Childhood Trauma and Psychotic Symptomatology in Ethnic Minorities With Schizophrenia

Jeremy Levit1, Jorge Valderrama2,3, Penelope Georgakopoulos2, AA-GPC Brooklyn, Carlos N. Pato2,3, and Michele T. Pato*,2,3

1College of Medicine, SUNY Downstate Health Sciences University, Brooklyn, NY; 2Institute for Genomic Health, SUNY Downstate Health Sciences University, Brooklyn, NY; 3Department of Psychiatry, SUNY Downstate Health Sciences University, Brooklyn, NY; 4Department of Cell Biology, SUNY Downstate Health Sciences University, Brooklyn, NY

*To whom correspondence should be addressed; 450 Clarkson Avenue, MSC 1291, Brooklyn, NY 11203, USA; tel: 626-676-9108, 718-270-2619, fax :718-270-2215, e-mail:michele.pato@downstate.edu

In response to recent findings implicating trauma in the phenomenology of psychosis, this study explored interactions between adverse childhood experiences (ACEs) and positive symptoms of psychosis in an understudied patient population, comprising individuals of African and Latino ancestry. Endorsement of ACEs was compared between 90 schizophrenia cases and 240 nonpsychotic controls, matched for ethnicity, gender, and age. Relative to controls, cases reported significantly greater exposure to physical abuse, emotional abuse, sexual abuse, neglect, witnessing domestic violence, and household member incarceration. Analyses further evaluated associations between ACEs and subtypes of hallucinations, delusions, and subjective thought disorder. Among female cases, the number of hallucinatory symptoms present increased with increasing ACE score. Hallucinatory symptoms further correlated with individual ACE items. For instance, third-person voices were more common among women exposed to childhood physical and emotional abuse. Interestingly, among women, grandiose delusions were negatively related to sexual abuse, perhaps reflecting the deleterious effects of sexual trauma on the development of a positive self-concept. Among male cases, no positive relationships with hallucinations were observed, but several delusional symptoms were correlated with childhood trauma experiences. The most statistically powerful ACE associations, in both males and females, were observed with experiences of thought broadcasting. This article further advocates for the consideration of ethnicity and gender as factors influencing trauma exposures and their clinical manifestations.

Key words: adverse childhood experiences/trauma/schizophrenia/ethnicity/gender stratification

Introduction

Recent years have seen a renewed effort to understand the effects of early life adversity on the development, clinical course, and symptomatology of schizophrenia. While considerable evidence supports a strong genetic basis for psychosis, the markedly elevated rates of childhood trauma observed in clinical samples have led many to contend that these developmentally disruptive experiences be considered as etiologic contributors to psychotic illness. Indeed, adverse childhood experiences (ACEs), spanning dimensions of sexual abuse, maltreatment, and neglect, show consistent associations with risk for psychosis, global symptom severity, and treatment outcome. Furthermore, among patients with psychosis, childhood trauma is associated with higher rates of hospitalization, suicidality/self-harm, and substance use disorders (SUD) as well as poorer psychosocial functioning and increased utilization of social services. Such relationships appear to follow dose-response trends, suggesting the cumulative effects of multiple traumas may lead to distinctly poorer clinical outcomes. Understanding the effects of ACEs on the course and presentation of psychotic illness could, therefore, meaningfully inform psychological and psychosocial treatments aimed at symptomatic relief, improved global functioning, and the reduction of disease burden.

Early life stress refers to events perceived as a threat to one’s physical or emotional well-being, which surpasses a child’s capacity for coping and self-regulation, resulting in prolonged states of physiologic hyperarousal. These experiences are considered powerful transdiagnostic risk factors for psychiatric conditions.
illness.\cite{21,22} Patients with psychotic illness, such as those with mood, anxiety, and SUD,\cite{33} often endorse a history of childhood abuse. For instance, in one schizophrenia sample, 83\% of patients had been subjected to childhood physical abuse (CPA), sexual abuse (CSA), or emotional neglect (CEN).\cite{3}

Although recent schizophrenia research has largely favored biogenetic paradigms,\cite{24} the etiology of this disorder is widely considered a multifactorial phenomenon, characterized by dynamic interactions between polygenic and environmental factors.\cite{25,26} Rosenthal's\cite{27} diathesis-stress model, in which environmental stressors interact with preexisting genetic vulnerabilities to precipitate or worsen psychosis, continues to provide the foundation for prevailing etiologic theories of schizophrenia. It has served as an interpretative framework to synthesize neuropsychological findings in psychosis research, including observations of heightened stress sensitivity\cite{28,29} and hypothalamic-pituitary-adrenal (HPA) axis dysregulation in patients with schizophrenia. Others have employed cognitive vulnerability models to describe the path from ACEs to psychosis, considering the impact of negative schemas of self and other\cite{30} and dissociation.\cite{31}

At present, the most well-validated associations between specific childhood traumas and psychotic symptoms are reported between hallucinatory symptoms and experiences of CSA,\cite{17,32,34} CPA,\cite{17,35} childhood emotional abuse (CEA),\cite{36} and CEN.\cite{37} From their chart review of 200 mixed psychiatric patients, Read et al\cite{33} reported increased verbal commenting and command hallucinations in patients with a history of CSA or CPA. Associations between subclinical paranoid ideation and trauma experiences, including CPA, neglect, and separation (ie, institutionalization),\cite{32,34,38} are reported, but similar analyses of paranoid delusions have yielded conflicting results in clinical samples.\cite{33,35,39} Importantly, many of the analyses linking trauma experiences to psychotic symptomatology have found significance within female, but not male samples,\cite{40,43} suggesting the long-term sequelae of trauma may vary by gender.

Although many assert that the effects of early life maltreatment are dependent on the nature of the trauma experienced, others have found traumas of any form to be equivocally predictive of adulthood psychosis.\cite{6} These authors focus, instead, on the additive effects of multiple ACEs. Indeed, understanding the effects of cumulative trauma may be of particular clinical significance, as the experience of only one form of childhood adversity is uncommon among patients with schizophrenia.\cite{44,45}

To this end, the ACEs questionnaire is an optimal tool, designed to assess the far-reaching effects of cumulative adversity. In addition to a myriad of negative medical and psychosocial outcomes,\cite{46} total ACE score is a significant predictor of hallucinations\cite{18,44} and risk for psychosis in adulthood.\cite{15} Additionally, endorsement of multiple ACEs is associated with greater psychiatric and medical comorbidity, substance abuse, and psychosocial impairment among patients with schizophrenia.\cite{13}

Understanding the effects of ACEs on the development and clinical course of psychosis may yield insight into often reported ethnic differences in schizophrenia.\cite{47} Authors have described increased prevalence and severity of psychosis among black individuals,\cite{47,49} a finding whose interpretation calls for consideration of diagnostician bias,\cite{40} differences in symptom reporting,\cite{41} and the unequal distribution of experiential adversity.\cite{47,49} Recent epidemiologic data continue to indicate elevated rates of psychotic symptoms amongst blacks (15.3\%) and Latinos (13.6\%), relative to whites (9.7\%) and individuals of Asian descent (9.6\%) living in the United States.\cite{52} Moreover, blacks and Latinos with psychotic illness report greater childhood abuse and neglect than white cases, which may mediate the relationship between ethnic minority status and elevated positive symptomatology.\cite{53}

The present study examines relationships of ACEs with the symptomatic manifestations of schizophrenia among African American and Latino participants, representing ethnic groups disproportionately afflicted by childhood trauma and psychosis.\cite{47,52,54} who are nonetheless underrepresented in the psychological and medical literature.\cite{55-57} First, we will compare ACE exposures between cases and ethnicity-, age-, and gender-matched controls. We will then explore the ways in which individual ACEs and cumulative ACE exposure relate to positive symptom subtypes. By situating our work within the extant literature, we aim to contribute a novel perspective on the role of social adversity in schizophrenia.

**Methods**

**Participants**

Participants in this study are from the Genomic Psychiatry Cohort (GPC).\cite{58} For the present study, phenotypic data from 240 controls, unaffected by schizophrenia or bipolar disorder, and 90 schizophrenia cases were analyzed. Each control was matched with a case by age, gender, and ethnicity using SAS software (SAS Institute Inc., with 2–3 controls for each case to reduce the risk of selection bias.\cite{59} Both cases and controls were recruited from the same communities in Brooklyn, NY, in which the overall median household income was $50 200 with an unemployment rate of 7.7\%.\cite{60} Participants were recruited between July 2018 and July 2019 via online advertising, referrals from healthcare professionals, and in-person recruitment in hospital waiting rooms. Controls were screened for personal and family history of bipolar disorder and schizophrenia spectrum disorders.

**Procedures**

The GPC study procedures have been previously described elsewhere.\cite{58} Briefly, cases and controls completed
self-report GPC questionnaires and the Adverse Childhood Experiences (ACEs) questionnaire. Cases also completed the Diagnostic Interview for Psychosis and Affective Disorders (DI-PAD), an in-person semi-structured interview in which positive symptom subtypes are assessed through direct questioning, and are classified by duration (present for less than 1 month, 1 month or longer, or not present). Interviewers were trained by master raters. Training included side-by-side interviews with trainer and trainee. Further testing of inter-rater reliability was conducted annually. See Pato et al for further details.

**Measures**

**GPC Screening Questionnaire.** This screening questionnaire collects demographic information and a general history of symptoms, including medical and psychiatric conditions (mood, anxiety, and psychotic disorders).

**Diagnostic Interview for Psychosis and Affective Disorders.** The DI-PAD is a semi-structured clinical interview developed from the Diagnostic Interview for Genetics Studies (DIGS). The DI-PAD is applied in conjunction with the Operational Criteria Checklist for Psychotic Illness (OPCRIT) to determine a diagnosis of schizophrenia (or bipolar disorder), which has yielded strong consistency with the best-estimate lifetime procedure. OPCRIT diagnoses are based on criteria outlined in Diagnostic and Statistical Manual of Mental Disorders, 4th Edition, Text Revision (DSM-IV-TR) and DSM-V.

The DI-PAD subdivides positive symptoms into hallucinations, delusions, and subjective thought disorder. Subjective thought disorder comprises experiences of thought insertion, withdrawal, broadcasting, and echo.

**The ACEs Study Questionnaire.** The ACEs questionnaire is a self-report tool used to assess the following adversities, occurring before the age of 18: emotional abuse, physical abuse, sexual abuse, emotional neglect, physical neglect, parental separation/divorce (“Divorce”), witnessing domestic violence (“Battered Mother”), household member with SUD, household member with mental illness (“Mental Illness”), and household member imprisonment (“Prison”). It yields a summed score from 0 to 10. The ACEs questionnaire has been shown to have good internal consistency, validity, and reliability. Furthermore, the ACEs questionnaire has been previously used to assess associations of childhood adversity with hallucinations.

**Analyses**

All analyses were conducted using SPSS version 24 (IBM Corp.) and were performed on both gender-stratified and combined-gender groups. Comparisons of discrete variables were carried out using the Pearson chi-square, with effect sizes defined by the measure of association, phi (φ), and a significance level set at $P < .05$. Due to the exploratory nature of this study, correction for multiple comparisons was not used. While this decision decreases the likelihood of false-negative results, it carries an increased risk of false positives. Responses to each ACE item were dichotomized as present or absent, as were DI-PAD data pertaining to the experience of each symptom. Chi-square was used to facilitate case-control comparisons of ACE responses and to identify associations between ACE items and psychotic symptoms. Case-control comparisons of ACE score utilized 2-tailed independent samples $t$-tests, with 95% confidence intervals. Binary logistic regressions were then carried out, with each type of psychotic symptom as a categorical dependent variable and ACE score as the independent variable. Finally, 3 linear regressions were run to characterize relationships between ACE score and the number of symptoms endorsed in each of 3 symptom categories (hallucinations, delusions, and subjective thought disorder). Regression models included age and gender as additional independent variables.

**Results**

**Clinical Characteristics**

As illustrated in table 1, 83.3% of schizophrenia cases and 82.5% of controls identified themselves as African Ancestry (AA), while 13.3% of cases and 12.9% of controls identified themselves as Latino Ancestry (LA).

**ACE Exposures**

Among cases, cumulative ACE scores ranged from 0 to 10 ($M = 2.72, SD = 2.784$) and were significantly higher than control ACE scores ($M = 1.04, SD = 1.581$). ACE scores were higher in male cases ($M = 2.44, SD = 2.620$) than male controls ($M = 0.93, SD = 1.383$) and higher in female cases ($M = 3.37, SD = 3.090$) than female controls ($M = 1.26, SD = 1.320$).

**Table 1. Sample Characteristics**

| Variables | Schizophrenia | Controls |
|-----------|---------------|----------|
|           | Cases ($n = 90$) | ($n = 240$) |
| Male | 63 (70%) | 159 (66.2%) |
| Female | 27 (30%) | 81 (33.8%) |
| Age (mean [SD]) | 40.64 (13.734) | 42.27 (13.768) |
| Ethnicity | | |
| African American | 75 (83.3%) | 198 (82.5%) |
| Hispanic/Latino | 12 (13.3%) | 31 (12.9%) |
| Mixed race | 2 (2.2%) | 10 (4.2%) |
| Other | 1 (1.1%) | 0 (0%) |
| Missing | 0 (0%) | 1 (0.4%) |
| Age of onset (mean [SD]) | 21.52 (8.963) | N/A |
| ACE score (mean [SD]) | 2.72 (2.784) | 1.04 (1.581) |
| Male | 2.44 (2.620) | 0.93 (1.383) |
| Female | 3.37 (3.090) | 1.26 (1.902) |

**Note:** ACE, adverse childhood experience.
Among cases, 27 (30%) reported 0 ACEs, while 29 (32.2%) reported 4 or more ACEs.

Relative to male controls, male cases had significantly greater exposure to every ACE item, except for parental separation/divorce (divorce) and household member incarceration (prison). Relative to female controls, female cases had greater exposure to every ACE item, outside of parental separation/divorce. When comparing female and male cases, females reported significantly greater exposure to domestic violence perpetrated against their mother/stepmother (battered mother) than their male counterparts. Additionally, female cases reported CSA more than twice as frequently as male cases, although this trend did not reach statistical significance (figure 2).

**Symptom Associations**

**Subjective Thought Disorder.** As illustrated in supplementary table 3, among cases, significant relationships were found between thought broadcasting and endorsement of physical abuse ($\chi^2(1) = 7.908, P = .005$), sexual abuse ($\chi^2(1) = 13.210, P < .001$), household SUD ($\chi^2(1) = 4.313, P = .038$), household mental illness ($\chi^2(1) = 6.391, P = .011$), and household member incarceration (“Prison”) ($\chi^2(1) = 6.783, P = .009$).

When stratified by gender, additional relationships were observed. In female cases, CSA was independently associated with thought broadcasting ($\chi^2(1) = 5.082, P = .024$). Among males, thought broadcasting was associated with CSA ($\chi^2(1) = 8.851, P = .003$), CPA ($\chi^2(1) = 5.962, P = .015$), CEN ($\chi^2(1) = 4.242, P = .039$), household SUD ($\chi^2(1) = 5.661, P = .017$), and household member incarceration ($\chi^2(1) = 5.236, P = .022$).

In addition, using logistic regression, a cumulative ACE score was found to predict symptoms of thought broadcasting (odds ratio [OR] = 1.293, 95% confidence interval [CI]: 1.089, 1.536) among the combined male and female groups (table 3).

**Hallucinations.** While male cases displayed no positive associations between ACEs and hallucinations, for female cases (supplementary table 2), third-person verbal hallucinations were associated with CEA ($\chi^2(1) = 5.105, P = .024$), CPA ($\chi^2(1) = 4.626, P = .031$), parental divorce/separation ($\chi^2(1) = 4.473, P = .034$), and household mental illness ($\chi^2(1) = 4.513, P = .034$). Additionally, among female cases, command voices were associated with emotional neglect ($\chi^2(1) = 5.266, P = .022$).

Among female cases, linear regression revealed a significant relationship between cumulative ACE score and the total number of auditory hallucinations (table 2). This relationship was not significant in the male group or the entire schizophrenia group.

**Delusions.** For male cases, delusions of influence correlated with physical neglect ($\chi^2(1) = 6.477, P = .011$). Delusions of grandiosity were significantly higher among men who had witnessed violence against their mother/stepmother ($\chi^2(1) = 4.385, P = .036$) (supplementary table 4). Additionally, delusions of influence were associated with greater cumulative ACE score in male cases (OR: 1.280, 95% CI: 1.028, 1.592) (supplementary table 6).

For female cases, there were no positive associations between ACEs and delusions. Interestingly, among women, grandiose delusions were negatively associated with experiences of CSA ($\chi^2(1) = 4.725, P = .030$).

**Discussion**

The present study examined relationships of ACEs with the positive symptoms of schizophrenia among participants from ethnic minority groups, disproportionately affected by both psychotic illness and childhood adversity. In our sample, we identified significant differences in rates of exposure to childhood traumas between schizophrenia cases and ethnicity-matched controls. We further described relationships between ACEs and distinct forms of hallucinations, delusions, and subjective thought disorder, many of which were gender specific.

**ACE Exposures**

Consistent with past research, our cases had significantly greater exposure to childhood traumatic stress than controls, matched for age, gender, and ethnicity. Relative

Table 2. Effects of Cumulative ACE Score on the Number of Hallucinatory, Delusional, or Subjective Thought Disorder Symptoms Among Cases

| ACE score | Hallucinations | Delusions | Subjective Thought Disorder |
|-----------|----------------|-----------|----------------------------|
| All       | β              | CI (95%)  | CI (95%)                   | CI (95%)                   |
|           | 0.108          | -0.051, 0.151 | -0.115, 0.152 | -0.163 |
| Male      | β              | CI (95%)  | CI (95%)                   | CI (95%)                   |
|           | -0.042         | -0.153, 0.111 | -0.078, 0.222 | -0.024, 0.167 |
| Female    | β              | CI (95%)  | CI (95%)                   |
|           | 0.420*         | 0.019, 0.295 | -0.386, 0.159 | -0.082, 0.265 |

Note: ACE, adverse childhood experience; β, regression coefficient; CI, confidence interval.

*P < .05.
to controls, physical neglect was elevated by a factor of 10 among cases, while physical (CPA), emotional (CEA), and sexual (CSA) abuse experiences were over 3 times more common in cases than controls. In fact, all ACE items, with the exception of parental separation/divorce, were significantly more prevalent in cases (figure 1).

In line with the literature on polytraumatization in schizophrenia, the majority of cases reported 2 or more forms of childhood adversity, with 24.4% of the sample endorsing 6 or more ACE items. Such trends may speak to the interrelatedness of ACE categories, as it is well established that exposure to one form of trauma increases a child’s risk of exposure to another, which may then inflict cumulative psychological harm.

Our female cases reported CSA more than twice as often as male cases, supporting past findings on sexual trauma in women with a psychotic disorder. In fact, female cases reported every ACE item more frequently than their male counterparts, although most of these relationships did not reach statistical significance (figure 2). This may be due to the small size of the female schizophrenia group, which comprised only 27 participants. Previous publications on patients with severe mental illness have reported equivalent rates of global trauma in men and women.

Here, we identified rates of household member incarceration among participants with schizophrenia that were not only greater than those of controls but also roughly 7 times greater than rates reported among the general population. The prevalence observed here may speak to the ethnic makeup of our sample, as rates of incarceration are markedly higher within African American and Latino communities in the United States. They may further reflect the socioeconomic disadvantage associated with

Table 3. Effects of Increasing ACE Score on the Presence of Subjective Thought Disorder Symptoms Among Cases

|                  | Thought Insertion | Thought Withdrawal | Thought Broadcast | Thought Echo |
|------------------|-------------------|--------------------|-------------------|--------------|
| ACE score        | OR (95%)          | OR (95%)           | OR (95%)          | OR (95%)     |
| All              | 1.047 (0.895–1.225) | 1.000 (0.820–1.220) | 1.293** (1.089–1.536) | 1.022 (0.821–1.273) |
| Male OR          | 0.971 (0.801–1.177) | 1.006 (0.789–1.283) | 1.321* (1.063–1.642) | 0.944 (0.707–1.262) |
| Female OR        | 1.198 (1.011–1.593) | 0.884 (0.575–1.359) | 1.227 (0.923–1.631) | 1.198 (0.901–1.593) |

Note: ACE, adverse childhood experience; OR, odds ratio; CI, confidence interval. *P < .05, **P < .01.

Fig. 1. Adverse childhood experience exposures in cases compared with ethnicity-, age-, and gender-matched controls.
psychotic illness. While childhood exposure to household member incarceration has been associated with poor physical and mental health outcomes, the path from household incarceration to negative health outcomes in adulthood is varied and complex. The literature suggests that criminality within the household puts a child at risk of a number of other ACE exposures, including CEA, CPA, CSA, and CEN.

The manner in which childhood adversity may give rise to psychosis remains a matter of speculation. There are notable neurobiological commonalities between trauma survivors and individuals with schizophrenia, including HPA hyperresponsiveness and dysregulation of subcortical dopamine. Aberrant dopamine signaling may contribute to the heightened salience assigned to internal representations in psychosis, while disinhibited HPA activity underlies increased stress sensitivity. Other authors suggest that dissociative phenomena stemming from abuse experiences may contribute to adulthood psychosis, noting considerable overlap in the symptomatology of dissociative disorders and schizophrenia.

Positive Symptom Associations

Previous publications suggest that positive psychotic symptoms, particularly auditory hallucinations, correspond strongly with childhood trauma. However, like Misiak et al., we found that hallucinatory symptoms related to ACEs only in female cases. For our female cases, auditory hallucinations correlated positively with a number of distinct ACE categories as well as with total ACE score. For instance, third-person voices were significantly more common in women with a history of childhood physical or sexual abuse. Furthermore, linear regression analysis of female cases identified a positive correlation between cumulative ACE score and the number of hallucinatory symptoms endorsed (table 2), supporting the notion that symptomatic effects of childhood trauma may be additive in nature.

While past descriptions of ACE associations with delusions are inconsistent, our data suggest that significant positive relationships exist but may occur only among men. For example, delusions of influence were predicted by a history of physical neglect as well as by higher ACE score among our male cases. Additionally, persecutory delusions and delusions of grandiosity were associated with parental separation/divorce and witnessing domestic violence, respectively. Previous conflicting findings on the association of grandiose delusions with adverse experiences may reflect a failure to account for gender differences, as our data suggest grandiose delusions relate to ACEs differently in women and men.

In fact, among the women in our sample, grandiose delusions displayed a negative association with CSA. Interestingly, this is not the first time that childhood abuse has been shown to predict the absence of grandiose delusions. This may speak to the injurious effects of abuse experiences on a child’s development of self-esteem, rendering grandiose delusional content incongruent with one’s sense of self. Indeed, among psychosis patients, delusions of grandiosity are significantly less common in both males and females with low self-esteem, although low self-esteem may be more common in women with schizophrenia.

Fig. 2. Adverse childhood experience exposure comparisons by gender in cases and controls.
To our knowledge, we are the first to investigate relationships of trauma with thought broadcasting (table 3, supplementary table 3), which revealed a number of robust associations. Thought broadcasting correlated with distinct ACE categories, including physical and sexual abuse, as well as with total ACE score in the combined-gender group. The basis of these relationships is yet unclear, as there is scarce literature available to interpret such findings. Symptoms of thought broadcasting are believed to stem from situational appraisals that evoke the perception of a breach in privacy or a loss of boundaries, rendering one’s internal mental processes transparent to others.84,85 As elements of abuse experiences are often incorporated into psychotic perceptual distortions,86 associations between thought broadcasting and experiences of physical and sexual abuse may relate to the nature of these traumas, which represent profound breaches of physical and emotional boundaries.87

**Limitations**

When interpreting data based on retrospective self-reports of childhood trauma, particularly in individuals with severe mental disturbances, reliable reporting cannot always be guaranteed. Some authors suggest that retrospective reporting may be influenced by the cognitive impairments,88 delusional symptoms, and detachment from reality associated with psychotic illness, as well as by normal processes of forgetting.89 However, an inquiry into the veracity of such reports has found surprising reliability within this patient population. For patients with severe mental illness, data on childhood trauma from self-report and clinician-rated assessments show high concordance.90 Moreover, reports of child abuse from patients with psychosis appear stable over time and not associated with the current severity of psychotic symptoms.89

The size of our clinical sample (n = 90), while comparable to those used in similar studies, is relatively small and provides limitations to data analysis. Our gender distribution was also skewed, with a greater representation of male cases (n = 63) than female cases (n = 27). In spite of this, the analysis of female cases yielded a number of significant associations. In our case-control analyses (figures 1 and 2), we selected 2 to 3 controls matched by age, gender, and ethnicity for each schizophrenia case, allowing for a larger number of trauma exposures in both men and women, including physical and sexual abuse, as well as with cumulative ACE score. Our findings further support the notion that multiple traumas may have additive effects on psychotic symptomatology. While psychological effects of trauma may vary by ethnicity,91,92 these distinctions remain unclear in schizophrenia. Through broadened investigation of similar ACE associations across multiple ethnic groups, future research may help to establish the ethnic specificity or generality of findings reported here.

**Clinical Significance**

Early life abuses and comorbid posttraumatic stress disorder (PTSD) diagnoses are often overlooked in patients with psychotic disorders.93,94 A preexisting diagnosis of schizophrenia may make clinicians less likely to take an abuse history94 and the symptoms of psychosis may further mask those of PTSD.95 Moreover, identified traumas are less often addressed in treatment plans for patients with schizophrenia.96 Trauma-informed treatment has grown increasingly prevalent in mental healthcare settings,97 and many authors indicate the need for such approaches in the treatment of psychotic illness.24 At present, cognitive behavioral (CBT) and psychodynamic therapies have been effectively applied to the treatment of schizophrenia,98,99 but their applicability to severely traumatized psychosis patients remains unclear. Effective adaptation of CBT techniques may entail a deeper dyadic exploration of connections between the patient’s unique psychotic experiences and past traumas.100 Continued investigation
into the symptomatologic effects of ACEs may shed light on the clinical heterogeneity of schizophrenia, enabling the development of more precisely targeted and individualized treatment approaches. To better reflect the patient population, such research efforts will benefit from the purposeful inclusion of ethnic minority participants.

Supplementary Material
Supplementary data are available at Schizophrenia Bulletin Open online.

Acknowledgments
We would like to acknowledge AA-GPC, Brooklyn site (Stella Kim Hansen, Margaret Salisu, Jorge Valderrama, Penelope Georgakopoulos, Ayman Fanous, Tim Bigdeli, James Knowles, Carlos Pato, and Michele Pato) for their efforts with data collection.

AA-GPC Brooklyn
Stella Kim Hansen1, Margaret Salisu1, Jorge Valderrama, Penelope Georgakopoulos, Ayman Fanous1,2, Tim Bigdeli1,2, James Knowles1,3, Carlos Pato, and Michele Pato.
1Institute for Genomic Health, SUNY Downstate Health Sciences University, Brooklyn, NY
2Department of Psychiatry, SUNY Downstate Health Sciences University, Brooklyn, NY
3Department of Cell Biology, SUNY Downstate Health Sciences University, Brooklyn, NY

References
1. Bebbington PE, Bhugra D, Brugha T, et al. Psychosis, victimisation and childhood disadvantage: evidence from the second British National Survey of Psychiatric Morbidity. Br J Psychiatry. 2004;185:220–226.
2. Conus P, Cotton S, Schimmelmann BG, McGorry PD, Lambert M. Pretreatment and outcome correlates of sexual and physical trauma in an epidemiological cohort of first-episode psychosis patients. Schizophr Bull. 2010;36(6):1105–1114.
3. Honig A, Romme MA, Ensink BJ, Escher SD, Pennings MH, deVries MW. Auditory hallucinations: a comparison between patients and nonpatients. J Nerv Ment Dis. 1998;186(10):646–651.
4. Larsson S, Andreassen OA, Aas M, et al. High prevalence of childhood trauma in patients with schizophrenia spectrum and affective disorder. Compr Psychiatry. 2013;54(2):123–127.
5. Sheffield JM, Williams LE, Blackford JU, Heckers S. Childhood sexual abuse increases risk of auditory hallucinations in psychotic disorders. Compr Psychiatry. 2013;54(7):1098–1104.
6. Varese F, Smeets F, Drukker M, et al. Childhood adversities increase the risk of psychosis: a meta-analysis of patient-control, prospective- and cross-sectional cohort studies. Schizophr Bull. 2012;38(4):661–671.
7. Read J, van Os J, Morrison AP, Ross CA. Childhood trauma, psychosis and schizophrenia: a literature review with theoretical and clinical implications. Acta Psychiatr Scand. 2005;112(5):330–350.
8. Lecomte T, Spidel A, Leclerc C, MacEwan GW, Greaves C, Bentall RP. Predictors and profiles of treatment non-adherence and engagement in services problems in early psychosis. Schizophr Res. 2008;102(1-3):295–302.
9. Schalinski I, Fischer Y, Rockstroh B. Impact of childhood adversities on the short-term course of illness in psychotic spectrum disorders. Psychiatry Res. 2015;228(3):633–640.
10. Larsson S, Aas M, Klungsoyr O, et al. Patterns of childhood adverse events are associated with clinical characteristics of bipolar disorder. BMC Psychiatry. 2013;13:97.
11. Leverich GS, McElroy SL, Suppes T, et al. Early physical and sexual abuse associated with an adverse course of bipolar illness. Biol Psychiatry. 2002;51(4):288–297.
12. Lysaker PH, Meyer PS, Evans JD, Clements CA, Marks KA. Childhood sexual trauma and psychosocial functioning in adults with schizophrenia. Psychiatr Serv. 2001;52(11):1485–1488.
13. Rosenberg SD, Lu W, Mueser KT, Jankowski MK, Cournos F. Correlates of adverse childhood events among adults with schizophrenia spectrum disorders. Psychiatr Serv. 2007;58(2):245–253.
14. Schenkel LS, Spaulding WD, DiLillo D, Silverstein SM. Histories of childhood maltreatment in schizophrenia: relationships with premorbid functioning, symptomatology, and cognitive deficits. Schizophr Res. 2005;76(2-3):273–286.
15. Álvarez MJ, Masramon H, Peña C, et al. Cumulative effects of childhood traumas: polytraumatization, dissociation, and schizophrenia. Community Ment Health J. 2015;51(1):54–62.
16. Muenzenmaier KH, Seixas AA, Schneeberger AR, Castille DM, Battaglia J, Link BG. Cumulative effects of stressful childhood experiences on delusional and hallucinations. J Trauma Dissociation. 2015;16(4):442–462.
17. Shevlin M, Dorahy M, Adamson G. Childhood traumas and hallucinations: an analysis of the National Comorbidity Survey. J Psychiatr Res. 2007;41(3-4):222–228.
18. Whitfield CL, Dube SR, Felitti VJ, Anda RF. Adverse childhood experiences and hallucinations. Child Negl. 2005;29(7):797–810.
19. Scott J, Chant D, Andrews G, Martin G, McGrath J. Association between trauma exposure and delusional experiences in a large community-based sample. Br J Psychiatry. 2007;190:339–343.
20. Pechtel P, Pizzagalli DA. Effects of early life stress on cognitive and affective function: an integrated review of human literature. Psychopharmacology (Berl). 2011;214(1):55–70.
21. Arnow BA. Relationships between childhood maltreatment, adult health and psychiatric outcomes, and medical utilization. J Clin Psychiatry. 2004;65(Suppl 12):10–15.
22. McLaughlin KA, Greif Green J, Gruber MJ, Sampson NA, Zaslavsky AM, Kessler RC. Childhood adversities and first onset of psychiatric disorders in a national sample of US adolescents. Arch Gen Psychiatry. 2012;69(11):1151–1160.
23. Lipschitz DS, Kaplan ML, Sorkenn JB, Faedda GL, Chorney P, Asnis GM. Prevalence and characteristics of physical and sexual abuse among psychiatric outpatients. Psychiatr Serv. 1996;47(2):189–191.
24. Read J, Ross CA. Psychological trauma and psychosis: another reason why people diagnosed schizophrenic must be offered psychological therapies. J Am Acad Psychoanal Dyn Psychiatry. 2003;31(1):247–268.
25. Pato MT, Sobell JL, Pato M, Bacos D, Pato CN. Genetic strategies in psychiatric disorders. *Focus*. 2010;8(3):307–315.
26. Jones SR, Fernyhough C. A new look at the neural diathesis–stress model of schizophrenia: the primacy of social-evaluative and uncontrollable situations. *Schizophr Bull*. 2007;33(5):1171–1177.
27. Rosenthal D. *Genetic Theory and Abnormal Behavior*. New York: McGraw-Hill; 1970.
28. Lardinois M, Lataster T, Mengelers R, Van Os J, Myin-Germeyns I. Childhood trauma and increased stress sensitivity in psychosis. *Acta Psychiatr Scand*. 2011;123(1):28–35.
29. van Winkel R, Stefanis NC, Myin-Germeyns I. Psychosocial stress and psychosis. A review of the neurobiological mechanisms and the evidence for gene-stress interaction. *Schizophr Bull*. 2008;34(6):1095–1105.
30. Fisher HL, Appiah-Kusi E, Grant C. Anxiety and negative self-schemas mediate the association between childhood maltreatment and paranoia. *Psychiatry Res*. 2012;196(2-3):323–324.
31. Varese F, Barkus E, Bentall RP. Dissociation mediates the relationship between childhood trauma and hallucination-proneness. *Psychol Med*. 2012;42(5):1025–1036.
32. Bentall RP, Wickham S, Shevlin M, Varese F. Do specific early-life adversities lead to specific symptoms of psychosis? A study from the 2007 the adult psychiatric morbidity survey. *Schizophr Bull*. 2012;38(4):734–740.
33. Read J, Agar K, Argyle N, Aderhold V. Sexual and physiological abuse during childhood and adulthood as predictors of hallucinations, delusions and thought disorder. *Psychol Psychother*. 2003;76(1 Pt 1):1–22.
34. Sitko K, Bentall RP, Shevlin M, O’Sullivan N, Sellwood W. Associations between specific psychotic symptoms and specific childhood adversities are mediated by attachment styles: an analysis of the National Comorbidity Survey. *Psychiatry Res*. 2014;217(3):202–209.
35. Velthorst E, Nelson B, O’Connor K, et al. History of trauma and the association with baseline symptoms in an Ultra-High Risk for psychosis cohort. *Psychiatry Res*. 2013;210(1):75–81.
36. Uçok A, Bikmaz S. The effects of childhood trauma in patients with first-episode schizophrenia. *Acta Psychiatr Scand*. 2007;116(5):371–377.
37. Vallejo MP, Cesonini OM, Farinola R, Prokopez CR. Childhood adversities in men with schizophrenia: dose-response vs. trauma specific hypothesis. *Arch Paediatr Dev Pathol*. 2017;1(1):1002.
38. Freeman D, Fowler D. Routes to psychotic symptoms: trauma, anxiety and psychosis-like experiences. *Psychiatry Res*. 2009;169(2):107–112.
39. Hammersley P, Dias A, Todd G, Bowen-Jones K, Reilly B, Bentall RP. Childhood trauma and hallucinations in bipolar affective disorder: preliminary investigation. *Br J Psychiatry*. 2003;182:543–547.
40. Misiaik B, Moustafa AA, Kiejna A, Frydecka D. Childhood traumatic events and types of auditory verbal hallucinations in first-episode schizophrenia patients. *Compr Psychiatry*. 2016;66:17–22.
41. Gayer-Anderson C, Fisher HL, Fearon P, et al. Gender differences in the association between childhood physical and sexual abuse, social support and psychosis. *Soc Psychiatry Psychiatr Epidemiol*. 2015;50(10):1489–1500.
42. Gibson LE, Anglin DM, Klugman JT, et al. Stress sensitivity mediates the relationship between traumatic life events and attenuated positive psychotic symptoms differentially by gender in a college population sample. *J Psychiatr Res*. 2014;53:111–118.
43. Kelly DL, Rowland LM, Patchan KM, et al. Schizophrenia clinical symptom differences in women vs. men with and without a history of childhood physical abuse. *Child Adolesce Psychiatry Ment Health*. 2016;10:5.
44. Prokopez CR, Cesonini OM, Caporosso GB, Reffino-Pereyra ML, Alberio G, Vallejo M. Prevalence and clinical impact of childhood adversities in women with schizophrenia [published online ahead of print June 26, 2018]. *Clin Schizophr Relat Psychoses*. doi:10.3371/CSRRPRCE.061518.
45. Vallejo M, Cesonini OM, Farinola R, Bertone MS, Prokopez CR. Adverse childhood experiences among men with schizophrenia. *Psychiatr Q*. 2017;88(4):665–673.
46. Felitti VJ, Anda RF, Nordenberg D, et al. Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The Adverse Childhood Experiences (ACE) Study. *Am J Prev Med*. 2019;56(6):774–786.
47. Jarvis GE. The social causes of psychosis in North American psychiatry: a review of a disappearing literature. *Can J Psychiatry*. 2007;52(5):287–294.
48. Kirkbride JB, Errazuriz A, Croudace TJ, et al. Incidence of schizophrenia and other psychoses in England, 1950–2009: a systematic review and meta-analyses. *PLoS One*. 2012;7(3):e31660.
49. Perlman G, Kotov R, Fu J, et al.; Genomic Psychiatry Cohort Consortium. Symptoms of psychosis in schizophrenia, schizoaffective disorder, and bipolar disorder: a comparison of African Americans and Caucasians in the Genomic Psychiatry Cohort. *Am J Med Genet B Neuropsychiatr Genet*. 2016;171(4):546–555.
50. Blow FC, Zeber JE, McCarthy JF, Valenstein M, Gillon L, Bingham CR. Ethnicity and diagnostic patterns in veterans with psychosis. *Soc Psychiatry Psychiatr Epidemiol*. 2004;39(10):841–851.
51. Sharpley M, Hutchinson G, Murray RM, McKenzie K. Understanding the excess of psychosis among the African-Caribbean population in England: review of current hypotheses. *Br J Psychiatry*. 2001;178(s40):s60–s68.
52. Cohen CI, Marino L. Racial and ethnic differences in the prevalence of psychotic symptoms in the general population. *Psychiatr Serv*. 2013;64(11):1103–1109.
53. Berg AO, Aas M, Larsson S, et al. Childhood trauma mediates the association between ethnic minority status and more severe hallucinations in psychotic disorder. *Psychol Med*. 2015;45(1):133–142.
54. Maguire-Jack K, Lanier P, Lombardi B. Investigating racial differences in clusters of adverse childhood experiences. *Child Adolesc Psychiatr Prim Care*. 2015;210(1):75–81.
55. Hartmann WE, Kim ES, Kim JHJ, et al. Cultural diversity revisited: recent publication trends in cross-cultural and ethnic minority psychology. *Rev Gen Psychol*. 2013;17(3):243–254.
56. Iwamasa G, Sorocco K, Koonce DA. Ethnicity and diagnostic patterns in veterans with psychosis. *Soc Psychiatry Psychiatr Epidemiol*. 2014;49(12):3234–3243.
57. Redwood S, Gill PS. Under-representation of minority ethnic groups in research–call for action. *Br J Gen Pract*. 2013;63(612):342–343.
58. Pato MT, Sobell JL, Medeiros H, et al.; Genomic Psychiatry Cohort Consortium. The Genomic Psychiatry Cohort: partners in discovery. *Am J Med Genet B Neuropsychiatr Genet*. 2013;162B(4):306–312.
59. Mortensen LQ, Andresen K, Burchardt J, Pommergaard HC, Rosenberg J. Matching cases and controls using SAS® Software. *Front Big Data*. 2019;2:4.
60. Stringer SM. *New York City Neighborhood Economic Profiles* [published online 2017].130. https://comptroller.nyc.gov/wp-content/uploads/documents/NYC_Neighborhood_Economic_Profiles_2017.pdf.
61. Nurnberger JI Jr, Blehar MC, Kaufmann CA, et al. Diagnostic interview for genetic studies. Rationale, unique features, and training. NIMH Genetics Initiative. *Arch Gen Psychiatry*. 1994;51(11):849–859; discussion 863.
62. Azavedo MH, Soares MJ, Coelho I, et al. Using consensus OPCRIT diagnoses. An efficient procedure for best-estimate lifetime diagnoses. *Br J Psychiatry*. 1999;175:154–157.
63. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders DSM-IV-TR*. 4th ed. Washington, DC: American Psychiatric Association; 2000.
64. Wingenthal F, Schäfer I, Terfehr K, et al. The reliable, valid and economic assessment of early traumatization: first psychometric characteristics of the German version of the Adverse Childhood Experiences Questionnaire (ACE). *Psychother Psychosom Med Psychol*. 2011;61(1):e10–e14.
65. Moran MD. Arguments for rejecting the sequential Bonferroni in ecological studies. *Oikos*. 2003;100(2):403–405.
66. Gilbert LK, Breiding MJ, Merrick MT, et al. Childhood adversity and adult chronic disease: an update from ten States and the District of Columbia, 2010. *Am J Prev Med*. 2015;48(3):345–349.
67. Lu W, Mueser KT, Rosenblum SD, Jankowski MK. Correlates of adverse childhood experiences among adults with severe mood disorders. *Psychiatr Serv*. 2008;59(9):1018–1026.
68. Dong M, Anda RF, Felitti VJ, et al. The interrelatedness of multiple forms of childhood abuse, neglect, and household dysfunction. *Child Abuse Negl*. 2004;28(7):771–784.
69. Mueser KT, Goodman LB, Trumback SL, et al. Trauma and posttraumatic stress disorder in severe mental illness. *J Consult Clin Psychol*. 1998;66(3):493–499.
70. Massoglia M. Incarceration, health, and racial disparities in health. *Law Soc Rev*. 2008;42(2):275–306.
71. Gjelsvik A, Dumont DM, Nunn A. Incarceration of a household member and Hispanic health disparities: childhood exposure and adult chronic disease risk behaviors. *Prev Chronic Dis*. 2013;10:E69.
72. Agerbo E, Sullivan PF, Vilhjálmsson BJ, et al. Polygenic risk score, parental socioeconomic status, family history of psychiatric disorders, and the risk for schizophrenia: a Danish population-based study and meta-analysis. *JAMA Psychiatry*. 2015;72(7):635–641.
73. Gjelsvik A, Dumont DM, Nunn A, Rosen DL. Adverse childhood events: incarceration of household members and health-related quality of life in adulthood. *J Health Care Poor Underserved*. 2014;25(3):1169–1182.
74. Morgan C, Fisher H. Environment and schizophrenia: environmental factors in schizophrenia: childhood trauma—a critical review. *Schizophr Bull*. 2007;33(1):3–10.
75. Dahouni T, Nour MM, McCutcheon RA, Adams RA, Bloomfield MAP, Howes OD. The relationship between childhood trauma, dopamine release and delametaphenamine-induced positive psychotic symptoms: a [1C]-(+)-PHNO PET study. *Transl Psychiatry*. 2019;9(1):287.
76. Read J, van Os J, Morrison AP, Ross CA. Childhood trauma, psychosis and schizophrenia: a literature review with theoretical and clinical implications. *Acta Psychiatr Scand*. 2005;112(5):330–330.
94. Young M, Read J, Barker-Collo S, Harrison R. Evaluating and overcoming barriers to taking abuse histories. Prof Psychol Res Pract. 2001;32(4):407–414.
95. Morrison AP, Frame L, Larkin W. Relationships between trauma and psychosis: a review and integration. Br J Clin Psychol. 2003;42(Pt 4):331–353.
96. Agar K, Read J. What happens when people disclose sexual or physical abuse to staff at a community mental health centre? Int J Ment Health Nurs. 2002;11(2):70–79.
97. Muskett C. Trauma-informed care in inpatient mental health settings: a review of the literature. Int J Ment Health Nurs. 2014;23(1):51–59.
98. Hamm JA, Hasson-Ohayon I, Kukla M, Lysaker PH. Individual psychotherapy for schizophrenia: trends and developments in the wake of the recovery movement. Psychol Res Behav Manag. 2013;6:45–54.
99. Gottdiener W. Individual psychodynamic psychotherapy of schizophrenia: empirical evidence for the practicing clinician. Psychoanal Psychol. 2006;23:583–589.
100. Keen N, Hunter ECM, Peters E. Integrated trauma-focused cognitive-behavioural therapy for post-traumatic stress and psychotic symptoms: a case-series study using imaginal reprocessing strategies. Front Psychiatry. 2017;8:92.