Childhood trauma and prodromal symptoms among individuals at clinical high risk for psychosis

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ABSTRACT

Introduction: Numerous studies point to an association between childhood trauma and the later development of psychotic illness. However, little is known about the prevalence of childhood trauma and its relationship to attenuated positive and other symptoms in individuals at heightened clinical risk for psychosis.
Method: Thirty clinical high-risk patients (83% male, 43% Caucasian, and with a mean age of 19) were ascertained from the New York metropolitan area and evaluated for prodromal and affective symptoms, and queried regarding experiences of childhood trauma and abuse.
Results: Ninety-seven percent endorsed at least one general trauma experience, 83% reported physical abuse, 67% emotional abuse, and 27% sexual abuse. As hypothesized, total trauma exposure was positively associated with severity of attenuated positive symptoms (in particular grandiosity), an effect primarily accounted for by ethnic minority participants, who reported greater exposure to trauma. Trauma exposure was related to affective symptoms only in the Caucasian subgroup.
Conclusions: Childhood trauma was commonly self-reported, especially among clinical high-risk patients from ethnic minorities, for whom trauma was related to positive symptoms. Future areas of research include an evaluation of potential mechanisms for this relationship, including neuroendocrine and subcortical dopaminergic function.

1. Introduction

Multiple lines of research suggest that traumatic childhood experiences (e.g., sexual and/or physical abuse, separation from or loss of parent) are associated with the development of psychotic illness. Population-based studies show an association between childhood trauma and later psychosis (Janssen et al., 2004; Shevlin et al., 2007; for reviews, see Krabbendam, 2008; Morgan and Fisher, 2007). Self-reported childhood trauma is prevalent in individuals with psychotic disorder (for reviews, see Bendall et al., 2008; Morgan and Fisher, 2007), and at rates higher than what is found in healthy controls (Agid et al., 1999; Morgan et al., 2007; Nettelbladt et al., 1996; for review, see Bendall et al., 2008). Among individuals with schizophrenia, childhood trauma has been associated both with severity of psychotic symptoms (Lysaker et al., 2001; Schenkel et al., 2005; Üçok and Bikmaz, 2007; but see Goff et al., 1991), and with severity of depressive and/or anxiety symptoms (Lysaker et al., 2005; Schenkel et al., 2005; Spence et al., 2006). By

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contrast, childhood trauma is less clearly related to severity of negative symptoms (Lysaker et al., 2001; Schenkel et al., 2005; Ücok and Bikmaz, 2007; for review, see Read et al., 2005).

Childhood trauma also apparently bears an association with subclinical psychotic-like experiences in both adolescent and adult non-clinical samples (Berenbaum, 1999; Campbell and Morrison, 2007; Gracie et al., 2007; Lataster et al., 2006). Such nonclinical psychotic experiences are associated with an increased risk of psychotic illness (e.g., Poulton et al., 2000). However, little is known about the prevalence of childhood trauma and its relationship to attenuated positive and other symptoms in clinical samples of adolescents and young adults identified as "prodromal" to, or at heightened clinical risk for, psychosis. This is important to identify, given the rates of conversion to psychotic illness among young people meeting prodromal research criteria (see Cannon et al., 2008). Based on the aforementioned literature, we hypothesized that childhood trauma would be frequently reported and related to positive and affective symptoms in a clinical high-risk cohort. As this is a relatively unique study, we also conducted exploratory analyses as to specific positive symptoms and various domains of trauma, to inform future studies. For example, we evaluated symptom associations with separation from a parent in this prodromal cohort, as this experience has been associated with psychotic illness (Mallett et al., 2002; Morgan et al., 2007).

2. Method

2.1. Participants

Participants were 30 individuals between the ages of 13 and 25 who were identified as prodromal to psychosis using the Structured Interview for Prodromal Syndromes/Scale of Prodromal Symptoms (SIPS/SOPS; Miller et al., 2003). Exclusion criteria included a history of "threshold" psychosis (as defined by the SIPS/SOPS), serious risk of harm to self or others, mental retardation, and lack of fluency in English. All participants provided either informed consent (for those ages 18 and older) or assent with parental consent (for those under age 18). This study was approved by the Institutional Review Board of the New York State Psychiatric Institute.

The 30 participants had a mean age of 18.8 (SD 3.7) and were primarily male ($n = 25$; 83%). Seventeen participants (57%) were of ethnic minority status. Specifically, 4 (13%) were African American, 8 (27%) Hispanic, 2 (7%) Asian, and 3 (10%) multi-racial; the remaining 13 (43%) were Caucasian.

2.2. Measures

The SIPS/SOPS was used to determine candidacy for the study and to assess severity of positive, negative, disorganized, and nonspecific prodromal symptoms. Positive symptoms included unusual thought content, suspiciousness, grandiosity, perceptual abnormalities and conceptual disorganization. The SIPS/SOPS was administered by or rated in consensus with CC, who co-developed the instrument (Miller et al., 1999) and established reliability with the Recognition and Prevention prodromal research program (RAP) at Hillside Hospital (ICCs > .70 for individual scale items and 100% for syndrome classification). Current depressive and anxiety symptoms (last 7 days) were measured with the Hamilton scales (Hamilton, 1960, 1976).

Self-reported childhood trauma was retrospectively assessed with the Early Trauma Inventory (ETI; Bremner et al., 2000), a 56-item semi-structured interview that probes for traumatic experiences of varying degrees of severity that occurred before age 18. Specific experiences assessed by the ETI are grouped into four domains: general trauma (24 items; e.g., death of a parent); physical abuse (including physical punishment; 9 items; e.g., spanked, punched, shoved); emotional abuse (8 items; e.g., ridiculed, neglected); and sexual abuse (15 items; e.g., inappropriate touching, exposure to genitalia). Physical assault experiences reportedly perpetrated by strangers were included under the general trauma subscale, whereas physical and emotional abuse allegedly perpetrated by family members and peers were included in the physical abuse and emotional abuse subscales, respectively. The ETI collects information on the frequency, age of onset and termination, and respondent-rated concurrent emotional impact of each experience reported. Participants between the ages of 13 and 17 were asked to report on experiences occurring at any time in the past. With these younger participants, language used to inquire about sexual abuse was modified as appropriate. Family members and clinicians were not routinely asked for collateral information regarding trauma experiences reported by participants. The ETI was administered by trained clinical researchers.

A dichotomous (yes/no) score for parental loss and/or separation was calculated to specifically reflect loss of or separation from a parent(s) due to death, divorce, or being raised by caregivers other than the parent(s) for at least six months. This score was determined using specific ETI items and other information collected during the ETI interview. Parental socioeconomic status (SES) was estimated using occupation rankings of the Hollingshead Index of Social Status (Hollingshead, 1975; coded by two raters; highest parental rating used); parental education was not used.

2.3. Data analysis

Trauma scores were calculated for each domain by simply counting the number of items endorsed, as scores derived from more complex strategies (e.g., weighting scores by frequency, emotional impact) have not proven to be more predictive of adult post-traumatic stress disorder symptom severity (Bremner et al., 2007). For rare instances of missing data, subscale scores reflected the prorated sum of experiences endorsed. Data were missing for 4 of the 15 sexual abuse items for 7 participants; these data were imputed as "no" for 6 participants based on clinical information available and their negative responses to the remaining sexual abuse items, and treated as missing for 1 participant. As sexual abuse was only rarely endorsed, this variable was dichotomized as yes/no. The other ETI domain scores (i.e., general trauma, physical abuse, and emotional abuse) were treated as continuous. As several symptom and trauma score distributions were positively skewed, Spearman correlations (for continuous variables), biserial or point-biserial correlations (for dichotomous-continuous variable pairings), or chi square (for dichotomous variables) were used. Alpha was set at .05

Table 1
Trauma and symptom scores and their associations with ethnicity

Score	Caucasian (n = 13)	Ethnic Minority (n = 17) [a]	r_{pb} or χ^2	p
Total trauma [b] (ETI)	5.75 (4.14); range = 1–14	10.82 (6.57); range = 3–24	.41	.03
-General	3.08 (2.22); range = 1–7	4.24 (2.31); range = 0–8	.25	.18
-Physical abuse	1.31 (1.11); range = 0–4	3.24 (2.49); range = 0–8	.44	.02
-Emotional abuse	1.38 (1.80); range = 0–5	2.76 (2.44); range = 0–7	.31	.10
-Sexual abuse	15%	35%	1.49	.22
Separation from parent [c]	23%	82%	10.54	<.01
Total positive symptoms (SIPS/SOPS)	11.85 (4.86); range = 5–21	14.59 (3.68); range = 5–19	.32	.09
Depressive symptoms (HRSD)	8.23 (4.46); range = 3–16	11.76 (7.27); range = 0–26	.28	.13
Anxiety symptoms (HRSA)	6.77 (4.17); range = 2–15	8.65 (6.65); range = 0–26	.17	.38

Note: ETI = Early Trauma Inventory; HRSA = Hamilton Rating Scale for Anxiety; HRSD = Hamilton Rating Scale for Depression; SIPS/SOPS = Structured Interview for Prodromal Syndromes/Scale of Prodromal Symptoms.
Associations between ethnic group and trauma or symptom scores examined with point-biserial correlations (r_{pb}) except for sexual abuse and separation from parent, for which associations with ethnic group assessed with chi square (χ^2).
[a] 13% African American, 27% Hispanic, 7% Asian, and 10% multi-racial.
[b] Total trauma score missing for 1 Caucasian participant due to missing sexual abuse items; thus N = 29 for this score.
[c] Separation from a parent(s) due to divorce or being raised by caregivers other than the parent(s) for at least six months; see text.

(two-tailed) for hypothesized associations of total trauma scores with positive, depressive, and anxiety symptoms.

3. Results

All participants met SIPS/SOPS criteria for the attenuated positive symptom prodromal syndrome, and 8 (28%) also met criteria for genetic risk (with a first-degree relative with psychotic illness) with recent functional decline (as described in Miller et al., 2003). Twenty nine participants (97%) endorsed at least one general trauma experience, 25 (83%) reported a history of physical punishment or abuse, 20 (67%) endorsed childhood emotional abuse, and 8 (27%) reported childhood

sexual abuse. Seventeen participants (57%) experienced parental separation, but none experienced loss of a parent through parental death.

Total trauma scores were not associated with age (p = .92), sex (p = .45), family history of psychotic illness (p = .19), or parental SES (p = .42). By contrast, childhood trauma was related to ethnic status (Table 1). Specifically, ethnic minority participants (n = 17) endorsed more trauma experiences (in particular physical abuse) and were more likely to have experienced separation from a parent than Caucasian participants (n = 13). Similarly, positive symptom severity was not associated with age (p = .25), sex (p = .91), family history (p = .70), or parental SES (.89), whereas it was related at the trend level to ethnicity (Table 1). Depressive and anxiety symptom severity, respectively, were not related to the demographic features examined (age: p = .60 and .90; sex: p = .44 and .46; family history: p = .97 and .79; parental SES: p = .50 and .20; ethnicity: p = .13 and .38). Given ethnic differences in both reported trauma exposure and positive symptom severity, trauma–symptom associations were examined for the total sample and by ethnic subgroup separately (except for sexual abuse, endorsed by only 2 Caucasian participants). Of note, the ethnic groups did not differ significantly on age (p = .72), sex (p = .87), or parental SES (p = .22). Family history of psychosis was present in 6/17 (35%) of the ethnic minority and 2/12 (17%) of the Caucasian participants; this difference was not statistically significant (p = .27).

As hypothesized, childhood trauma was significantly associated with positive symptom severity in the total sample. Specifically, physical and sexual abuse (and emotional abuse at the trend level; p = .07) were related to positive symptoms, most notably grandiosity. However, this effect was primarily accounted for by ethnic minority participants (Table 2). Of note though, emotional abuse was moderately associated with total positive symptom severity in both ethnic subgroups. A different pattern emerged for affective symptoms: Although total childhood trauma bore no relation to affective symptoms within the entire cohort (depression: p = .23; anxiety: p = .23) or among ethnic minority participants (depression: p = .49; anxiety: p = .66), it was highly correlated with depressive and anxiety symptoms only in the Caucasian subgroup (specifically general trauma and physical abuse; Table 2). By contrast, total trauma was not associated with negative symptom

Table 2
Associations of trauma scores with positive and affective symptoms for the total sample and by Caucasian and minority subsamples

Symptom	General trauma r_s			Physical abuse r_s			Emotional abuse r_s			Sexual abuse (Y/N) r_b			Total trauma score r_s		
	Total	C	EM	Total	C	EM	Total	C	EM	Total	C [a]	EM	Total	C	EM
Positive – total (SIPS/SOPS)	.15	−.05	.16	.43*	−.01	.42	.34	.34	.27	.42*	–	.43	.44*	.11	.38
-Unusual thought content	.17	−.18	.31	.33	.12	.19	.13	.21	−.12	.28	–	.26	.31	.06	.19
-Suspiciousness	−.05	−.27	.04	.38*	.16	.49*	.10	−.04	.12	.28	–	.39	.16	−.10	.24
-Grandiosity	.20	−.43	.52*	.32	−.49	.61**	.39*	.26	.49*	.42*	–	.55*	.37*	−.37	.72**
-Perceptual abnormalities	.14	.07	−.13	.22	.01	.06	.21	.24	−.12	.23	–	−.03	.27	.15	−.11
-Conceptual disorganization	−.11	.06	−.30	.10	.29	−.14	.03	.06	−.01	.07	–	−.07	.06	.21	−.13
Depressive (HRSD)	.28	.74**	−.05	.11	.51	−.25	.13	.33	−.12	−.05	–	−.31	.23	.79**	−.18
Anxiety (HRSA)	.26	.69**	−.03	.16	.61*	−.18	−.02	.29	−.23	−.01	–	−.23	.23	.77**	−.12

Note: C = Caucasian subsample; EM = ethnic minority subsample; HRSA = Hamilton Rating Scale for Anxiety; HRSD = Hamilton Rating Scale for Depression; N = no; SIPS/SOPS = Structured Interview for Prodromal Syndromes/Scale of Prodromal Symptoms; Total = total sample; Y = yes.
N = 30 except for analyses involving Total trauma, for which N = 29.
[a] Associations not examined separately for Caucasian subsample, as only 2 Caucasian participants endorsed sexual abuse.
* $p \le .05$.
** $p \le .01$.

severity within the total cohort ($p=.76$) or either ethnic subgroup (Caucasian: $p=.88$; minority: $p=.60$). As was seen with positive symptoms however, childhood trauma, particularly physical abuse, was associated with symptoms of disorganization (total trauma: $p=.02$; physical abuse: $p<.01$). Exploratory analyses indicated that those who experienced parental separation did not differ on positive ($p=.50$), depressive ($p=.69$), or anxiety ($p=.62$) symptom severity from those who did not; this was the case for the total cohort and among both ethnic subgroups.

4. Discussion

To the best of our knowledge, this is the first published report on associations between childhood trauma and severity of symptoms in adolescents and young adults identified as putatively prodromal to psychotic illness. As hypothesized, positive symptoms were associated with self-reported exposure to trauma, specifically childhood abuse. Among positive symptoms, grandiosity bore the greatest relationship to trauma exposure. Although preliminary in nature, our results suggested ethnic differences in the types of symptoms associated with trauma exposure, with positive symptoms relevant in ethnic minorities and affective symptoms related to trauma in Caucasian high-risk individuals. Of interest, parental socioeconomic status was not related to either trauma exposure or positive symptom severity.

An association between reported childhood abuse and positive symptom severity in young people at risk for psychotic disorder is consistent with what is found in individuals with schizophrenia (Lysaker et al., 2001; Schenkel et al., 2005; Ücok and Bikmaz, 2007). A relationship of trauma to affective symptoms (as found in the Caucasian subgroup) is also seen in schizophrenia (Lysaker et al., 2005; Schenkel et al., 2005; Spence et al., 2006). Of the positive symptoms assessed, we found that grandiosity was most notably associated with trauma exposure in this prodromal cohort. Exploratory analyses also suggested a relationship between childhood physical abuse and suspiciousness, which is consistent with non-clinical studies suggesting an association between childhood trauma and paranoid tendencies (Gracie et al., 2007; Campbell and Morrison, 2007). Childhood trauma did not appear to be related to perceptual abnormalities in this clinical sample, in contrast to what has been observed in non-clinical samples (Berenbaum 1999; Campbell and Morrison, 2007; Whitfield et al., 2005).

Our findings of ethnic differences in trauma–symptom associations are of interest but should be viewed as tentative, given the small sample sizes of the ethnic subgroups and the grouping of disparate ethnicities into one group. The apparent lack of association between trauma and positive symptoms in the Caucasian subgroup may be due to insufficient power and because the Caucasian participants endorsed fewer traumatic events. This finding, which is consistent with other studies (Hussey et al., 2006; Mallett et al., 2002; Morgan et al., 2007), resulted in a truncated range of scores compared to those of the minority subgroup. Future studies with larger sample sizes are needed to clarify if there are true ethnic differences in the types of symptoms associated with childhood trauma.

It has been proposed that early exposure to trauma may increase risk for psychotic illness (see Krabbendam, 2008; Morgan and Fisher, 2007; Read et al., 2001). This may occur through the effects of early adverse experiences on subcortical dopamine regulation, abnormalities of which have been associated with schizophrenia (e.g., Laruelle et al., 1999; see Guillin et al., 2007). Animal studies have indicated that social isolation rearing can result in subcortical dopamine hyperresponsivity (Lapiz et al., 2003), and in humans, low maternal care in childhood may be associated with greater stress-induced striatal dopamine release in adulthood (Pruessner et al., 2004; Soliman et al., 2008). Early trauma is associated with hyperresponsivity of the hypothalamic-pituitary-adrenal (HPA) axis in adulthood (Heim et al., 2000; for review, see Mello et al., 2003), and it has been hypothesized that such HPA axis abnormalities may serve to increase risk for psychosis in vulnerable individuals through HPA-dopamine system interactions (Corcoran et al., 2003; Thompson et al., 2004; Walker and Diforio, 1997). An alternative is that the subtle social and motor abnormalities of premorbid schizophrenia may increase the likelihood that a child will experience trauma, such as being victimized or abused.

Strengths of this study include its comprehensive and standardized assessment of trauma exposure and symptoms in a well-characterized, ethnically diverse cohort of young people at heightened risk for psychosis. A limitation is the absence of a matched healthy control group, which limits conclusions as to trauma prevalence. However, rates of self-reported childhood trauma in this high-risk cohort are largely comparable to those observed in individuals with schizophrenia assessed with the same measure, the Early Trauma Inventory, for the domains of general trauma (92%), physical abuse (83%), and emotional abuse (67%; Corcoran, unpublished data). (Lower rates of sexual abuse reported in this prodromal cohort (27%) compared with a schizophrenia cohort (37.5%; Corcoran, unpublished data) may be because this cohort is predominantly male (83%) and relatively young (mean age of 19)). Another limitation is a nearly exclusive reliance on self-report without regular corroboration from family members or other sources, potentially increasing the risk of recall bias. Of note, although it is sometimes assumed that inaccurate self-reporting of child abuse is especially an issue for individuals with psychotic disorders, it may be no greater in these groups than in the general population; however, this question is in need of further investigation (for discussion, see Morgan and Fisher, 2007; Read et al., 2005). Another limitation of this study, as mentioned, is its modest sample size, such that risk of Type II error is increased and effect modifications of ethnicity on trauma–symptom associations cannot be definitively explored. Finally, as the current study is cross-sectional, no inferences regarding causation can be drawn from its results.

We will continue to expand and follow this clinical high-risk cohort, and evaluate whether any specific type of abuse is a predictor of transition to psychosis, as was recently reported by A. Thompson et al. (2008). Such longitudinal work, combined with the examination of features that link putative risk factors (e.g., childhood trauma) to potential mechanisms of psychosis development (e.g., neuroendocrine responses to stress, subcortical dopamine functioning) could inform models of pathophysiology and the development of targeted intervention and prevention strategies. Our findings underscore the clinical importance of assessing for trauma in high-risk cohorts and for evaluating attenuated positive symptoms

in traumatized populations. Although speculative, public health efforts to reduce trauma and violence among children could plausibly have an effect on the incidence of psychotic symptoms and disorders.

Contributors

Judy L. Thompson was involved in designing the study, conducted the analyses, and wrote the first draft of the manuscript. Meredith Kelly was involved in designing the study, conducted literature searches, and prepared data for analyses. David Kimhy was involved in designing the study and assisting with manuscript preparation and editing. Jill Harkavy-Friedman was involved in designing the study, provided input on the statistics used, and assisted with manuscript editing. Shamir Khan was involved in data collection, study design, and managing the prodromal research project within which this study was conducted. Julie Messinger was involved with data collection, preparing data for analyses, and providing feedback on manuscript preparation and editing. Scott Schobel was involved in data collection and assisting in directing the prodromal research project within which this study was conducted. Ray Goetz provided assistance with data management, analyses, and manuscript editing. Dolores Malaspina was involved in study design and overseeing the prodromal research project within which this study was conducted. Cheryl Corcoran is Director of the prodromal research project within which this study was conducted, initiated and designed this study, provided guidance and oversight of the collection and analyses of data, and assisted the first author with manuscript preparation by editing and rewriting sections of the manuscript.

Conflict of interest

All authors declare that they have no conflicts of interest.

Acknowledgments

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