

Effects of Childhood Maltreatment on Violent Injuries and Premature Death During Young Adulthood Among Urban High-Risk Men

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Objectives: To assess childhood maltreatment as a risk factor for violent injuries and premature death in young adulthood and whether these associations are mediated by adolescent heavy drinking, hard drug use, hard drug selling, and violent offending.

Design: Prospective longitudinal study of boys followed from childhood into young adulthood.

Setting: Pittsburgh, Pennsylvania.

Participants: A total of 1009 men from the Pittsburgh Youth Study.

Main Exposure: Childhood maltreatment.

Main Outcome Measures: Premature deaths between ages 18 and 38 years from the Social Security Death Index and self-reports of violent injuries inflicted by gunshot or knife between ages 18 and 28 years.

Results: Young men who experienced childhood maltreatment, compared with their counterparts who did not experience it, had a greater risk of violent injuries (rela-

tive risk = 1.61; 95% CI, 1.10-2.35) and death (hazard ratio = 2.85; 95% CI, 1.37-5.93) during young adulthood. Adolescent violent offending and hard drug selling explained the association between childhood maltreatment and violent injuries, and violent offending partially accounted for the association between childhood maltreatment and premature death. Although adolescent violent offending predicted both outcomes, maltreated boys still had an increased risk of premature death (hazard ratio = 2.54; 95% CI, 1.21-5.34) after accounting for their adolescent violence.

Conclusions: Childhood maltreatment significantly predicts premature death and violent injuries during young adulthood. These associations are partially explained by adolescent involvement in violence and drug dealing. Targeted interventions for maltreated boys to reduce their involvement in adolescent deviant behaviors may help decrease their risks for later serious injuries and premature death.

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CHILDHOOD MALTREATMENT is a significant public health concern in the United States. Data from the National Child Abuse and Neglect Data System indicate that 9.3 children per 1000 were victims of childhood maltreatment in 2009,¹ and data from the 2005-2006 National Incidence Study indicate rates of 39.5 children per 1000.²

Individuals maltreated in childhood, compared with nonmaltreated individuals, are at higher risk for morbidity³⁻⁸ and mortality⁹⁻¹² during the life span. Nevertheless, research focusing on the effects of childhood maltreatment on injuries and mortality has been largely limited to studies in early developmental periods^{5,10} or later adulthood.^{3,11} Most studies examining later outcomes have relied on retrospective self-

reports of childhood maltreatment.^{3,11} To our knowledge, no studies have clearly identified the potential mechanisms that might account for premature death and nonfatal injuries beyond early childhood. This study attempts to fill these gaps.

Findings from longitudinal studies of maltreated youths in adolescence and adulthood have been inconsistent with regard to whether these individuals are at higher risk for premature death. One study followed youths through age 18 years and found that abused children had an elevated risk of death compared with nonabused children.¹⁰ Similarly, another found that adverse childhood experiences, including childhood abuse, were associated with an elevated risk of premature death in midlife.¹¹ In contrast, another study did not find that mortality rates dif-

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ferred between maltreated individuals and matched control subjects in young adulthood after controlling for several demographic and family characteristics.¹² These inconsistencies may be due to differences in measures, observation periods, age cohorts, geographic areas, and/or analytic methods.

Because death rates of young adults are more than twice those of adolescents,¹³ the mortality gap between maltreated and nonmaltreated individuals might further increase in young adulthood. Accordingly, it is imperative to investigate the association between childhood maltreatment and premature death through young adulthood. Moreover, death might not be the only severe ramification of childhood maltreatment in adolescence and young adulthood; adolescents are likely to engage in risk behaviors,¹⁴ which might lead to injuries that are not fatal but are disabling. To date, no studies to our knowledge have concurrently investigated the association of childhood maltreatment with both violent injuries and premature death.

Attention should be paid to the mechanisms by which childhood maltreatment increases the risk of death and violent injuries. A problem behavior perspective¹⁵ has the potential to explain this association. For example, involvement in deviant behaviors may increase the risk of nonfatal and fatal consequences. Specifically, adolescent substance use,^{16,17} drug selling,¹⁸ and violence^{19,20} are well-known precursors of the risks for mortality and violent injuries among adolescents and young adults. Considering that these behaviors are highly prevalent among individuals with childhood maltreatment histories,²¹⁻²⁹ these behaviors may be direct mechanisms linking childhood maltreatment to premature death and violent injuries in young adulthood.

This study focuses on adolescent risk behaviors because of the importance of early risk behaviors on developmental trajectories of deviant behaviors^{24,29} and the need to maintain the temporal order between mediators and outcomes. The study contributes to the literature by examining whether childhood maltreatment increases the risk of violent injuries and/or premature death during young adulthood through adolescent heavy drinking, hard drug use, hard drug selling, and violent offending after controlling for other childhood adversities and sociodemographic characteristics.

METHODS

STUDY DESIGN AND STUDY POPULATION

Subjects were boys from the Pittsburgh Youth Study, a prospective longitudinal study of youth development.³⁰ The Pittsburgh Youth Study began in 1987 and initially consisted of 3 cohorts (N = 1517) who had been randomly selected from the first, fourth, and seventh grades of public schools in Pittsburgh, Pennsylvania (referred to as the youngest, middle, and oldest cohorts, respectively). After an initial screening, the top 30% who screened at highest risk for antisocial behavior were included in the sample for follow-up, together with 30% randomly selected from the remainder. More than half of the sample were black, and the rest were almost all white. More than 90% lived with their biological mother at the time of their screening. Although about one-third received public assistance, the boys were fairly evenly distributed across socioeconomic sta-

tus levels.³⁰ The current study was limited to the youngest (n = 503; age range at baseline, 5-9 years) and oldest (n = 506; age range at baseline, 11-16 years) cohorts because the middle cohort was surveyed only from 1987 to 1991. Data were collected at approximate ages of 7 to 20, 25, and 28 years for the youngest cohort and approximate ages of 13 to 25 and 34 years for the oldest cohort. The study was approved by the University of Pittsburgh Institutional Review Board.

DEFINITIONS OF VARIABLES

Boys were identified as maltreated if any type of maltreatment (ie, physical or sexual abuse, physical neglect, emotional maltreatment, or moral, legal, or educational maltreatment) was substantiated and they were first referred to Children and Youth Services by age 13 years. Age 13 years was chosen as the cutoff because a history of childhood maltreatment was fully documented for both cohorts through age 13 years. Those who were first referred to Children and Youth Services between ages 14 and 17 years (20 of 298 referrals [6.7%]) were excluded to ensure temporal order between childhood maltreatment and the mediators (ages 14-17 years). In addition, those who were referred to Children and Youth Services but whose cases were unsubstantiated (76 of 298 referrals [25.5%]) were excluded from the study because prior findings have been inconsistent about whether they more closely resemble substantiated cases³¹ or nonmaltreated cases³² in terms of their risk behaviors. Also, referral to Children and Youth Services could be biased by race and poverty.³³⁻³⁵ The final sample consisted of 913 men (202 maltreated and 711 nonmaltreated).

Violent injuries were defined as any gunshot or knife wound from ages 18 through 28 years (mean age at their last report, 25 years). Death data came from mortality records obtained from a search of the Social Security Death Index through July 27, 2010, when the youngest cohort was aged 27 to 32 years (mean age, 29 years) and the oldest cohort was aged 34 to 38 years (mean age, 35 years). *Premature death* was any death that occurred between ages 18 and 38 years.

The mediators were measured at ages 14 to 17 years, an intermediate period between childhood maltreatment and the outcomes. Because the frequency of engaging in the risk behaviors was low, all the mediators were coded as dichotomous variables. *Heavy drinking* was defined as typically having 6 or more drinks (beer, wine, or liquor) per occasion. *Hard drug use* was defined as using any illegal drug except marijuana (hallucinogens, cocaine, crack, heroin, phencyclidine, tranquilizers, barbiturates, codeine, amphetamines, and other prescription medications for nonmedical reasons). *Hard drug selling* was defined as selling any hard drugs (eg, heroin, cocaine, or LSD). Violent offending was assessed using official conviction records (county, state, and/or federal) or self-report or caretaker report of the youth committing robbery, attacking to hurt or kill, homicide, manslaughter, rape or forced sex, simple assault, or gang fighting. *Violence* was defined as any violent offense between ages 14 and 17 years.

To disentangle the effect of childhood maltreatment from other adverse childhood experiences, 4 domains of household dysfunction were measured. Approximately at ages 8 and 15 years for the youngest and oldest cohorts, respectively, the primary caretaker (usually the mother) was asked about female and male caretaker problems. *Caretaker's alcohol and drug problems* were defined as any caretaker having sought help for a substance use problem. *Caretaker's mental illness* was defined as a caretaker ever having sought help for any mental health problem (depression, anxiety, mental retardation, or schizophrenia). *Caretaker's incarceration* was defined as any caretaker ever having been incarcerated. *Not living with 2 biological parents*

Table 1. Characteristics of Participants by Childhood Maltreatment

Characteristic	Maltreated (n=202)	Nonmaltreated (n=711)	P Value
Demographic control			
Age at screening, mean (SD), y	9.2 (3.2)	9.8 (3.3)	.02
Race/ethnicity, %			.006
Black	48.5	37.6	
White, other, or mixed	51.5	62.4	
Parental SES, mean (SD)	29.4 (12.9)	37.6 (13.5)	<.001
Cohort, %			.005
Youngest	51.9	40.6	
Oldest	48.1	59.4	
Household dysfunction up to adolescence			
Not living with 2 biological parents, %	87.6	65.0	<.001
Caretaker, %			
Alcohol and drug problems	18.3	8.9	<.001
Mental illness	28.7	17.9	.001
Incarceration	10.9	2.1	<.001
Household dysfunction score, mean (SD)	1.5 (0.9)	0.9 (0.7)	<.001
Mediator during adolescence, %			
Heavy drinking	45.5	42.2	.40
Hard drug use	19.3	13.9	.06
Hard drug selling	29.7	17.6	<.001
Violent offending	51.0	30.7	<.001
Outcome during young adulthood, %			
Violent injuries ^a	18.8	11.1	.005
Premature death ^b	7.4	2.5	.001

Abbreviation: SES, socioeconomic status.

^aStudy participants (n=854) are those who had violent injury information between ages 18 and 28 years.

^bStudy participants (n=911) are those who had death information between age 18 years and July 27, 2010.

was defined as the primary caretaker being ever widowed, never married, or ever divorced or separated or if there was no female caretaker up to age 17 years for the participant. The household dysfunction score was the sum of these 4 domains, ranging from 0 to 4, and is similar to a measure used in previous research.¹¹ Because cohort differences in patterns of alcohol use and violence have been found in this sample,^{36,37} cohort (oldest vs youngest) was controlled in the analyses. Parental socioeconomic status, based on the Hollingshead Four Factor Index of Social Status³⁸ at the first follow-up assessment, was also controlled. Race/ethnicity was controlled with black individuals compared with individuals of white, other, or mixed races/ethnicities. Age at the initial screening was included to account for within-cohort differences in age and for age differences in outcomes.

STATISTICAL ANALYSIS

All analyses were conducted with Stata version 11.0 statistical software (StataCorp LP). We used χ^2 analyses and *t* tests to compare characteristics between maltreated and nonmaltreated young men. Bivariate correlations are reported for all the variables included in the multivariate analyses. A generalized linear model with a log link and binomial error distribution was used to examine the effects of childhood maltreatment experiences on violent injuries through the hypothesized mediators. The Kaplan-Meier method and the log-rank test were con-

ducted to assess the relative risk (RR) of death between the maltreated and nonmaltreated groups.³⁹ The Cox proportional hazards model for survival analysis was used to estimate the hazard of death for nonmaltreated and maltreated young men through the proposed mediators.³⁹ Two respondents who died prior to age 17 years were eliminated owing to a temporal order issue. We report RRs for serious injuries, hazard ratios for premature death, and 95% CIs.

For both outcomes, individual mediators were first added separately, and all significant mediators ($P < .05$) from the single-mediator models were tested simultaneously in a multiple-mediator model.^{40,41} Missing data ranged from 4.3% to 6.5%. All missing data except the dependent variables were imputed under the missing-at-random assumption.⁴²

RESULTS

CHARACTERISTICS OF MALTREATED YOUNG MEN

Table 1 presents results from bivariate analyses comparing characteristics of maltreated (22.1%) and nonmaltreated (77.9%) young men. Maltreated young men compared with nonmaltreated young men were slightly younger at screening (mean, 9.2 vs 9.8 years, respectively; $P = .02$), more likely to be black (48.5% vs 37.6%, respectively; $P = .006$), and more likely to be in the youngest cohort (51.9% vs 40.6%, respectively; $P = .005$). Maltreated young men compared with nonmaltreated men were also significantly more likely to grow up in a household with a lower socioeconomic status (mean Hollingshead Four Factor Index of Social Status score, 29.4 vs 37.6, respectively; $P < .001$), with a caretaker who was in an unstable marriage (87.6% vs 65.0%, respectively; $P < .001$), and with at least 1 caretaker who was more likely to have an alcohol or drug problem (18.3% vs 8.9%, respectively; $P < .001$), a mental illness (28.7% vs 17.9%, respectively; $P = .001$), and/or a higher rate of incarceration (10.9% vs 2.1%, respectively; $P < .001$). Maltreated young men compared with nonmaltreated young men reported significantly higher rates of hard drug selling (29.7% vs 17.6%, respectively; $P < .001$) and violent offending (51.0% vs 30.7%, respectively; $P < .001$) during adolescence. There was no significant difference in heavy drinking or hard drug use between the 2 groups. During young adulthood, maltreated young men compared with nonmaltreated young men had a greater risk of violent injuries (18.8% vs 11.1%, respectively; $P = .005$) and mortality (7.4% vs 2.5%, respectively; $P = .001$).

Table 2 shows the correlations among all the variables included in the multivariate analyses. All the problem behaviors were significantly related to each other, but multicollinearity was not a problem in the multivariate model.

DIRECT AND MEDIATED EFFECTS OF CHILDHOOD MALTREATMENT ON VIOLENT INJURIES

Table 3 shows that, after adjusting for covariates, maltreated young men compared with nonmaltreated young men were more likely to be injured (RR=1.61; 95% CI, 1.10-2.35). The effect of childhood maltreatment was

Table 2. Bivariate Correlations for All Variables in Multivariate Analysis^a

Variable No.	Variable Description	Variable No., Bivariate Correlation												
		1	2	3	4	5	6	7	8	9	10	11	12	
1	Childhood maltreatment	1.00												
2	Heavy drinking	0.05	1.00											
3	Hard drug use	0.13	0.50 ^b	1.00										
4	Hard drug selling	0.23 ^b	0.38 ^b	0.39 ^b	1.00									
5	Violent offending	0.30 ^b	0.35 ^b	0.19 ^b	0.48 ^b	1.00								
6	Age at screening	-0.07 ^b	0.08 ^b	0.03	0.04	0.17 ^b	1.00							
7	Youngest cohort ^c	0.16 ^b	-0.16 ^b	-0.07	-0.05	-0.23 ^b	-0.97	1.00						
8	Black ^d	0.16 ^b	-0.36 ^b	-0.32 ^b	0.45 ^b	0.27 ^b	0.03	0.02	1.00					
9	Parental SES	-0.25 ^b	0.01	0.09 ^b	-0.18 ^b	-0.17 ^b	-0.01	-0.04	-0.23 ^b	1.00				
10	Household dysfunction	0.27 ^b	-0.002	-0.005	0.12 ^b	0.17 ^b	-0.19 ^b	0.21 ^b	0.22 ^b	-0.18 ^b	1.00			
11	Violent injuries	0.20 ^b	0.10	0.02	0.43 ^b	0.43 ^b	0.10 ^d	-0.18 ^b	0.32 ^b	-0.11 ^b	0.03	1.00		
12	Premature death	0.27 ^b	0.03	-0.02	0.30 ^b	0.35 ^b	0.03	-0.09	0.41 ^b	-0.03	0.06	0.13	1.00	

Abbreviation: SES, socioeconomic status.

^aThree forms of correlation are used, depending on the characteristics of variables: the Pearson correlation between 2 continuous variables, the point-biserial correlation between a dichotomous variable and a continuous variable, and the tetrachoric correlation for 2 dichotomous variables.

^b $P < .05$.

^cOldest cohort is the reference group.

^dWhite, other, and mixed races/ethnicities are the reference group.

Table 3. Direct and Mediated Effects of Childhood Maltreatment on Violent Injuries^a

Variable	Risk Ratio (95% CI)					
	Panel 1	Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
Childhood maltreatment	1.61 (1.10-2.35)	1.57 (1.07-2.29)	1.58 (1.08-2.32)	1.44 (1.005-2.07)	1.43 (0.99-2.08)	1.32 (0.93-1.89)
Mediator						
Heavy drinking		1.44 (1.02-2.05)				1.00 (0.71-1.42)
Hard drug use			1.19 (0.72-1.97)			
Hard drug selling				2.36 (1.64-3.40)		1.89 (1.30-2.75)
Violent offending					2.63 (1.79-3.86)	2.27 (1.51-3.40)
Covariate						
Age at screening	1.01 (0.82-1.24)	1.00 (0.82-1.22)	1.01 (0.82-1.23)	0.96 (0.79-1.17)	0.97 (0.80-1.18)	0.94 (0.77-1.15)
Youngest cohort ^b	0.62 (0.16-2.39)	0.63 (0.17-2.33)	0.62 (0.16-2.37)	0.49 (0.13-1.84)	0.57 (0.16-2.07)	0.50 (0.14-1.83)
Black ^c	2.22 (1.46-3.37)	2.45 (1.60-3.75)	2.28 (1.49-3.49)	1.86 (1.21-2.87)	2.02 (1.34-3.06)	1.79 (1.15-2.78)
Parental SES	0.99 (0.98-1.00)	0.99 (0.98-1.00)	0.99 (0.98-1.00)	0.99 (0.98-1.00)	0.99 (0.98-1.00)	0.99 (0.98-1.01)
Household dysfunction	0.96 (0.75-1.22)	0.95 (0.75-1.20)	0.95 (0.74-1.21)	0.92 (0.74-1.15)	0.85 (0.66-1.09)	0.84 (0.67-1.06)

Abbreviation: SES, socioeconomic status.

^aStudy participants (n=854) are those who had violent injury information between ages 18 and 28 years. Panel 1 shows the effect of childhood maltreatment on violent injuries while controlling for covariates. Panels 2 through 5 show the effect of childhood maltreatment on violent injuries while separately controlling for plausible mediators (heavy drinking, hard drug use, hard drug selling, and violent offending, respectively) and all covariates. Panel 6 shows the effect of childhood maltreatment on violent injuries while controlling for all significant mediators from panels 2 through 6 ($P < .05$) and all covariates.

^bOldest cohort is the reference group.

^cWhite, other, and mixed races/ethnicities are the reference group.

slightly reduced by individually adding heavy drinking, hard drug selling, and violent offending to the model (panels 2, 4, and 5). After adding these 3 significant mediators to the same model (panel 6), the effect of childhood maltreatment was no longer significant (RR=1.32; 95% CI, 0.93-1.89). Hard drug selling (RR=1.89; 95% CI, 1.30-2.75) and violent offending (RR=2.27; 95% CI, 1.51-3.40) significantly predicted violent injuries.

DIRECT AND MEDIATED EFFECTS OF CHILDHOOD MALTREATMENT ON PREMATURE DEATH

There were a total of 35 deaths during the 913 person-year observation period, yielding a mortality rate of 3834 deaths per 100 000 person-years (7426 for maltreated in-

dividuals and 2813 for nonmaltreated individuals). The major cause of death was homicide (n=26), followed by accident (n=3), unknown (n=3), natural (n=2), and suicide (n=1). Survival curves between nonmaltreated and maltreated young men based on the Kaplan-Meier estimator are shown in the **Figure**. Compared with nonmaltreated young men, maltreated young men had a significantly diminished survival time through young adulthood (log-rank statistic=9.72; $P = .002$).

Table 4 shows that, after controlling for the covariates, death rates were higher for maltreated young men than nonmaltreated young men (hazard ratio=2.85; 95% CI, 1.37-5.93). The risk of childhood maltreatment on premature death was reduced by adolescent violent offending, although the effect of childhood maltreatment on premature death remained significant (hazard ratio=2.54; 95%

CI, 1.21-5.34), indicating only a partial mediation effect. Adolescent heavy drinking, hard drug use, and hard drug selling were not significant mediators.

COMMENT

This study sought to extend our understanding of the association between childhood maltreatment and premature death and violent injuries. The results indicated that young men who experienced childhood maltreatment and were referred to Children and Youth Services by age 13 years, compared with their counterparts who did not experience it, had a greater risk of violent injuries and death during young adulthood as well as greater risks of engaging in risk behaviors during adolescence. Hard drug selling and violent offending during adolescence (ages 14-17 years) were underlying mechanisms linking childhood maltreatment to violent injuries. Adolescent violence, in particular, remained a strong and significant pre-

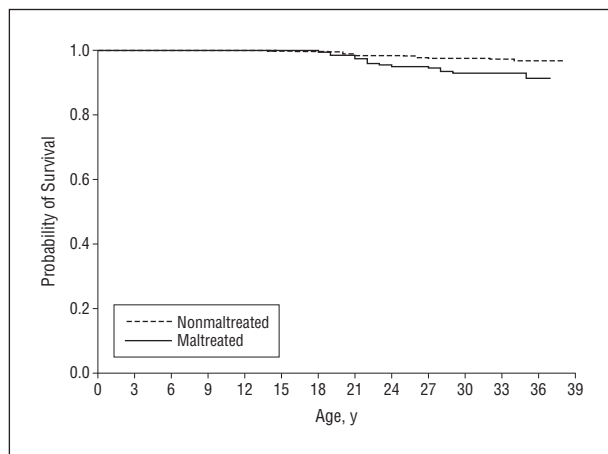


Figure. Kaplan-Meier estimate of survival probabilities among maltreated and nonmaltreated young men. The survival curves between the 2 groups differed significantly (log-rank statistic = 9.72; $P = .002$).

dictor for both violent injuries and death after accounting for sociodemographic and familial factors as well as childhood maltreatment.

The findings are consistent with a problem behavior perspective¹⁵ and prior research, which has shown that childhood maltreatment plays a major role in the development of deviant behaviors²¹⁻²⁹ and that these behaviors appear to increase the risk of violent injuries and mortality.¹⁶⁻²⁰ However, to our knowledge, previous studies have not formally tested this potential mediation effect.

Researchers have suggested that childhood maltreatment might be only 1 type of childhood adversity that contributes to the development of negative health outcomes. That is, the adverse association between childhood maltreatment and health outcomes might be accounted for by the potentially confounding effects of other childhood adversities such as parental substance use and poverty^{43,44} that may ultimately increase the likelihood of a false-positive relationship. Except 1 study,¹² prior studies focusing on childhood maltreatment and mortality could not fully disentangle confounding associations. This study intended to clarify this issue. After adjusting for demographic characteristics and household dysfunction scores, the risk of death was almost twice as high and the risk of violent injuries was approximately 60% higher for maltreated young men than nonmaltreated young men. The fact that these findings are different from those of White and Widom,¹² who found no significant effects of childhood maltreatment on premature death, may be due to several differences between the 2 studies. There may be a period effect because the youths in this study grew up in an inner city in the 1980s and 1990s, when American society experienced a dramatic increase in rates of violence and homicide during the crack-cocaine epidemic.^{18,45} The fact that 74.3% of the deaths were homicide might in part explain the period effect. The sample in the study by White and Widom was born during an earlier period (before 1971) and also included both men and women. Further, racial and geo-

Table 4. Direct and Mediated Effects of Childhood Maltreatment on Premature Death^a

Variable	Hazard Ratio (95% CI)				
	Panel 1	Panel 2	Panel 3	Panel 4	Panel 5
Childhood maltreatment	2.85 (1.37-5.93)	2.83 (1.36-5.90)	2.86 (1.37-5.97)	2.68 (1.29-5.57)	2.54 (1.21-5.34)
Mediator					
Heavy drinking		1.25 (0.62-2.52)			
Hard drug use			0.94 (0.33-2.73)		
Hard drug selling				1.66 (0.80-3.44)	
Violent offending					2.66 (1.24-5.68)
Covariate					
Age at screening	0.97 (0.64-1.46)	0.97 (0.64-1.45)	0.97 (0.64-1.46)	0.96 (0.64-1.44)	0.94 (0.63-1.41)
Youngest cohort ^b	0.55 (0.04-8.09)	0.55 (0.04-7.92)	0.54 (0.04-8.08)	0.53 (0.04-7.60)	0.53 (0.04-7.47)
Black ^c	4.55 (1.72-12.04)	4.81 (1.79-12.93)	4.51 (1.68-12.08)	4.09 (1.52-11.00)	4.21 (1.58-11.20)
Parental SES	1.01 (0.98-1.03)	1.01 (0.98-1.03)	1.01 (0.98-1.03)	1.01 (0.98-1.03)	1.01 (0.98-1.04)
Household dysfunction	1.13 (0.70-1.81)	1.13 (0.70-1.80)	1.13 (0.70-1.82)	1.13 (0.71-1.79)	1.02 (0.63-1.67)

Abbreviation: SES, socioeconomic status.

^aStudy participants (n=911) are those who had death information between age 18 years and July 27, 2010. Panel 1 shows the effect of childhood maltreatment on premature death while controlling for covariates. Panels 2 through 5 show the effect of childhood maltreatment on premature death while separately controlling for plausible mediators (heavy drinking, hard drug use, hard drug selling, and violent offending, respectively) and all covariates. Because only violent offending was a significant mediator, there was no reason to test any of the mediators in combination.

^bOldest cohort is the reference group.

^cWhite, other, and mixed races/ethnicities are the reference group.

graphic differences between the 2 samples might account for the differences in findings.

We focused on deviant behaviors only during adolescence as mediators owing to the issue of temporal order. Yet, persistent risk behaviors throughout adulthood might lead to fatal or near-fatal consequences. Future research should examine adulthood risk behaviors as potential mediators. In addition, there might be other mechanisms linking childhood maltreatment to violent injuries and premature death, such as social support,^{46,47} community violence,⁴⁸ peer delinquency,⁴⁹ accessibility to emergency care, or attitudes toward seeking help from “the system” (ie, police),⁵⁰ which should be tested in future studies.

Several features of this study warrant attention when interpreting the results. First, the sample represents young men who grew up in an inner city, and approximately half were prone to antisocial behavior at screening. Thus, the results may not generalize to lower-risk men, women, or youths who live in different environments. Moreover, any individuals who experienced childhood maltreatment after age 13 years were excluded owing to a lack of comparable information for the youngest cohort and also to establish the hypothesized temporal order between the predictor and mediators. Thornberry et al²¹ found that maltreatment during adolescence had significant effects on substance use, violence, and suicidal thoughts. Therefore, the effects of childhood maltreatment on the outcomes in this study may have been underestimated. In addition, although the measures improved on those of previous studies because they included both official and reported data from diverse sources, measures of heavy drinking, drug use, drug selling, and violent injuries were based only on youth self-reports. Nonetheless, reliability and validity of self-report data have been established in many studies.⁵¹ Owing to a relatively small sample, this study did not examine whether different types, severity, and age of childhood maltreatment as well as receiving foster care might affect the risk of premature death and violent injuries among maltreated individuals. Future research with larger samples should examine these potential moderators.

Despite these limitations, this study contributes compelling evidence supporting childhood maltreatment as a key risk factor for both violent injuries and death during young adulthood in a contemporary sample. In addition, violent offending during adolescence appears to be an important mediator. Violent offending and being a victim of violence, however, are intertwined and mutually influence each other.²⁰ Adolescent violent offending is strongly correlated with violent crime in adulthood, especially for maltreated individuals,²⁴ which in turn increases the risk of violent injuries and mortality. Accordingly, it is imperative to provide targeted prevention for maltreated youths to help them deal with their maltreatment experience and reduce their involvement in adolescent risk behaviors and later violent offending. In addition, social policies should focus on alleviating fundamental structural problems (eg, poverty, single parenting, community violence, difficulties in accessing health care) that contribute to childhood maltreatment as well as to the risk of death and injuries for maltreated individuals.

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