dill et al., 1991)[1]. Thirdly, this sample was characterized by more

[1] We thank an anonymous reviewer for bringing this issue to our attention.

chronic and treatment refractory psychiatric inpatients and limits generalizability to the broader array of individuals with schizophrenia spectrum disorders.

Although this investigation is the first to report a greater amount of detailed information regarding the type, frequency, and severity of childhood maltreatment in schizophrenia populations, information was gathered retrospectively and detailed information was limited. As a result, this investigation was unable to include a number of factors known to be associated with childhood abuse. For example, important variables such as whether the perpetrator was a family member, whether or not there were multiple perpetrators, and the amount of contact the child had with the perpetrator after the abuse occurred would have added important information. Also, larger studies, using a more inclusive battery of cognitive tests, are required to definitively determine whether childhood abuse differentially affects cognitive functioning in adulthood. Lastly, retrospective data, such as reports of premorbid functioning and abuse details, may have been limited by reporter bias and difficulties with recall. However, previous investigations have demonstrated that reports of adult psychiatric patients regarding childhood abuse are generally reliable (Goodman et al., 1999; Herman and Schatzow, 1987; Read et al., 2003) and that such reports among patients with schizophrenia are as reliable as that found in the general population (Darves-Bornoz et al., 1995).

All patients in this investigation met DSM-IV criteria (American Psychiatric Association, 1994) for schizophrenia or schizoaffective disorder. Although this investigation did not directly investigate post traumatic stress disorder (PTSD) and borderline personality disorder (BPD), it could be possible that factors inherent to PTSD or BPD were, in part, responsible for the findings. Future investigations examining early maltreatment and schizophrenia should consider the potential contributions of these comorbid diagnoses.

In this investigation, we defined maltreatment as neglect, or physical or sexual abuse. Although these are quite different categorically, and may have resulted in varied traumatic experiences, recent research in this area has suggested that the frequency and severity of childhood maltreatment may be a more meaningful predictor of later psychological adjustment than the type of mal-

treatment (Higgins, 2004). However, future research is needed to clarify this issue and to better examine the effects of specific types of child maltreatment in adults with schizophrenia spectrum disorders. Moreover, these are not the only types of childhood experiences that would be considered traumatic and/or abusive. Childhood events such as exposure to domestic violence and/or overly conflictual home environments, psychological or emotional abuse, death, and even divorce, are often overlooked and can cause significant stress. Future investigations that examine childhood trauma and/or maltreatment should be large enough to include these variables as part of a more comprehensive picture of childhood experiences.

The present findings highlight a clear relationship between childhood maltreatment and a more severe course of illness among individuals with schizophrenia spectrum disorders. Further investigations using larger sample sizes as well as prospective studies that document childhood trauma and follow the developmental paths of children thought to be at risk for schizophrenia are needed. Such investigations should include a more detailed inquiry on the occurrence of abuse and/or trauma, and should include specific questions related to traumatic experience. Investigations such as these will help researchers better understand the potential relationships between early trauma and the development and course of schizophrenia spectrum disorders.

The results of this investigation have several clinical implications. Despite high rates of childhood maltreatment among individuals with serious mental .illness, many in the mental health field fail to routinely assess for abuse history (Read 'and Fraser, 1998; Young et al., 2001). Based on findings from this study and others linking childhood trauma and psychosis in psychiatric populations, and particularly schizophrenia spectrum populations, greater attention should be given to the occurrence of early traumatic experience and its role in the presentation and treatment of psychotic symptoms. A routine assessment of trauma history should be part of standard clinical care for both inpatient and outpatient populations (Agar et al., 2002; Read and Fraser, 1998; Read and Ross, 2003; Dill et al., 1991). Moreover, psychiatric staff should be adequately trained on when and how to obtain abuse histories (e.g., within the context

of a safe and confidential setting) as clinicians have reported reluctance to ask about abuse history, particularly when evaluating individuals with schizophrenia, due to holding to a biological model of etiology, fear of upsetting the patient, and other factors (Young et al., 2001). Additionally, the implementation of integrated treatment approaches are needed for this population (Read, 1997; Read et al., 2003). Such treatments hold the promise for better addressing the needs of traumatized individuals who experience psychosis.

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