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# Traumatic Childhood Experiences in the 21st Century: Broadening and Building on the ACE Studies With Data From the National Child Traumatic Stress Network

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## Abstract

The study objectives were to (a) examine the association between total number of trauma types experienced and child/adolescent behavioral problems and (b) determine whether the number of trauma types

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experienced predicted youth behavioral problems above and beyond demographic characteristics, using a diverse set of 20 types of trauma. Data came from the National Child Traumatic Stress Network's (NCTSN) Core Data Set (CDS), which includes youth assessed and treated for trauma across the United States. Participants who experienced at least one type of trauma were included in the sample ( $N = 11,028$ ; age = 1½-18 years; 52.3% girls). Random effects models were used to account for possible intraclass correlations given treatment services were provided at different NCTSN centers. Logistic regression analyses were used to investigate associations among demographic characteristics, trauma, and emotional and behavioral problems as measured by the Child Behavior Checklist (CBCL). Significant dose–response relations were found between total number of trauma types and behavior problems for all CBCL scales, except Sleep, one of the subscales only administered to 1½- to 5-year-olds. Thus, each additional trauma type endorsed significantly increased the odds for scoring above the clinical threshold. Results provide further evidence of strong associations between diverse traumatic childhood experiences and a diverse range of behavior problems, and underscore the need for a trauma-informed public health and social welfare approach to prevention, risk reduction, and early intervention for traumatized youth.

**Keywords**

National Child Traumatic Stress Network, traumatic childhood experiences, child traumatic stress (CTS), behavior problems, Child Behavior Checklist

Every year, millions of children and adolescents throughout the United States are exposed to traumatic events. Some events, such as natural disasters, are single occurrences, whereas others, such as maltreatment and domestic violence, may occur repeatedly in children's lives. Regarding the former, although the event may be a single occurrence, like other traumas, the consequences are often not. Recent natural disasters, including the Joplin tornado and Superstorm Sandy, and the accompanying loss of life, displacement of families from homes and communities, and disruption of children's normal activities of school and friendships for weeks and months, make clear the long-term impact that often ensues following such "single-occurrence" events, all of which can influence youth in multiple ways, including emotionally, psychologically, and socially.

Findings from a nationally representative survey of 1,400 U.S. youth highlight the pervasive nature of childhood trauma. More than two thirds of youth reported exposure to at least one significant traumatic event by age 16, whereas more than one third reported exposure to multiple traumatic events (Copeland, Keeler, Angold, & Costello, 2007). Moreover, traumatic events during childhood are linked to an array of emotional and behavioral problems and psychosocial impairments (Ford, Connor, & Hawke, 2009).

The long-term negative consequences of childhood trauma and chronic adversity have emerged as major public health and social welfare challenges for the 21st century. For more than a decade, the associations between childhood trauma and poor health outcomes have been documented in a series of well-known retrospective studies with adult populations (commonly referred to as the *Adverse Childhood Experiences* or *ACE* studies). These studies consistently demonstrate robust links between ACEs and social, emotional, and cognitive impairments (Anda et al., 2006; Briere, Kaltman, & Green, 2008; Felitti et al., 1998); adoption of health risk behaviors (Brown et al., 2010; Felitti, et al., 1998; Fuemmeler, Dedert, McClernon, & Beckham, 2009; Hyman et al., 2008); disease, disability, and social problems that manifest into adulthood (Anda et al., 2006; Brown et al., 2010; Dube et al., 2009; Felitti et al., 1998), including marked reductions in life expectancy associated with traumatic childhood experiences (Brown et al., 2009).

Notwithstanding their contribution in drawing further attention to the broad array of serious and persisting sequelae of childhood trauma, the ACE studies collectively carry at least three important methodological limitations that are addressed by this study. First, the ACE literature currently includes few *prospective* studies of the consequences of ACEs during childhood and adolescence. The few extant studies that draw on the ACE conceptual framework have focused primarily on adolescents and young adults (Anda et al., 2002; Duke, Pettingell, McMorris, & Borowsky, 2010; Flaherty et al., 2009; Holbrook et al., 2007; Johnson et al., 2002; Schilling, Aseltine, & Gore, 2007; Young, Hansen, Gibson, & Ryan, 2006); indeed, we were able to identify only two published articles in the corpus of ACE studies that focus specifically on younger children (Ethier, Lemelin, & Lacharite, 2004; Graham-Bermann & Seng, 2005). Second, many ACE studies involve retrospective reports concerning adverse events that occurred several decades prior (Dube, Williamson, Thompson, Felitti, & Anda, 2004), a potential limitation given the findings of studies regarding the validity of adult retrospective reports of ACE (Hardt & Rutter, 2004). Third, many ACE studies assess a limited range of only 10 adverse life events, specifically emotional abuse, sexual abuse, physical abuse, domestic violence, parental separation or divorce, mental illness in household,

household substance abuse, criminal household member, emotional neglect, and physical neglect (Brown, et al., 2009; Brown, et al., 2010)—a methodological practice that restricts the capacity to investigate the possible effects of other potentially high-magnitude childhood events, whether they be commonplace (e.g., community violence, sexual assault, traumatic loss/separation/bereavement, and school violence) or comparatively more rare in U.S. clinical settings (e.g., natural disaster, kidnapping, forced displacement, war/terrorism/political violence). Efforts to better understand the consequences of exposure to trauma, loss, and other severe adversities in childhood can thus be enhanced by studies that systematically assess a broad and diverse array of traumatic events in childhood and adolescence.

Accordingly, this study constitutes an extension of Felitti et al.'s original ACE conceptual framework by examining behavioral outcomes associated with a diverse array of 20 traumatic events, losses, and circumstances in childhood and adolescence. To this end, we studied a large clinic-referred sample of children and adolescents (age 1½-18 years) across the United States who were exposed to developmentally salient traumatic events, including major adversities not found in the original 10 ACEs (e.g., school violence, community violence, traumatic loss, natural disasters). Moreover, in contrast to health-related outcomes, we utilized a developmentally appropriate instrument to focus on behavioral problems of direct relevance to health and mental health practitioners who work with pediatric populations. We used a standardized test of child and adolescent psychosocial functioning to investigate links between traumatic childhood experiences and internalizing and externalizing behavior problems given the high prevalence rates of such problems in youth referred for psychological trauma services, widely reported associations between behavioral problems and negative outcomes in other developmentally salient life domains (e.g., school behavior and performance), and their implications for early identification and implementation of effective treatment.

## **Study Hypotheses**

We drew on the accumulating evidence base regarding the negative sequelae of ACEs to form two hypotheses:

**Hypothesis 1:** There will be a dose–response association between traumatic childhood experiences (i.e., total number of trauma types) and internalizing and externalizing behavior problems, such that as the number of trauma types experienced increases, so also does the likelihood of these problems.

**Hypothesis 2:** Exposure to multiple types of traumatic childhood experiences will increase the likelihood of clinical levels of child and adolescent internalizing and externalizing behavior problems after statistically adjusting for demographic characteristics.

## Method

Data were collected by participating member sites of the National Child Traumatic Stress Network (NCTSN), which is comprised of centers that provide trauma-informed mental health services, including a range of evidence-based treatments, to children in diverse settings and across service systems (e.g., mental health and health services, child welfare, schools, juvenile justice). The mission of the NCTSN is to raise the standard of care and improve access to services for traumatized children, their families, and communities throughout the United States. As part of this effort, data were collected on the children and adolescents referred for assessment and treatment. These data serve as the basis for the CDS. See Briggs, Fairbank, Greeson, et al. (2012) for a detailed description of the NCTSN and the CDS.

## Participants

The full CDS includes data on 14,088 children and adolescents between the ages of 0 and 21 years who have experienced between 0 and 20 total trauma types. For this study, children and adolescents ages 1½ to 18 years who experienced at least one confirmed or suspected trauma type were included in the sample ( $N = 11,028$ ). This age range was consistent with the developmental considerations of the selected dependent variables, which were internalizing and externalizing behavioral syndrome scales from the *Child Behavior Checklist* (CBCL). Missing data were handled using listwise deletion. All aspects of this quality improvement initiative complied with the Institutional Review Board of Duke University Health System and all federal regulations for human subject protection.

To better understand the missing data pattern, we compared demographic variables for youth with complete versus missing data, breaking the sample into two age groups (ages 1½-5 years vs. 6-18 years) in accordance with the age ranges covered by the two versions of the CBCL used in this study. For the first age group (age 1½-5 years), only race resulted in a significant difference: Blacks had significantly higher odds of being dropped due to missing data on any of the variables under study compared with Whites. Significant differences were found in the second age group between the retained versus dropped groups for the variables ethnicity, race, and eligibility for public

insurance. Blacks, Hispanics, and those eligible for public insurance had significantly higher odds of being dropped due to missing data on any of the variables under study compared with Whites, non-Hispanics, and those not eligible for public insurance.

## Measures

Covariates included demographic variables, specifically gender, age, race (White/Black/Other), ethnicity (Hispanic/Latino), current primary residence (home, with relatives, regular foster care, treatment foster care, residential treatment center), and eligibility for public insurance (e.g., Medicaid, State Health Insurance) which served as a proxy for income.

Trauma history variables in the CDS include 20 different types of trauma exposures derived from the *Trauma History Profile* (THP) section of the University of California at Los Angeles Posttraumatic Stress Disorder (UCLA PTSD) Reaction Index (see Table 1; Steinberg, Brymer, Decker, & Pynoos, 2004). The THP is completed by the interviewing clinician and includes reports from both the child and his or her caregiver. The events included as trauma types in the THP are consistent with the types of events included in the *National Child Abuse and Neglect Data System* (U.S. Department of Health and Human Services, 2000). See Briggs et al. (2012) for definitions of the 20 events. Additional details and salient characteristics about each trauma were also collected to create comprehensive THP. For this study, we operationally defined *traumatic childhood experiences* as the independent variable by summing the total number of different *types* of trauma a child or adolescent was recorded as having experienced (range = 1-20). To facilitate testing of hypothesized dose-response relations, we subsequently truncated the upper range of the total trauma count variable to 10+ *exposures* (making the functional range 1, 2, 3 . . . 10+) to ensure adequate frequencies within each cell.

The CBCL, completed by a parent/caregiver, is one of the most widely used standardized measures for evaluating maladaptive behavioral and emotional problems across multiple developmental periods (1½-5 years; 6-18 years). The CBCL was developed to address the issue of defining child behavior problems empirically. There are two versions of the CBCL based on age (i.e., 1½-5 years; 6-18 years). Both versions were used in this study. Across the two versions, the CBCL has five externalizing subscales—*Aggressive Behavior*, *Emotionally Reactive Behavior*, *Rule Breaking Behavior*, *Attention Problems*, and *Social Problems*—and six internalizing subscales—*Anxious/Depressed*, *Somatic Complaints*, *Sleep Problems*, *Thought Problems*, *Withdrawn/Depressed*, and *Withdrawn* (see Table 2). Some subscales pertain to all age groups (e.g., *Aggressive Behavior*), whereas others pertain to only

**Table 1.** Descriptive Characteristics (N = 11,028).

Variable	M (SD)/n (%)	M (SD)/n (%)	M (SD)/n (%)
	1.5-5 Years	6-18 Years	Total
<b>Demographics</b>			
Age in years	4.2 (1.1)	11.9 (3.4)	10.6 (4.2)
<b>Sex</b>			
Female	875 (48.8%)	4,901 (53.1%)	5,776 (52.3%)
Male	917 (51.2%)	4,334 (46.9%)	5,251 (47.6%)
<b>Race</b>			
White	716 (42.3%)	2,977 (33.9%)	5,563 (59.9%)
Black	401 (23.7%)	2,402 (27.4%)	2,909 (31.3%)
Other	147 (8.7%)	547 (6.2%)	821 (8.8%)
<b>Ethnicity</b>			
Hispanic or Latino	428 (25.3%)	2,854 (32.5%)	3,282 (32.1%)
Not Hispanic or Latino	1,264 (74.7%)	5,926 (67.5%)	6,952 (67.9%)
<b>Child's current primary residence</b>			
Home (with parents)	819 (54.2%)	5,212 (64.9%)	6,031 (54.6%)
Relatives or other family	266 (17.6%)	1,193 (14.9%)	1,459 (13.2%)
Foster care	353 (23.4%)	897 (11.2%)	1,250 (11.2%)
Residential treatment center	5 (0.3%)	345 (4.3%)	350 (3.2%)
Other	65 (4.3%)	347 (4.3%)	412 (3.7%)
Public insurance	1,130 (63.1%)	5,806 (62.9%)	6,936 (62.8%)
<b>Trauma exposure</b>			
Number of trauma types	3.19 (2.2)	3.71 (2.5)	3.62 (2.4)
Traumatic loss/separation/ bereavement	735 (41.0%)	4,725 (51.1%)	5,460 (49.5%)
Domestic violence	939 (52.4%)	4,488 (48.6%)	5,427 (49.2%)
Impaired caregiver	770 (42.9%)	3,594 (38.9%)	4,364 (39.5%)
Emotional abuse	612 (34.2%)	3,550 (38.4%)	4,162 (37.7%)
Physical abuse	511 (28.5%)	2,872 (31.1%)	3,383 (30.6%)
Neglect	737 (41.1%)	2,668 (28.8%)	3,405 (30.8%)
Sexual abuse	445 (24.8%)	2,256 (24.4%)	2,701 (24.4%)
Community violence	98 (5.4%)	1,672 (18.1%)	1,770 (16.0%)
Sexual assault	167 (9.3%)	1,509 (16.3%)	1,676 (15.1%)
School violence	30 (1.6%)	1,256 (13.6%)	1,286 (11.6%)
Other trauma	183 (10.2%)	995 (10.7%)	1,178 (10.6%)
Serious injury	124 (6.9%)	1,063 (11.5%)	1,187 (10.7%)
Physical assault	89 (4.9%)	1,044 (11.3%)	1,133 (10.2%)
Illness/Medical trauma	150 (8.3%)	905 (9.8%)	1,055 (9.5%)
Interpersonal violence	41 (2.2%)	528 (5.7%)	569 (5.1%)
Natural disaster	28 (1.6%)	529 (5.7%)	557 (5.0%)
Kidnapping	34 (1.9%)	205 (2.2%)	239 (2.1%)
Forced displacement	13 (0.7%)	181 (1.9%)	194 (1.7%)
War/terrorism/political violence outside United States	10 (0.5%)	115 (1.2%)	125 (1.1%)
War/terrorism/political violence inside United States	2 (0.1%)	98 (1.0%)	100 (0.9%)

Note. Race, ethnicity, and trauma exposure are not mutually exclusive categories.



**Table 2.** CBCL Syndrome Subscales: Frequency and Percentage in Clinical Range (>69).

Variable (Total <i>n</i> )	Frequency (%)		
	Ages 1½-5 Only	Ages 6-8 Only	All Ages
Emotionally Reactive (1,494) <sup>a</sup>	285 (19.1)		
Sleep Problems (1,494) <sup>b</sup>	304 (20.4)		
Withdrawn (1,494) <sup>b</sup>	312 (20.9)		
Rule Breaking (6,543) <sup>a</sup>		1,669 (25.5)	
Social Problems (6,543) <sup>a</sup>		1,260 (19.3)	
Thought Problems (6,543) <sup>b</sup>		1,581 (24.2)	
Withdrawn/Depressed (6,543) <sup>b</sup>		1,527 (23.3)	
Aggressive Behavior (8,037) <sup>a</sup>			2,283 (28.4)
Anxious/Depressed (8,037) <sup>b</sup>			1,739 (21.6)
Attention Problems (8,037) <sup>a</sup>			1,825 (22.7)
Somatic Complaints (8,037) <sup>b</sup>			1,232 (15.3)

Note. CBCL = Child Behavior Checklist.

<sup>a</sup>Externalizing Problems.

<sup>b</sup>Internalizing Problems

the younger age group (e.g., *Emotionally Reactive*) or older age group only (e.g., *Rule Breaking*). The reliability and validity of both versions of the CBCL are well-established (Achenbach & Rescorla, 2001). For this analysis, Cronbach's alpha ranged from .86 to .89 for the subscales. Clinical syndrome subscale scores, instead of the "broadband" externalizing subscale score, were used in this study to examine dose-response between trauma exposure types and specific behavior problems. For logistic regression analyses, we used a dichotomous outcome variable (denoted as 1 = subscale score fell within the clinical range, defined as a *T*-score > 69, else = 0).

## Data Analyses

To explore the association between trauma exposure and child and adolescent behavior problems, we used multivariate logistic regressions, controlling for demographics. Because coefficients of the logistic regression are not intuitive, odds ratios with 95% confidence intervals are provided for interpretation. The odds ratio is defined as  $\exp(\beta)$ . Pearson's *r* was used to investigate hypothesized dose-response associations by estimating correlations between the total number of trauma types and behavioral and emotional problems. To adjust for possible intraclass correlations given that participants were nested

within different NCTSN centers across the United States, we modeled center-level random effects using SAS PROC GLIMMIX. The logistic regression models created to assess the associations between trauma exposure and child and adolescent behavior problems were

$$\text{Logit (Behavior Problem)} = \beta_0 + \beta_1 \text{Trauma Exposure} + X\beta, \quad (1)$$

where  $X$  = age, gender, race, ethnicity, current primary residence, eligibility for public insurance.

## Results

### *Demographic and Trauma Characteristics*

Table 1 presents descriptive characteristics (demographics and trauma exposures) of children and adolescents included in the study. The mean age was 10.6 years ( $SD = 4.2$ ), with approximately equal proportions of males (47.6%) and females (52.3%). Over half the participants identified themselves as White (59.9%), 31.3% identified themselves as Black, and 32.1% of the participants identified themselves as Hispanic or Latino. The majority of the children and adolescents lived at home with their parents (54.6%), and slightly more were eligible for public insurance (62.8%). Most youth reported experiencing more than one trauma type; the average number of trauma types was  $M = 3.6$  ( $SD = 2.4$ ; *Median* = 3.0). Domestic Violence (49.2%) and Traumatic Loss/Bereavement/Separation (49.5%) were experienced by almost half of the children and adolescents, whereas War/Terrorism/Political Violence inside or outside the United States were experienced by less than 1.1%. The percentage of the sample in the clinical range for each CBCL subscale ( $T$ -score > 69) was also assessed (Table 2). The *Somatic Complaints* subscale had the smallest percentage of children/adolescents in the clinical range at baseline (15.3%), and *Aggressive Behavior* had the largest percentage (28.4%).

### *Externalizing Problems*

Table 3 presents odds ratios and confidence intervals from the logistic regression models for externalizing behavior outcome variables. In these models (which included age, gender, race, ethnicity, and eligibility for public insurance as covariates), we found a significant dose–response relationship between total number of trauma types and each of the five externalizing problems ( $p < .05$ ). Each additional type of trauma exposure significantly

**Table 3.** Odds Ratios and Confidence Intervals From Logistic Regression Models for Externalizing Outcomes.

	Aggressive	Attention	Emotionally Reactive <sup>a</sup>	Rule Breaking <sup>b</sup>	Social Problems <sup>b</sup>
Age <sup>c</sup>	0.98 [0.96, 0.99]**	0.99 [0.97, 1.00]	1.14 [0.98, 1.34]	0.94 [0.92, 0.96]***	0.96 [0.94, 0.98]***
Female vs. Male	0.76 [0.68, 0.85]***	1.17 [1.04, 1.32]**	0.90 [0.67, 1.22]	0.83 [0.73, 0.95]**	1.09 [0.95, 1.26]
Hispanic/ Latino vs. non-Hispanic/ Latino	0.68 [0.57, 0.82]***	0.74 [0.61, 0.90]**	1.47 [0.95, 2.27]	0.64 [0.51, 0.80]***	0.77 [0.62, 0.96]*
Black vs. White	0.95 [0.82, 1.10]	0.89 [0.76, 1.03]	1.05 [0.71, 1.56]	1.07 [0.91, 1.27]	0.83 [0.69, 0.99]*
Other vs. White	0.80 [0.64, 1.00]	0.86 [0.69, 1.09]	1.34 [0.82, 2.18]	0.98 [0.75, 1.28]	0.72 [0.54, 0.96]*
Public insurance vs. other types	1.09 [0.95, 1.24]	1.12 [0.97, 1.28]	1.06 [0.73, 1.53]	1.08 [0.92, 1.26]	1.14 [0.97, 1.34]
No. of trauma types <sup>c</sup>	1.11 [1.09, 1.14]***	1.11 [1.08, 1.14]***	1.13 [1.04, 1.22]**	1.16 [1.12, 1.19]***	1.12 [1.09, 1.16]***

Note. OR = odds ratio.

<sup>a</sup>1½ to 5 only.

<sup>b</sup>6 to 18 only.

<sup>c</sup>ORs are associated with a one-unit increase.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

increased the odds of scoring within the clinical range on each CBCL subscale, with odds ratios ranging from 1.11 for *Aggressive Behavior* and *Attention Problems* to 1.16 for *Rule Breaking*. Thus, each one-unit increase in the total number of reported trauma types increased the odds of scoring in the clinical range for *Rule Breaking* (after controlling for demographic variables) by 16%.

### Internalizing Problems

Table 4 presents odds ratios and confidence intervals from the logistic regression models for internalizing behavior outcome variables. In these models, with the same covariates as the externalizing models, we found a significant dose–response relationship between total number of trauma types and five of the six internalizing problems ( $p < .05$ ). The significant odds ratios range from 1.07 for *Withdrawn/Depressed* to 1.15 for *Thought Problems*. Thus, each one-unit increase in the total number of reported trauma types increased

**Table 4.** Odds Ratios and Confidence Intervals From Logistic Regression Models for Internalizing Outcomes.

	Anxious/ Depressed	Somatic Complaints	Sleep Problems <sup>a</sup>	Thought Problems <sup>b</sup>	Withdrawn/ Depressed <sup>b</sup>	Withdrawn <sup>a</sup>
Age <sup>c</sup>	1.03 [1.01, 1.04]***	1.1 [1.08, 1.12]***	0.81 [0.7, 0.94]**	0.96 [0.94, 0.98]***	1.06 [1.04, 1.08]***	0.98 [0.86, 1.13]
Female vs. male	1 [0.88, 1.13]	1.31 [1.13, 1.51]***	1.15 [0.86, 1.53]	1.01 [0.88, 1.15]	0.86 [0.75, 0.98]*	0.93 [0.7, 1.23]
Hispanic/Latino vs. non- Hispanic/ Latino	1.08 [0.9, 1.3]	1.02 [0.82, 1.26]	0.72 [0.46, 1.12]	0.77 [0.63, 0.95]*	1.16 [0.95, 1.42]	1.35 [0.91, 2.01]
Black vs. White	0.58 [0.49, 0.68]***	0.73 [0.6, 0.88]**	0.69 [0.47, 1.01]	0.85 [0.72, 1.01]	0.87 [0.73, 1.04]	1.02 [0.71, 1.48]
Other vs. White	0.81 [0.64, 1.03]	0.88 [0.67, 1.15]	0.7 [0.42, 1.18]	0.75 [0.58, 0.98]*	0.88 [0.68, 1.15]	0.92 [0.57, 1.49]
Public Insurance vs. other types	0.95 [0.82, 1.09]	0.88 [0.75, 1.04]	1.26 [0.88, 1.8]	1 [0.86, 1.17]	0.93 [0.8, 1.09]	1.11 [0.79, 1.56]
No. of trauma types <sup>c</sup>	1.1 [1.07, 1.13]***	1.08 [1.05, 1.12]***	1.06 [0.98, 1.14]	1.15 [1.12, 1.18]***	1.07 [1.04, 1.1]***	1.12 [1.05, 1.21]**

Note. OR = odds ratio.

<sup>a</sup> 1/2 to 5 only.

<sup>b</sup> 6 to 18 only.

<sup>c</sup> ORs are associated with a one-unit increase.

\*p < .05. \*\*p < .01. \*\*\*p < .001.

the odds of scoring in the clinical range for *Thought Problems* (after controlling for demographic variables) by 15%.

### Covariates

Some covariates were also significant predictors (see Tables 3 and 4). In particular, age was a significant predictor for several CBCL subscales, such that older youth had significantly lower odds on the *Aggressive Behavior*, *Rule Breaking*, *Social Problems*, *Sleep Problems*, and *Thought Problems* syndrome scales compared with younger youth. In contrast, older youth had significantly higher odds on the *Anxious/Depressed*, *Somatic Complaints*, and *Withdrawn/Depressed* syndrome scales. In addition, females had significantly lower odds on the *Aggressive Behavior Rule Breaking* and *Withdrawn/Depressed* syndrome scales compared with males. In contrast, females had significantly higher odds on *Attention Problems* and *Somatic Complaints* compared with males. African American participants had significantly lower odds on the *Social Problems*, *Anxious/Depressed*, and *Somatic Complaints* syndrome scales compared with White participants.

## **Discussion**

Child and adolescent trauma exposure is a major public health and social welfare problem that is linked to a broad range of both proximal and distal negative psychosocial and health consequences, including shortened life expectancy (Shalev et al., 2013). The present study builds upon and extends, in three important ways, the findings and some of the methodological limitations of the original ACE studies. First, we examined theorized behavioral sequelae of trauma exposure during a period in respondents' lives that is more proximal in its measurement (in some cases decades closer) to the incident, specifically by examining the incidence and sequelae of childhood and adolescent traumatic stress in childhood and adolescence. Second, we expanded the range of traumatic childhood events assessed to encompass such clinically and theoretically important experiences as loss, community violence, natural disaster, and war/terrorism. Third, we examined the incremental predictive effect of traumatic childhood experiences—operationally defined as the total number of reported trauma types—above and beyond the predictive effects of a standard set of demographic variables, in relation to different types of internalizing and externalizing behavior problems. Two advantages of this more proximal and comprehensive assessment of childhood trauma include addressing concerns regarding the accuracy of major life events reported many years later in retrospect (Anda et al., 2006; Brown et al., 2010; Dube et al., 2009; Felitti et al., 1998; Hyman et al., 2008), and the production of therapeutically actionable empirical evidence regarding dose–response relations between traumatic childhood experiences and behavior problems during critical developmental periods in childhood and adolescence (Anda et al., 2002; Duke et al., 2010; Ethier et al., 2004; Flaherty et al., 2009; Graham-Bermann & Seng, 2005; Johnson et al., 2002). Our examination of predictive effects also allowed for investigation of factors such as race and ethnicity, which are not always included in the ACE studies.

## **Limitations**

Although a large clinic-referred national sample carries important advantages—including the use of a “real-world” field setting to investigate factors that may significantly contribute to children’s psychosocial dysfunction—it is important to underscore that the CDS was primarily established as a quality improvement initiative, consisting of data collected from children and adolescents referred specifically to NCTSN-affiliated clinics for behavioral and/or emotional difficulties. Accordingly, these data are not nationally representative. Rather, it is reasonable to infer that these

data generalize to NCTSN-affiliated clinics that contributed data gathered from the children and adolescents whom they treated. Notably, the large size and national breadth of the NCTSN that spans many diverse geographic regions and settings ensure considerable diversity among constituent sites with respect to geographic setting, staff size and composition, institutional affiliations, areas of specialization, and populations served (Pynoos et al., 2008). The generalizability of these results is also limited by the differences, described earlier, in the retained versus dropped group with respect to race, ethnicity, and eligibility for public insurance. In addition, our study design utilized only pretreatment baseline data, which do not support causal inference.

More than half of the children in the sample received public insurance. Poverty may impart environmental risks to optimal child development including exposure to suboptimal education, housing, health access, and violence exposure (Gudino, 2013; MacMillan, Tanaka, Duku, Vaillancourt, & Boyle, 2013; Koenen, Moffitt, Poulton, Martin, & Caspi, 2007). In addition, child maltreatment occurs more frequently in the context of poverty (Sedlak et al., 2010). Thus, traumatic childhood experiences that are associated with poverty may be overrepresented in this sample. Notwithstanding these limitations, this study's findings further strengthen the assertion that exposure to trauma and loss in childhood and adolescence is a major public health and social welfare problem that carries important implications for raising public awareness and mounting interventions that focus on prevention and early remediation, where possible, of the psychosocial consequences of childhood trauma.

### *Conclusions, Implications, and Directions for Future Research*

Serious child and adolescent behavioral problems, in light of their strong links to a broad range of negative sequelae across the life course (e.g., childhood aggression is a strong predictor of adult crime and violence; Liu, 2004), are of major societal concern with respect to both intervention and public policy. Notwithstanding the correlational nature of our study design, our findings of significant links between exposure to childhood trauma and traumatic losses on one hand, and the development of negative psychosocial outcomes in childhood and adolescence on the other, point to five implications.

First, these findings emphasize the clinical utility of assessing for a broad range of types of childhood trauma and losses as an integral part of evaluating the developmental history of youth presenting with internalizing and externalizing behavioral problems. Although precluding causal inference, our

study design is sufficient to establish childhood trauma and loss exposure as a dose–response *risk marker* for internalizing and externalizing problems in youth. Nevertheless, we underscore that individual causal risk factors that make up “risk factor caravans”—defined as *constellations of causal risk factors that accumulate, co-occur, and “travel” with their host across development but do not necessarily arise from the same causal origins, operate through similar pathways* (e.g., share the same primary mediators or moderators), *exert the same causal effects, or eventuate in the same causal consequences* (Layne et al., 2009). Thus, different risk factor caravan elements (i.e., different constellations or combinations of trauma and loss exposure) may call for different intervention foci, objectives, practice elements, and therapeutic skills.

A second, related implication is the promise of broad-spectrum measures of childhood trauma and loss for “unpacking” risk factor caravans through the systematic investigation of potentially *differential associations* that interlink specific types of exposure with specific sequelae (Layne, Olsen, et al., 2010). These efforts will facilitate examination of the relative contributions of (a) specific types of trauma and loss, experienced during (b) specific developmental periods, in relation to (c) a range of outcomes (maladaptive as well as resilient) as assessed across (d) different developmental periods (e.g., Spinazzola et al., 2005).

A third implication is that youth with trauma and loss may benefit from flexibly tailored, modularized treatments that systematically assess and treat internalizing and externalizing child behavior problems, in addition to traditional “trauma-related” problems (e.g., PTSD). Recent evidence concerning the superior performance of such interventions over both standard “protocolized” treatments and “treatment as usual” underscores the viability and promise of this approach (Weisz et al., 2011).

A fourth implication arises from the promise that our findings hold for addressing a call to increase the “real-world” relevance of treatments by evaluating outcomes using “real-world” indicators that stakeholders care most deeply about (Kazdin, 2006). In particular, youth trauma histories are often discovered only *after* clients are referred for treatment of externalizing or internalizing problems and associated functional impairment as the primary presenting problem. Thus, trauma-focused approaches that incorporate internalizing and externalizing problems and associated functional impairment as an integral part of treatment may be more successful in producing “real-world” outcomes compared with treatments that focus on PTSD as a primary intervention target. A promising development in this respect is a novel approach to conceptualizing and measuring “clinically significant change” developed by Layne, Ostrowski, Greeson, Briggs-King, and Olsen (2010).

Specifically, the authors “translated” reductions in PTSD symptoms across repeated treatment sessions into concomitant reductions in 10 types of functional impairment (e.g., academic problems, behavioral problems). The authors found that shifts from the “severe” to the “moderate” range as well as from the “moderate” to the “mild/absent” range of PTSD symptom severity resulted in significant reductions in the odds likelihood of impairment for most outcomes.

A fifth implication of these findings is the basic question they pose for intervention developers, psychiatric epidemiologists, and public policy makers. Specifically, *does taking proactive steps to reduce the prevalence of childhood trauma, paired with timely intervention that effectively reduces behavioral problems and related psychiatric sequelae of childhood trauma once it occurs, meaningfully reduce negative consequences later in life?* Viewed through the lens of “risk factor caravan” as well as “resource caravan” (Hobfoll, 2001) conceptual frameworks, addressing such a problem will involve “unpacking” complex ecologies into their constituent “ecopathology” as well as “ecoresilience” aspects and investigating how these intersect with developmentally linked risks, capacities, tasks, milestones, and trajectories (Layne et al., 2009). For example, what are the developmental periods of maximum risk for exposure to specific developmentally linked stressors? How do risks and resources accumulate over time, across different developmental periods, to affect subsequent exposure to or protection from additional risks? Are certain types of trauma and loss experiences more potent contributors to specific behavior problems than others, or operate via different pathways (e.g., mediators and moderators)? Are specific resources more beneficial in response to stressors, such that they can be enhanced early in life as a protective or preventive measure (Layne et al., 2009)? Developing theory and an empirical evidence base that can address these questions will promote the development of prevention/early intervention programs that are more precise in identifying “evidence-based” intervention foci and pairing these with “evidence-based” intervention objectives and practice elements (Layne et al., 2007).

In conclusion, our results highlight the many ways in which childhood trauma may contribute to negative outcomes in childhood, adolescence, and beyond. Continued efforts to understand and expand on these associations will help to foster the development of “next generation” prevention and intervention initiatives that are capable of reducing the incidence, frequency, and harmful sequelae of childhood trauma and loss, while simultaneously enhancing wellness and positive youth development.



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## Authors' Note

The views, policies, and opinions expressed are those of the authors and do not necessarily reflect those of Center for Mental Health Services (CMHS), Substance Abuse and Mental Health Services Administration (SAMHSA), or U.S. Department of Health and Human Services (USDHHS).

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