Features of Childhood Maltreatment and Resilience Capacity in Adulthood: Results from a Large Community-Based Sample

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Childhood maltreatment is consistently associated with poor outcomes. However, few epidemiological studies have examined the association between childhood maltreatment and adult resilience capacity, defined as one's perceived ability to cope successfully with challenges. This study aimed to determine associations between adult resilience capacity and specific types and features of childhood maltreatment. Participants were African American adults recruited from a public urban hospital in Atlanta, GA ($N = 1,962$) between 2005 and 2013. Childhood maltreatment, including witnessing domestic violence or physical, emotional, and sexual abuse, was assessed retrospectively using the Traumatic Events Inventory. Perceived resilience capacity was assessed using the Connor-Davidson Resilience Scale. Linear regressions were performed assessing the association between resilience capacity and childhood maltreatment exposure in general, as well as specific dimensions of exposure, including type, co-occurrence, and developmental timing, adjusting for covariates. Participants exposed to any maltreatment reported lower resilience capacity than unexposed peers, $B = -0.38$, $SE = 0.04$, $p < .001$. All maltreatment types were negatively associated with resilience capacity, even after adjusting for other lifetime trauma exposure. Only emotional abuse remained significantly associated with resilience capacity after accounting for current psychological distress, $B = -0.11$, $SE = 0.05$, $p = .022$. Maltreatment co-occurrence followed an inverse dose–response relationship with resilience capacity: For each additional maltreatment type, scores decreased by 0.18 units ($SD = 0.02$), $p < .001$. Finally, the developmental timing of maltreatment did not reveal any differential influences on resilience capacity. The results suggest that childhood emotional abuse and co-occurrence of maltreatment types may be particularly deleterious to adult resilience capacity.

By the time they reach late adolescence, an estimated 16% of individuals will have been exposed to some form of mal-

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treatment (Gilbert et al., 2009), including witnessing domestic violence or experiencing physical, emotional, or sexual abuse (Teicher & Samson, 2013). These experiences are associated with long-term physical and mental health consequences across the life course, such as cardiovascular disease and diabetes (Basu, McLaughlin, Misra, & Koenen, 2017), as well as mental disorders in adulthood (Green et al., 2010), making them major public health problems. However, there is a wide variation in long-term outcomes among youth exposed to maltreatment, with many individuals not developing psychiatric disorders in adulthood (Green et al., 2010).

This observation has led many researchers in public health and other fields to examine individual capacity for resilience, or the ability to function competently and face future challenges or adversities successfully (Cicchetti & Rogosch, 2009).

Resilience is typically conceptualized as a dynamic process of adaptation that is dependent on internal and external factors (Southwick, Bonanno, Masten, Panter-Brick, & Yehuda, 2014). In the present paper, we focus specifically on resilience capacity, an individual-level factor defined here as one's perception of their capability to face future challenges successfully, including perceptions about one's personal qualities, such as self-confidence, adaptability, and ability to endure stress (Choi, Stein, Dunn, Koenen, & Smoller, 2019; Mancini & Bonanno, 2006). Resilience capacity should not be conflated with the process of resilience following adversity, which involves multiple factors beyond just intrapersonal traits, including other individual, interpersonal, and ecological factors (Bonanno & Diminich, 2013). We prefer the term resilience capacity to the term "trait resilience," which has been used in previous work (Campbell-Sills, Forde, & Stein, 2009; Daniels et al., 2012), as resilience capacity is expected to be able to change within a person, and is not an inherent, fixed trait. Resilience capacity is closely related to but distinct from the more process-focused construct of trauma coping self-efficacy (Benight et al., 2015), which focuses on one's perceptions of their ability to utilize coping strategies for stress-related demands. In contrast, resilience capacity refers more generally to self-perceptions of successful adaptation to future adversity. Resilience capacity may be one of many factors that contributes to the resilience process following adversity. As resilience capacity may decrease the risk of negative outcomes following future adversities (Daniels et al., 2012; Hourani et al., 2012), it is relevant to examine how maltreatment may impact this capacity, as such insights could guide public health interventions aimed at promoting mental health.

Several studies have suggested that childhood maltreatment may negatively impact one's self-reported resilience capacity in adulthood. For example, Campbell-Sills et al. (2009) found that maltreatment was associated with lower resilience capacity among participants in a community sample. Moreover, Howell and Miller-Graff (2014) found that childhood exposure to violence was associated with adult resilience capacity, although this association was no longer significant after controlling for symptoms of depression and anxiety. However, to date, no studies have considered how specific features of maltreatment might shape one's self-reported resilience capacity.

Prior evidence suggests that features of maltreatment, such as its type or types, co-occurrence, and timing, may exert differential impacts on psychological outcomes (Cecil, Viding, Fearon, Glaser, & McCrory, 2017). There has been some specificity in patterns of maladjustment following different types of trauma exposures. For example, relative to other maltreatment types, emotional abuse has been associated with an increased risk for negative outcomes, particularly regarding emotion regulation and internalizing symptoms of psychiatric distress in young adulthood (Cecil et al., 2017). In addition, the co-occurrence of exposures, often defined with a count of maltreatment types (Hodges et al., 2013), may also influence resilience capacity. Although there are limitations to the cumulative count approach, the findings from adverse childhood experiences (ACE) studies have shown a dose–response relationship between the number of ACEs and adult mental health risk, suggesting a cumulative burden of adversity on psychological functioning (Sareen et al., 2013). Finally, the developmental timing of maltreatment exposure could also influence adult resilience capacity. There may be sensitive periods during development when neuroplasticity is particularly high and exposure to negative stimuli is, therefore, particularly impactful (Knudsen, 2004). Although evidence that supports the impact of sensitive periods has been mixed, there is some suggestion that maltreatment that occurs before 5 years of age is particularly deleterious for later mental health (Dunn, McLaughlin, Slopen, Rosand, & Smoller, 2013; Dunn, Nishimi, Powers, & Bradley, 2017). However, the effect of the developmental timing of maltreatment on resilience capacity is largely unknown.

Resilience capacity has been found to be negatively correlated with psychological distress (Campbell-Sills, Cohan, & Stein, 2006; Edwards, Probst, Rodenhizer-Stampfli, Gidycz, & Tansill, 2014). Though related, these two constructs are distinct: Resilience capacity refers to one's perception of their ability to successfully face stress, whereas psychological distress refers to general affective symptoms, including depression and anxiety (Bonanno & Diminich, 2013). If resilience capacity were simply the direct inverse of psychological distress, data on psychological symptoms would be sufficient to understand the impact of maltreatment on adult capacity to respond to future stress. Whereas pretrauma distress may predict the development of psychopathology in the face of later adversity (Sayed, Iacoviello, & Charney, 2015), a range of pretrauma experiences, including factors such as coping, cognitive abilities, and personality, have also been found to impact the risk of posttrauma psychopathology (DiGangi et al., 2013). As such, efforts are warranted to determine the impact of maltreatment on resilience capacity above and beyond psychological distress.

Using data from a socioeconomically diverse sample of adults with high levels of trauma exposure, we investigated the association between exposure to child maltreatment, as well as the features of that maltreatment, and adult resilience capacity. Our goal was to test whether the following features of maltreatment exposure were associated with lower resilience capacity: (a) certain types of maltreatment, (b) co-occurrence of maltreatment types, and (c) developmental timing of maltreatment exposure. Given evidence suggesting that the construct of resilience capacity is related to yet distinct from psychological distress, we tested whether (d) the associations between maltreatment and resilience capacity existed independent of current psychiatric symptoms. To our knowledge, the present study was the first to explore the impact of maltreatment features on adult resilience capacity while accounting for current psychological symptoms.

Method

Participants and Procedure

Data were taken from the Grady Trauma Project (GTP), a National Institute of Mental Health–funded study of determinants of posttraumatic stress disorder (PTSD), which was conducted between 2005 and 2013 (Gillespie et al., 2009). Participants were recruited from medical clinic waiting rooms at an urban, nonprofit healthcare center in Atlanta, Georgia (United States), where they were either patients or the family members of patients (e.g., a patient's parent or child). Consenting adults participated in structured, verbal interviews administered by trained research assistants; interviews assessed demographics, lifetime adversity exposure, and psychological functioning. Verbal interviews were conducted due to variations in participant literacy levels, and interviewers monitored participant safety and well-being throughout the process. Interviews lasted 45–75 min, depending on participant trauma history and availability, as study questions proceeded until the clinic was ready to see the participant or their family member. All study procedures were approved by Emory University's Institutional Review Board and the Grady Health Care System Research Oversight Committee.

Data from 1,962 participants with complete information for all relevant measures were included in the current analysis; most missing data were a function of the clinic waiting room interview procedure. Specifically, participants completed interviews until the clinic was ready to see the participant or their family member, thus ending the interview and leading to missing data on any measures that had not been completed up until that point. From the initial sample of 6,764 individuals, 3,268 (48.3%) had missing information on trauma exposure, which was collected at the end of the interview. Of individuals with missing information on trauma exposure, 1,351 (38.6%) had missing outcome information, and, of these individuals, 183 (8.5%) had missing covariate information. The analytic sample ($N = 1,962$) did not differ regarding age, sex, educational attainment, or income from participants who were excluded ($n = 4,802$), $ps = .087$–$.562$; however, individuals in the analytic sample were more likely to be employed (53.6%) relative to those who were excluded (48.2%), $p < .001$. Additionally, because only a small proportion of original sample participants identified their race as White or other (3.6% and 3.8%, respectively), thus limiting power to determine significant racial/ethnic differences, we restricted the analytic sample to African American participants.

Measures

Childhood maltreatment. Exposure to childhood maltreatment was collected through the Traumatic Events Inventory (TEI; Gillespie et al., 2009), a 14-item screening questionnaire used to assess an individual's history of trauma exposure. The TEI was developed for use in racially and ethnically diverse urban samples and has shown strong associations with PTSD in this population, suggesting strong construct validity (Schwartz,

Bradley, Sexton, Sherry, & Ressler, 2005). We focused on five items related to maltreatment: violence between parents or caregivers (i.e., "Did you witness violence between your parents or caregivers when you were a child?"), physical abuse (i.e., "Were you beaten or physically punished in other ways as a child?"), emotional abuse (i.e., "Did adults who cared for you talk to you in mean ways?"), or sexual abuse before 18 years of age (i.e., "Before age 14, did an adult or older teenager sexually abuse you or have any type of sexual contact with you," "Between the ages of 14 and 18 years, did an adult or older teenager sexually abuse you?"). Participants were asked whether they had been exposed to each maltreatment type, and, if so, their age in years at first exposure. Maltreatment type exposure was coded as a binary variable for each individual type (0 = unexposed, 1 = exposed) and for any maltreatment (0 = unexposed to all types, 1 = exposed to any type). The co-occurrence of child maltreatment was coded as a count variable by summing the number of maltreatment types reported, which ranged from 0 for none to 4 for exposure to all types. Age at first exposure was used to categorize exposed participants by developmental timing of first exposure into three time periods, consistent with previous work (Dunn et al., 2017): early childhood (age 0–5 years), middle childhood (age 6–10 years), and adolescence (age 11–18 years). We created a categorical variable (four-level for unexposed, early childhood, middle childhood, and adolescence) for developmental timing of any child maltreatment; the earliest age of any exposure was used if multiple types were endorsed.

Resilience capacity. Participants completed the 10-item Connor-Davidson Resilience Scale (CD-RISC 10; Campbell-Sills & Stein, 2007), an abbreviated and validated version of the original 25-item CD-RISC, which is one of the most widely used scale measures of resilience. This unidimensional self-report scale assesses the positive capacity of an individual to cope with stress (Campbell-Sills & Stein, 2007), including perceptions of personal qualities encompassing this positive capacity, such as the ability to adapt to change, achieving goals despite obstacles, and staying focused under pressure. Although we refer to the construct simply as resilience capacity herein, we note this construct refers specifically to one's perceived resilience capacity. Scale scores have demonstrated excellent reliability and validity (Connor & Davidson, 2003), and have been used in other African American populations (Bailey, Sharma, & Jubin, 2013). In the current sample, the Cronbach's alpha value was .88. Participants indicated how true each of the items was for themselves over the past month, using a 5-point Likert scale ranging from 0 (*never true*) to 4 (*always true*). A total sum score was created (range: 0–40), with higher scores indicating higher resilience capacity. For ease of interpretation, sum scores were standardized ($M = 0$; $SD = 1$).

Covariates. Sociodemographic covariates were included in all regression models and included: age (continuous); sex

(binary variable coded as male vs. female); highest level of educational attainment (categorical variable coded as less than high school, high school graduate or equivalent, more than high school graduate or equivalent/college graduate); household monthly income (categorical variable coded as $0–$499, $500–$999, $1,000 or more); and employment status (categorical variable coded as unemployed, unemployed receiving disability support, or employed with or without disability support).

Lifetime trauma exposure. As maltreatment and traumatic exposures tend to cluster within individuals (Breslau, Davis, & Andreski, 1995), and recent trauma may proximally impact adult resilience capacity (Bonanno & Diminich, 2013), we also assessed lifetime trauma exposure. Specifically, we controlled for lifetime trauma using the remaining 10 TEI items, which were clustered into three groups, based on prior research (Breslau et al., 1998): any other interpersonal violence (i.e., the murder of a friend/family member, being attacked by a romantic partner, sexual abuse after 18 years of age, witnessing an attack on a friend/family member, witnessing an attack on someone else), any non-interpersonal trauma (i.e., natural disaster, serious accident or injury, sudden life-threatening illness), and any other trauma. All events other than sexual abuse after 18 years of age could have occurred at any age. We created a set of binary variables to capture presence versus absence of exposure to any item within each lifetime trauma group, to determine the impact of maltreatment above and beyond later lifetime trauma exposures.

Symptoms of depression and posttraumatic stress. To disentangle the relation between resilience capacity and psychological distress, we also adjusted for current depressive and posttraumatic stress symptoms (PTSS). Self-reported depressive symptoms were assessed using the Beck Depression Inventory–II (BDI-II; Beck, Steer, & Brown, 1996), a 21-item validated and widely used inventory of depressive symptoms. Items on the BDI-II are scored using a 4-point Likert scale related to symptom severity, which ranges from 0 (*I do not feel sad*) to 3 (*I am so sad or unhappy that I can't stand it*); item responses were summed, resulting in total scores ranging from 0 to 63. In the current sample, the Cronbach's alpha value was .93.

Self-reported PTSS were assessed using the modified Posttraumatic Stress Symptom Scale (mPSS; Coffey, Dansky, Falsetti, Saladin, & Brady, 1998), a 17-item validated measure of the frequency of PTSS, which correspond to diagnostic criteria defined by the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed. text rev.; *DSM-IV-TR*). Items on the mPSS are scored on a 4-point Likert scale related to symptom frequency, which ranges from 0 (*not at all*) to 3 (*5 or more times per week/very much/almost always*). Item responses were summed, resulting in total scores ranging from 0 to 51. In the current sample, the Cronbach's alpha value was .92. Separate, continuous scores for depressive and PTSS were used, with higher scores for each indicating more severe symptoms.

Data Analysis

We performed descriptive analyses to assess distributions of maltreatment and resilience capacity and compare levels of resilience capacity by each covariate. We also examined correlations between resilience capacity and psychological symptoms. We then ran a series of hierarchical linear regression models to evaluate the association between features of maltreatment exposure and resilience capacity in adulthood. The models were hierarchical, with each subsequent model building on the prior by adding additional covariates. The effects of linear regression models are unstandardized beta coefficients for standardized resilience capacity.

Model 1: Any maltreatment exposure and maltreatment types. To determine the independent effects of maltreatment types, we ran individual models with each of the following variables as the primary predictor: any maltreatment, witnessing violence between caregivers, physical abuse, emotional abuse, and sexual abuse. As maltreatment types tend to co-occur, we also ran a model that included all maltreatment types together. With these maltreatment type predictors, we conducted Model 1 in three steps. First, Step A assessed the association between exposure to any child maltreatment (any child maltreatment vs. never exposed) and resilience capacity. Second, Step B built on Step A by additionally adjusting for other lifetime trauma exposures, using binary lifetime trauma variables, to determine the effect of maltreatment above and beyond other lifetime exposures. Third, Step C built on Step B by additionally adjusting for depressive and PTSS, to determine the impact of maltreatment exposure on resilience capacity independent of current psychological distress. All models adjusted for sociodemographic covariates.

Model 2: Maltreatment co-occurrence. To determine the effect of maltreatment co-occurrence, Model 2 assessed the association between the number of specific reported child maltreatment types and levels of resilience capacity, comparing individuals who had not been exposed to any maltreatment to those who had experienced various combinations of maltreatment types. Co-occurrence was modeled both as a continuous (range: 0–4) and a categorical variable (0 [unexposed], 1, 2, 3, 4 types) to evaluate linear and threshold effects. Similar to Model 1 analyses, we ran Model 2 in steps: Step A adjusted for sociodemographic covariates, Step B additionally adjusted for other lifetime trauma exposures, and Step C additionally adjusted for psychological symptoms. Tukey post hoc two-way comparisons were conducted for the categorical co-occurrence variable to determine whether the effects of different maltreatment counts differed from each other.

Model 3: Developmental timing of maltreatment. Finally, Model 3 assessed the association between the developmental timing of any maltreatment as a categorical variable (0 = unexposed [referent]; 1 = exposed in early childhood, 2 = exposed in middle childhood, 3 = exposed in adolescence) and resilience capacity. Again, Step A adjusted for sociodemographic covariates, Step B additionally adjusted for other trauma exposure (i.e., binary lifetime trauma variables), and Step C additionally adjusted for psychological symptoms. Tukey post hoc two-way comparisons for each pairwise combination were conducted to determine if the effects of exposure in different developmental time periods differed from each other. All analyses were performed using SAS (Version 9.4; SAS Institute, Inc., Cary, North Carolina).

Results

Sample Characteristics

The analytic sample of 1,962 African American adults ranged in age from 18 to 78 ($M = 40.3$, $SD = 13.6$) and was mostly female (73.9%). Additional sample characteristics are presented in Table 1. The average reported level of unstandardized resilience capacity was 31.84 ($SD = 7.4$; standardized scores $M = 0.00$, $SD = 1.0$) and was normally distributed, with a slight negative skew, skewness = −1.04. Significant differences in resilience capacity were found for all sociodemographic covariates. Younger and older participants reported higher levels of resilience capacity, whereas middle age participants reported lower levels. Compared to their peers, participants who were male, had higher levels of educational attainment and income, and were unemployed at the time of assessment were more likely to report higher levels of resilience capacity. Depressive and PTSS were normally distributed, with a slight positive skew, skewness = 0.94 and 1.01, respectively. Pearson correlations identified that resilience capacity was negatively correlated with both depressive, $r = −.54$, and PTSS, $r = −.34$, which were highly correlated with each other, $r = .68$.

Child maltreatment exposure was common, with over half of the participants (55.0%) reporting exposure to at least one maltreatment type. There was also a high co-occurrence of maltreatment types; among exposed individuals, only 44.7% reported exposure to only one type, whereas 25.9% reported exposure to three or four types. Polychoric correlations between maltreatment exposures ranged from $r = .36$ for the correlation between witnessing violence and sexual abuse to $r = .64$ for the correlation between physical and emotional abuse. The average age of first exposure to any maltreatment was 8.0 years ($SD = 3.5$); among exposed participants, 28.0% were first exposed in early childhood (ages 0–5 years), 49.5% were first exposed in middle childhood (ages 6–10 years), and 22.5% were first exposed in adolescence (ages 11–18 years). Exposure to other traumas was also common: 84.1% of the sample reported exposure to some other type of interpersonal violence (age at first exposure: $M = 17.44$ years, $SD = 10.2$, range: 0–64 years), 75.2% reported

exposure to noninterpersonal trauma (age at first exposure: $M = 18.90$ years, $SD = 12.1$, range: 0–64 years), and 32.0% reported exposure to other unspecified trauma (age at first exposure: $M = 27.53$ years, $SD = 14.1$, range: 1–68).

Model 1: Effect of Exposure to Child Maltreatment Types on Resilience Capacity

Participants who were exposed to any type of child maltreatment had significantly lower levels of resilience capacity compared to those who were unexposed, after controlling for sociodemographic covariates, $B = −.38$, $SE = 0.04$, $p < .001$ (Table 2). When each maltreatment type was assessed separately, exposure to each individual type was associated with significantly lower resilience capacity, with emotional abuse showing the largest magnitude of association, $B = −.47$, $SE = 0.05$, $p < .001$. When all four maltreatment types were entered into one model, which was adjusted for sociodemographic covariates, associations between resilience capacity and witnessing violence, emotional abuse, and sexual abuse remained significant: $B = −0.12$, $SE = 0.05$, $p = .019$ for witnessing violence; $B = −0.36$, $SE = 0.06$, $p < .001$ for emotional abuse; and $B = −0.17$, $SE = 0.05$, $p = .001$ for sexual abuse (Table 3), whereas the effect of physical abuse was no longer significant, $B = −0.07$, $SE = 0.06$, $p = .273$.

The effects of any maltreatment, as well as those for each individual maltreatment type, were slightly attenuated, though they persisted after additionally adjusting for exposure to other types of traumatic events (Step B). After adjusting for current psychological symptoms (Step C), all associations with resilience capacity became nonsignificant except the effects of any maltreatment type, $B = −0.09$, $SE = 0.04$, $p = .025$; and emotional abuse, $B = −0.10$, $SE = 0.05$, $p = .022$. This attenuation seemed to be largely explained by depressive symptoms. See the Supplementary Materials for effect estimates of other trauma and psychological symptoms for Models 1–3.

Model 2: Effect of Co-Occurrence of Child Maltreatment Types on Resilience Capacity

When assessed as a continuous variable, every additional maltreatment type was associated with a 0.18 unit decrease, on average, in resilience capacity, after adjusting for sociodemographic covariates, $B = −0.18$, $SE = 0.02$, $p < .001$, suggesting that exposure to multiple maltreatment types was associated with lower resilience capacity in a dose–response fashion. When modeling the level of maltreatment co-occurrence categorically to examine potential threshold effects, participants exposed to any single maltreatment type had significantly lower levels of resilience capacity compared to those who were unexposed, after adjusting for sociodemographic covariates, $B = −0.21$, $SE = 0.05$, $p < .001$, whereas participants who had been exposed to all four maltreatment types had even lower levels of resilience capacity, $B = −0.63$, $SE = 0.10$, $p < .001$ (Table 4). Individuals who had been exposed to two, three, or four maltreatment types relative to no exposure had significantly lower

Table 1

Distribution of Covariates and Resilience capacity in the Analytic Sample

Covariate	N	%	M	SD	F	df	Pairwise comparisons
Age (years)							
18–25	405	20.6	0.10	0.9	9.04***	4	18–25 vs. 26–35*, 36–45*,
26–35	370	18.9	−0.05	1.0			46–55*** 26–35 vs. ≥ 56*
36–45	352	17.9	−0.09	1.0			36–45 vs. ≥ 56***
46–55	555	28.3	−0.16	1.1			46–55 vs. ≥ 56***
≥ 56	280	14.3	0.23	0.9			
Sex							
Male	513	26.2	0.11	1.0	10.79*	1	
Female	1,449	73.9	−0.06	1.0			
Educational attainment							
Less than HS	432	22.0	−0.28	1.1	24.36***	2	Less than HS vs. HS diploma
HS diploma or GED	844	43.0	−0.01	1.0			or GED***,
Some college or college graduate	686	35.0	0.14	0.9			Some college or college graduate***; HS diploma or GED vs. Some college or college graduate*
Household monthly income (USD)							
$0–$499	611	31.1	−0.21	1.1	19.65***	2	$0–$499 vs. $500–$999*,
$500–$999	535	27.3	−0.01	1.0			≥ $1,000***
≥ $1,000	816	41.6	0.12	0.9			$500–$999 vs. ≥ $1,000+
Employment status							
Employed	1,051	53.6	−0.07	1.0	9.38***	2	Employed vs. unemployed***;
Unemployed with disability	350	17.8	−0.10	1.1			Unemployed with
Unemployed	561	28.6	0.14	0.8			disability vs. unemployed*

Note. $N = 1,962$. Analysis of variance (ANOVA) were performed for resilience, in standardized 10−item Connor−Davidson Resilience Scale (CD−RISC10) total units ($M = 0$, $SD = 1$) by each covariate, with F statistics and significant pairwise comparisons. HS = high school; GED = General Education Development certificate. *$p < .05$. ***$p < .001$.

resilience capacity compared with those who had been exposed to only one maltreatment type relative to no exposure, Tukey two-way comparisons $ps = .001$–$.003$, although there were no significant differences between the effects associated with two, three, or four types, Tukey two-way comparisons, $ps = .556$–$.975$. The association between maltreatment co-occurrence and resilience capacity was slightly attenuated but remained significant after adjusting for other trauma (Step B) and became largely nonsignificant after adjusting for current psychological symptoms (Step C). Individuals exposed to two or three types of maltreatment had significantly lower levels of resilience capacity relative to those with no exposure, even after adjusting for psychological symptoms.

Model 3: Effect of Developmental Timing of Child Maltreatment on Resilience Capacity

Exposure to any child maltreatment that began during any age category was associated with lower resilience capacity compared to no exposure, after adjusting for sociodemographic characteristics (Table 5). Although the magnitude of associa-

tion varied slightly by age at first exposure (i.e., early childhood, middle childhood, or adolescence), none of the Tukey two-way comparisons were statistically significant, $ps = .322$–$.999$, suggesting there was no developmental period during which maltreatment was more strongly associated with resilience capacity relative to other periods.

Discussion

Five key findings emerged from the present study. First, adults who reported exposure to any type of maltreatment, meaning they had witnessed household violence or experienced physical, emotional, or sexual abuse, had lower levels of resilience capacity in adulthood compared to unexposed individuals, even after accounting for sociodemographic confounders and other lifetime trauma exposure. These effects were observed for each type of maltreatment when examined individually. This finding is generally consistent with what was reported in a previous cross-sectional study by Campbell-Sills and colleagues (2009), who found significant bivariate associations between lower CD-RISC ratings of

Table 2

Results From Model 1 Individual Linear Regression Analyses for the Effect of Child Maltreatment Exposure (Exposed vs. Unexposed) on Resilience capacity

Maltreatment type[a]	N	%	B	SE	F[a]	df_{reg}	df_{res}	R^2	ΔR^2 (%)
Any child maltreatment	1,079	55.0							
Step A: Covariates			−0.38***	0.04	19.27	9	1,952	.08	–
Step B: Other traumatic events			−0.37***	0.05	14.58	12	1,949	.08	0.1
Step C: Depressive symptoms and PTSS			−0.09*	0.04	63.06	14	1,947	.31	23.0
Witnessing violence	608	31.0							
Step A: Covariates			−0.27***	0.05	14.49	9	1,952	.06	–
Step B: Other traumatic events			−0.25***	0.05	11.37	12	1,949	.07	0.3
Step C: Depressive symptoms and PTSS			−0.07	0.04	62.79	14	1,947	.31	25.0
Physical abuse	370	18.9							
Step A: Covariates			−0.32***	0.06	14.38	9	1,952	.06	–
Step B: Other traumatic events			−0.30***	0.06	11.29	12	1,949	.07	0.3
Step C: Depressive symptoms and PTSS			0.01	0.05	62.54	14	1,947	.31	25.0
Emotional abuse	484	24.7							
Step A: Covariates			−0.47***	0.05	20.84	9	1,952	.09	–-
Step B: Other traumatic events			−0.46***	0.05	15.88	12	1,949	.09	0.1
Step C: Depressive symptoms and PTSS			−0.11*	0.05	63.09	14	1,947	.31	22.0
Sexual abuse	592	30.2							
Step A: Covariates			−0.31***	0.05	15.48	9	1,952	.07	–
Step B: Other traumatic events			−0.30***	0.05	12.00	12	1,949	.07	0.2
Step C: Depressive symptoms and PTSS			−0.04	0.05	62.62	14	1,947	.31	24.0

Note. PTSS = posttraumatic stress symptoms. We used 15 linear regression models to assess effects of exposure to any child maltreatment (at least one type) or each maltreatment types (0 = never exposed; 1 = exposed) on resilience capacity (standardized 10-item Connor-Davidson Resilience Scale [CD-RISC10] units).
[a]Step A covariates: age, sex, education, income, and employment status; Step B: Step A covariates plus other traumatic event exposure; Step C: Step A covariates and Step B traumatic event exposure plus continuous depressive symptoms and PTSS. All F statistics were significant at $p < .001$.
*$p < .05$. ***$p < .001$.

resilience capacity in adulthood and emotional abuse, sexual abuse, and neglect in childhood; however, Campbell-Sills et al. found no significant association between physical abuse and resilience. Our results are also consistent with another large cross-sectional study of adolescents by Ding and colleagues (2017), in which the authors found that childhood maltreatment was negatively correlated with resilience capacity measured using the CD-RISC ($r = -.40$, $p < .001$); however, their analysis did not adjust for potential confounders.

Second, when comparing the effects of maltreatment types after adjusting for their co-occurrence, only witnessing violence, emotional abuse, and sexual abuse were associated with lower resilience capacity; physical abuse was no longer associated. This finding differs from what was reported by Campbell-Sills et al. (2009), who found that no individual maltreatment types were associated with adult resilience capacity after adjusting for their co-occurrence (correlations between maltreatment exposures in ranged from $r = .45$ to $r = .65$), suggesting any exposure to maltreatment was important but the effect was not limited to a particular type. Our findings indicate that the unique effect of physical abuse on resilience capacity may be explained by co-occurring maltreatment types. However, among participants in our sample, physical abuse was less common and often

co-occurred with other maltreatment types, making it difficult to detect true independent effects when coadjusting.

Third, emotional abuse had the highest magnitude of effect on resilience capacity and remained significantly associated after adjusting for psychological distress. These findings are similar to those reported in a cross-sectional study, which demonstrated associations between emotional abuse and lower levels of positive traits (i.e., coping, stability, control) and higher levels of negative traits (i.e., anger, sensitivity, anxiety); conversely, that study found that physical abuse and neglect were associated with higher levels of positive traits (Sudbrack, Manfro, Kuhn, de Carvalho, & Lara, 2015). Although much of the association between maltreatment features and resilience capacity was explained by concurrent psychological distress in our sample, emotional abuse may have had an independently negative impact on adult resilience capacity among participants. Emotional abuse is known to disrupt the development of one's self-concept, often leading to negative self-perceptions and impairing emotion regulation (Cecil et al., 2017). This psychological impact may be especially deleterious for long-term adjustment, lowering one's confidence in their capacity to face challenges. Emotional abuse also may be more chronic than other maltreatment types and, thus, be more noxious for future psychological

Table 3

Results From Model 1 Linear Regression Analyses for the Effects of All Types of Child Maltreatment Exposure (Exposed vs. Unexposed), Coadjusted on Resilience capacity

Maltreatment type[a]	B	SE	F^a	df_{reg}	df_{res}	R^2	ΔR^2 (%)
Step A: Covariates							
Witnessing violence	−0.12*	0.05	17.72	12	1,949	.10	–
Physical abuse	−0.07	0.06					
Emotional abuse	−0.36***	0.06					
Sexual abuse	−0.17***	0.05					
Step B: Other traumatic events							
Witnessing violence	−0.12*	0.05	14.25	15	1,946	.10	0.1
Physical abuse	−0.07	0.06					
Emotional abuse	−0.35***	0.06					
Sexual abuse	−0.17***	0.05					
Step C: Depressive symptoms and PTSS							
Witnessing Violence	−0.05	0.04	52.08	17	1,944	.31	21.0
Witnessing violence	0.06	0.05					
Physical abuse	−0.11*	0.05					
Emotional abuse	−0.02	0.05					

Note. PTSS = posttraumatic stress symptoms. Three linear regression models were used to assess the effects of exposure to each of four maltreatment types (0 = never exposed; 1 = exposed) on resilience capacity (standardized 10-item Connor-Davidson Resilience Scale [CD-RISC10] units).
[a]Step A covariates: age, sex, education, income, and employment status; Step B: Step A covariates plus other traumatic event exposure; Step C: Step A covariates and Step B traumatic event exposure plus continuous depressive symptoms and PTSS. All F statistics were significant at $p < .001$.
*$p < .05$. ***$p < .001$.

functioning, although we could not assess this dimension of exposure in the present study.

Fourth, more maltreatment type co-occurrence was associated with lower resilience capacity in a dose–response fashion. This is consistent with at least two other cross-sectional studies that used the CD-RISC, which also found negative, though small, correlations between resilience capacity and the number of child maltreatment types ($r = −0.10, p < .01$; Edwards et al., 2014) or adverse childhood events ($r = −.19, p < .001$; Poole, Dobson, & Pusch, 2017). It should be noted that cumulative adversity models are limited and assume additive and equally negative effects across maltreatment types, which may not be an appropriate assumption (Lanier, Maguire-Jack, Lombardi, Frey, & Rose, 2018). Our findings suggest that more complex maltreatment exposure, indicated by multiple types, could be particularly noxious regarding adult resilience capacity.

Finally, we found no differences in resilience capacity based on age at first exposure to maltreatment; this finding is inconsistent with some research, which has identified specific effects for early maltreatment, in particular, on later psychopathology (Dunn et al., 2013, 2017). Our results also differ from one other cross-sectional study, in which the authors found that resilience capacity, assessed using the CD-RISC, was negatively correlated with a cumulative measure of stress that occurred during adolescence but not childhood (Petros, Opacka-Juffry, & Huber, 2013). Discrepancies between our study and prior findings may reflect differences in the nature of maltreatment relative to other types of stressors. Maltreatment may indicate a chronic adverse environment across one's development, whereas some stressful experiences may be more acute and may occur during specific developmental time periods.

Our results also highlight several important new directions for future research. We found that the effects of different features of child maltreatment on resilience capacity were attenuated after adjusting for psychological distress; this was especially true concerning depressive symptoms. Given the cross-sectional study design, we were unable to disentangle directionality, although we recognize potential bidirectional influences of resilience capacity and depressive symptoms, and concurrent depressed mood may strongly influence one's perception of their resilience. Assessing the extent to which resilience capacity and depressive symptoms influence one another over time may be a promising area of inquiry for future longitudinal studies. It is possible that, relative to more distal childhood experiences among older adults, recent maltreatment among younger adults was more impactful for resilience capacity, although these associations were not explored in the current study. Future research could examine the relative impact of more recent versus more distal exposures, particularly in longitudinal contexts. Additionally, although previous research suggests that perceptions of one's resilience may influence later psychological responses to trauma (Daniels et al., 2012; Hourani et al., 2012), further work should examine the relative importance of one's perceived capability to be resilient and more objective measures of coping strategies or available resources. This distinction between objective and

Table 4

Results From the Set of Model 2 Linear Regression Analyses for Child Maltreatment Exposure Co-Occurrence on Resilience capacity

Maltreatment count[a]	N	%	B	SE	F[a]	df_{reg}	df_{res}	R^2	ΔR^2 (%)
Step A: Covariates									
0 types	883	45.0	Ref.	Ref.	17.09	12	1,949	.10	—
1 type	483	24.6	−0.21[c]***	0.05					
2 types	317	16.2	−0.46***	0.06					
3 types	179	9.1	−0.55***	0.08					
4 types	100	5.1	−0.63***	0.10					
Step B: Other traumatic events									
0 types	883	45.0	Ref.	Ref.	13.75	15	1,946	.10	0.1
1 type	483	24.6	−0.21[b]***	0.06					
2 types	317	16.2	−0.45***	0.06					
3 types	179	9.1	−0.55***	0.08					
4 types	100	5.1	−0.62***	0.10					
Step C: Depressive symptoms and PTSS									
0 types	883	45.0	Ref.	Ref.	52.09	17	1,944	.31	22.0
1 type	483	24.6	−0.07	0.05					
2 types	317	16.2	−0.13*	0.06					
3 types	179	9.1	−0.15*	0.07					
4 types	100	5.1	−0.01	0.10					

Note. PTSS = posttraumatic stress symptoms; Ref. = reference. Three linear regression models assessed effects of child maltreatment count (i.e., number of maltreatment types—categorical (0 [Ref.], 1, 2, 3, or 4 types)) on resilience (i.e., standardized 10-item Connor-Davidson Resilience Scale [CD-RISC10] units).
[a]Step A covariates: age, sex, education, income, and employment status; Step B: Step A covariates plus other traumatic event exposure; Step C: Step A covariates and Step B traumatic event exposure plus continuous depressive symptoms and PTSS. All F statistics were significant at $p < .001$. [b]Significant post hoc Tukey comparisons $(p < .05)$ for the effects of one maltreatment type versus each progressive level of maltreatment co-occurrence (i.e., 2, 3, or 4); no other pairwise comparisons were significant (e.g., 2 vs. 3).
*$p < .05$. ***$p < .001$.

subjective reporting may illuminate how perception influences manifested resilient outcomes following adversity.

Our findings provide an interesting descriptive examination of resilience capacity across different sociodemographic groups. Resilience capacity was highest among the youngest (age 18–25 years) and oldest participant groups (55 years and older). This is generally reflected in the literature, as resilience tends to increase with age (Bonanno & Diminich, 2013; Campbell-Sills et al., 2009). Consistent with other findings (Campbell-Sills et al., 2009, 2018), resilience capacity was associated with socioeconomic status in our sample, with participants who had higher levels of educational attainment and income reporting higher levels of resilience capacity. Interestingly, unemployed participants in our sample reported higher resilience capacity relative to those who were employed or on disability. This may be due to a higher proportion of young people (age 18–25 years) among the unemployed participants (26.4%) compared to the employed participants (22.6%) and those on disability (5.7%), suggesting the unemployed individuals (e.g., students) were younger and, thus, more likely to report higher levels of resilience capacity.

The current study had several limitations. First, the data were collected cross-sectionally, with maltreatment and trauma reported retrospectively. However, retrospective reporting of specific forms of maltreatment is generally accurate, with ex-posures tending to be underreported rather than overreported, thus biasing effects towards the null (Hardt & Rutter, 2004). The age at which an individual first experienced maltreatment may have been less reliably reported than the presence versus absence of exposure, potentiating the role of measurement error in developmental timing models and limiting the detection of significant differences by age of exposure. Second, the maltreatment measure did not capture other forms (e.g., emotional or physical neglect) or important features (e.g., severity, frequency, chronicity) of exposure, precluding examination of associations between these factors and resilience capacity. For example, chronic or longer-lasting maltreatment may strongly impact resilience capacity regardless of the developmental period of exposure onset. Our sample also included predominantly female African Americans of a generally low socioeconomic status who resided in one urban U.S. city; thus, generalizations to other populations are limited. However, the average levels of self-reported resilience in our sample are consistent with those reported in other community and clinical samples that have also been assessed using the CD-RISC10 (Campbell-Sills et al., 2009; Poole et al., 2017). Minority, urban individuals of low socioeconomic status are largely understudied in epidemiological surveys and may experience high levels of maltreatment and poorer health outcomes associated with maltreatment (Liu, Kia-Keating, &

Table 5

Results From the Set of Model 3 Linear Regression Analyses for the Effect of Age at First Exposure to Child Maltreatment on Resilience capacity

Age at first exposure[a]	N	%	B	SE	F[a]	df_{reg}	df_{res}	R^2	ΔR^2 (%)
Step A: Covariates									
Unexposed	883	45.0	Ref.	Ref.	16.06	11	1,950	0.08	–
Early childhood (age 0–5 years)	302	28.0	−0.46***	0.06					
Middle childhood (age 6–10 years)	534	49.5	−0.34***	0.05					
Adolescence (age 11–18 years)	243	22.5	−0.35***	0.07					
Step B: Other traumatic events									
Unexposed	883	45.0	Ref.	Ref.	12.72	14	1,947	0.08	0.1
Early childhood (age 0–5 years)	302	28.0	−0.45***	0.07					
Middle childhood (age 6–10 years)	534	49.5	−0.33***	0.05					
Adolescence (age 11–18 years)	243	22.5	−0.34***	0.07					
Step C: Depressive symptoms and PTSS									
Unexposed	883	45.0	Ref.	Ref.	55.18	16	1,945	0.31	23.0
Early childhood (age 0–5 years)	302	28.0	−0.10	0.06					
Middle childhood (age 6–10 years)	534	49.5	−0.07	0.05					
Adolescence (age 11–18 years)	243	22.5	−0.12*	0.06					

Note. Three linear regression models were used to assess the effects of age at first exposure to maltreatment, relative to no exposure, on resilience capacity (standardized 10-item Connor-Davidson Resilience Scale [CD-RISC10] units).
[a]Step A covariates: age, sex, education, income, and employment status; Step B: Step A covariates plus other traumatic event exposure; Step C: Step A covariates and Step B traumatic event exposure plus continuous depressive symptoms and PTSS. All *F* statistics were significant at $p < .001$.
*$p < .05$. ***$p < .001$.

Nylund-Gibson, 2018); as such, examining adversity and resilience capacity in these individuals is particularly important. Indeed, maltreatment exposure was highly prevalent in our sample, similarly reflected in other analyses of this cohort (Dunn et al., 2017; Powers, Ressler, & Bradley, 2009). Finally, we were unable to determine whether individuals received mental health treatment following child maltreatment, which could have influenced both psychological distress and resilience capacity.

Despite these limitations, the current study provides more nuanced evidence regarding associations between features of child maltreatment and adult self-reported resilience in a large, community sample of African American individuals with high levels of trauma exposure. This research adds to the growing literature of the influence of early life exposures on later resilience capacity, suggesting that features of maltreatment may be important for determining later capacity. Future research may employ methods such as latent class analyses to explore common types of maltreatment profiles, which could consider multiple maltreatment features in one model. Our findings suggest that features of child maltreatment, such as emotional abuse or accumulation of maltreatment burden, may be particularly deleterious to future adult resilience capacity and may illuminate mechanisms through which negative early life exposures impact later resiliency. It is possible that processes to build resilience capacity, such as promoting self-efficacy and personal competency, developing secure social support systems, and providing community resources to effectively cope with stress, in addition to treatment to reduce symptoms of psychological distress, may be effective in promoting resiliency to future stress among

individuals exposed to maltreatment. Further research should aim to understand features of maltreatment that impact later resilience capacity across different populations, using longitudinal study designs, to inform targeted early prevention or intervention efforts, potentially promoting resilience from later-life adversity.

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