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Longitudinal associations between community violence exposure and suicidality

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Abstract

Purpose—To examine longitudinal associations between community violence exposure and suicide ideation and attempt, and whether depressive symptoms and aggressive behavior are intervening variables in this association.

Methods—Participants were 473 urban and predominantly African American adolescents who completed measures of community violence exposure, depressive symptoms, and suicide ideation and attempt in grades 6, 7, and 8; teachers reported about adolescents' aggressive behaviors in grades 6, 7, and 8. Path analysis was used to examine direct and indirect associations between community violence exposure in grade 6 and suicide ideation and attempt in grade 8. Depressive symptoms and aggressive behavior were examined as part of an indirect path from grade 6 community violence exposure to later suicide ideation and attempt.

Results—Results revealed an indirect association between community violence exposure and later suicide ideation for males and females; community violence exposure in grade 6 was associated with depressive symptoms in grade 7, which in turn were positively associated with suicide ideation in grade 8. For males, community violence exposure in grade 6 was associated with increases in aggressive behavior in grade 7, which in turn were associated with suicide attempts in grade 8.

Conclusions—Findings suggest indirect pathways between community violence exposure and later suicide ideation and attempt for male and female adolescents. Results highlight the necessity for reducing youth community violence exposure and enhancing strategies for managing the effects of community violence exposure in order to reduce risk for adolescent suicide.

Keywords

adolescents; African American; community violence; suicide

Adolescents are exposed to community violence CV at alarming rates [1,2,3,4,5]. The public health significance of this high prevalence of adolescent CV exposure is magnified given the multiple emotional and behavioral problems associated with CV exposure; these include

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anxiety and posttraumatic stress symptoms, depressive symptoms, aggression and antisocial behavior, social withdrawal, substance use, and academic problems [5,6,7,8,9]. Recently, there has been increased attention to the co-occurrence of community violence exposure and suicidal behaviors. Overall, studies report increased suicide ideation and attempts among youth exposed to violence. For example, Cleary (2000) found that suicidal behavior (ideation and attempt) and violent behavior were more frequent among youth who had been victimized compared with those who had not been victims of violence [10]. O'Leary and colleagues found that violence exposure was significantly associated with suicide ideation in a sample of preadolescents, and that youth who reported suicide ideation reported higher levels of distress in response to exposure to violence than those who did not report suicidal ideation [11]. In a sample of adolescents ages 12–18, suicidal behavior (suicide ideation and deliberate self-harm) was associated with exposure to violence, with the risk of suicidal behavior increasing as the level of violence exposure increased. Specifically, suicidal behavior was highest among youth who had been severely victimized, lower among those who had been moderately victimized, and the lowest for those who had only witnessed violence [12]. Among a sample of incarcerated adolescent male juvenile delinquents with conduct disorder, Ruchkin and colleagues (2003) found that suicide ideators and attemptors reported significantly more exposure to violence than youth who did not endorse suicidal behavior [16].

Research linking CV and suicide behaviors has been difficult to interpret because the majority of this research has relied on cross-sectional designs. As a result, it is unclear whether exposure to CV predicts later suicide ideation and attempt, and if so what mechanisms account for this association. Examination of risk factors for suicide ideation and attempt suggest possible mechanisms that might link CV and suicide. For example, depressive symptoms have consistently been linked with suicide behaviors [14,15]. Aggressive youth also have been shown to have higher risk for suicide [16,17]. Several studies report gender differences in these risks for suicide behavior, with the effect of depressive symptoms stronger for females [14] and aggressive and disruptive behavior emerging as a stronger risk for males [18].

In addition to evidence highlighting each as risk factors for suicide behavior, both depressive symptoms and aggressive behavior have been identified as consequences of CV exposure [5, 7]. Thus, it is possible that in addition to the concurrent association between CV and suicide documented in prior research, there is a longitudinal association between CV exposure and suicide that is accounted for, at least in part, by depressive and aggressive behaviors. Prior cross-sectional research showing a reduced association between adolescent violence exposure and suicide behaviors after adjusting for depressive symptoms and aggressive behavior suggests that this may be the case [12].

The present research examines longitudinal associations between exposure to CV and suicide behaviors in a community sample of urban and predominantly African American adolescents. It was hypothesized that CV exposure would predict increased depressive and aggressive behaviors which, in turn, would predict suicide behavior. This study extends prior literature in several important ways. The prospective longitudinal design enhances our understanding of the nature of association between community violence and suicide behavior. To date, there has been limited empirical examination of mechanisms that may link exposure to community violence and suicide behaviors in adolescents; understanding these pathways will inform prevention and intervention efforts. Examining these issues in a community sample will reveal whether the associations observed in high-risk samples also are present among other samples of youth.

Method

Participants

Participants were 473 middle school students initially assessed in the fall of first grade as part of an evaluation of two universal school-based preventive interventions whose immediate targets were early learning and aggressive behavior [19]. There were no exclusion criteria for participation in the interventions. Of the 678 children who participated in the intervention trial in grade 1, 473 had written parental consent, provided verbal assent, and had completed measures of community violence exposure, depressive symptoms and aggressive behavior, and suicidal behavior in grades 6, 7, and 8, respectively. These 473 youth comprised the sample of interest for this study. Procedures for this study were approved by the Johns Hopkins University Committee on Human Research (CHR #: H.33.02.06.07.A1).

Approximately half of the sample was female ($N = 220$; 46.5%). The majority of the sample, approximately 87%, was African American and the remaining participants were Caucasian. As an indicator of the socioeconomic status of the sample, 70.1% of the sample received free lunch or reduced lunches according to parent report at the 1st grade assessment. At the 6th grade assessment, youth ranged in age from 10.63 to 13.12 ($M = 11.77$, $SD = .35$). The 473 students participating in this study did not differ from the students not included in this study in terms of gender, percentage receiving free or reduced lunch, intervention status, age at entry into the study, first grade self-reports of anxiety or depressive symptoms, or teacher ratings of first grade externalizing problems.

Assessment Design

Community violence exposure, depressive symptoms, aggressive behavior, and suicide ideation and attempt were assessed in each of grades 6, 7, and 8. The time lag between variables included in the path analytic models was selected in order to permit conclusions about the influence of community violence exposure on subsequent suicide ideation and attempt. Specifically, the path analyses include community violence exposure assessed in grade 6; depressive symptoms and aggressive behavior assessed in grade 7; and suicide ideation and attempt assessed in grade 8.

Measures

Community violence exposure during the past year was assessed using items from the Children's Report of Exposure to Violence [20], a self-report instrument used to assess the frequency of exposure to community violence. Two CREV subscales were employed in the present study: violence directly witnessed and violence personally experienced (victimization). The violent events included being beaten up, robbed or mugged, stabbed or shot, or witnessing someone experiencing one or more of those events or witnessing a killing. The CREV has proven to be highly reliable in African American youth and to be related to psychological well-being [20]. A total CV exposure score was created by summing the number of CV events witnessed and directly experienced.

Depressive symptoms were assessed using the Baltimore How I Feel [21], a youth self-report measure of depressive and anxious symptoms. The BHIF was designed as a first-stage measure in a two-stage epidemiologic investigation of the prevalence of child and adolescent mental disorders as defined in the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., rev.) [22]. Youth report the frequency of depressive symptoms over the last two weeks on a four-point scale (1 = "never," 4 = "most times") recoded such that items are scored 0 to 3 and a score of 0 indicates no symptoms. A summary score may be created by taking the mean of the items, and higher scores indicate more depressive symptoms. Chronbach's alpha for the Depression scale in grade 7 was .82.

Aggressive behavior was measured using the aggressive/disruptive behavior subscale of the Teacher Observation of Classroom Adaptation - Revised [23], a brief measure of each child's adequacy of performance on the core tasks in the classroom as defined by the teacher. As part of a structured interview, the interviewer records the teacher's ratings of the adequacy of each student's performance (never true to always true) in several domains, including aggressive behavior. Items are rated on a 6-point scale (1 = 'almost never'; 6 = 'always'), with higher numbers indicating more aggressive behavior. A summary aggression score was created by taking the mean of the 5-item aggressive/disruptive subscale. Coefficient alpha for the aggressive/disruptive behavior subscale was .86 in grade 7.

Suicide ideation and attempt in the past year were assessed using items from the Major Depression module of the Diagnostic Interview Schedule for Children IV [24]. Respondents indicated whether or not they have thought about killing themselves; this item was used to represent suicide ideation. Respondents also reported the number of times they have tried to kill themselves; this item was dichotomized (0 = 'none'; 1 = 'more than 1') to represent suicide attempt.

Demographic information and intervention status—Information was collected on participants' age, gender, and intervention status (i.e., participation in an intervention or control condition during first grade).

Analytic Strategy

Path analysis using *Mplus* 5 [25] was used to examine the hypothesized relationships among study constructs. Model fit was evaluated using multiple indicators of fit: Chi-square, Comparative Fit Index (CFI), the Tucker Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA). Hu and Bentler [26] suggest that CFI and TLI values above .95 and RMSEA values less than .08 represent acceptable fit; RMSEA values equal or less than .05 represent good fit [27].

Suicide ideation and attempt were analyzed together. These 8th grade outcomes were regressed on depressive symptoms and aggressive behavior in 7th grade. Depressive symptoms and aggressive behavior were regressed on grade 6 CV exposure. Intervention status and prior suicide behavior were controlled in each of the path analytic models. To determine whether longitudinal associations between CV, aggressive and depressive symptoms, and suicide behavior were due to stability in aggression or depressive symptoms, we also ran models controlling for initial aggressive behavior and depressive symptoms.

Because prior research has identified gender differences in the association between CV exposure and psychological adjustment [3,28], including suicide behaviors [12], multiple group analyses were performed to test gender differences in the path models. First, paths were freely estimated for males and females. Next, the freely estimated model was compared to models in which paths for males and females were constrained to be equal. A significantly poorer fit of the constrained model compared to the freely estimated model provides evidence of moderation by gender. Because the outcome variables were categorical, the WLSMV estimator was used. With WLSMV estimation, differences between chi-square values are not distributed as chi-square. Therefore, the *Mplus* DIFFTEST was used to compare the nested models.

Results

Preliminary analyses

Means and standard deviations of study variables are summarized in Table 1. Males reported significantly more exposure to violence than females ($t = 2.62, p < .01$). Forty-two percent of males and 32% of females reported exposure to at least one type of community violence exposure in 6th grade. Community violence exposure did not differ according to intervention status.

Teachers reported significantly more aggression in males than females ($t = 5.92, p < .001$), and females reported more depressive symptoms than males ($t = 2.18, p < .05$). There were no gender differences in suicide attempts in the past year, but there was a trend for more females to have suicide ideation during the past year ($\chi^2 = 2.53, p = .09$). One-third of male participants who reported suicide attempts in 8th grade also reported suicide ideation. All of the female participants who reported suicide attempts in 8th grade also reported suicide ideation. There were no direct effects of grade 6 CV exposure on grade 8 suicide ideation or attempt for males or females. Because this first criterion for mediation was not met, only indirect effects of CV exposure on suicide ideation and attempt were examined [29] in the path analyses described below.

Path analysis

The multiple group model, with paths freely estimated for males and females, yielded an adequate fit to the data ($\chi^2 = 15.67, ns$; CFI = .96; TLI = .94; RMSEA = .035). For males, CV exposure in 6th grade was significantly positively associated with depressive symptoms in 7th grade which, in turn, were significantly positively associated with 8th grade suicide ideation. CV exposure in 6th grade was positively associated with aggressive symptoms in 7th grade, which in turn were positively associated with 8th grade suicide attempts for males. Sixth grade ideation and attempts, and 8th grade suicide ideation and attempts were positively associated for males. Sixth grade ideation and attempts predicted 8th grade ideation and attempts, respectively. There was a significant positive association between 6th grade CV exposure and 6th grade suicide ideation. There was no effect of the intervention on grade 7 depressive or aggressive symptoms, or 8th grade suicide ideation or attempt for males (See Figure 1).

For females, CV exposure in 6th grade was significantly positively associated with depressive symptoms in 7th grade, which in turn were significantly associated with suicide ideation in 8th grade. CV exposure in 6th grade was significantly associated with girls' 7th grade aggressive behavior; however, aggressive behavior was not associated with suicide ideation or attempt. CV exposure in 6th grade was positively associated with 6th grade suicide attempts for girls. Suicide ideation and attempt in 8th grade were positively correlated. There was no effect of the intervention on grade 7 depressive or aggressive symptoms, or 8th grade suicide ideation or attempt for females (See Figure 2).

DIFFTEST was used to compare the strength of path estimates for males and females. Each path was tested separately. The correlation between 6th grade CV exposure and suicide attempt was significantly stronger for females than males ($\chi^2(1) = 4.80, p < .05$), but no other paths were significantly different between males and females.

To evaluate whether the observed indirect associations between 6th grade CV and 8th grade suicide ideation and attempt were due to stability in depressive symptoms or aggressive behavior, the aforementioned model was run controlling for the effect of grade 6 depressive symptoms on grade 7 depressive symptoms and the effect of grade 6 aggressive behavior on grade 7 aggression. The effect of depressive symptoms on suicide ideation remained significant for females, but the effect of 6th grade CV on depressive symptoms was reduced to

nonsignificance for males and females, suggesting that the indirect association CV → depressive symptoms → suicide ideation was partly accounted for by stability in depressive symptoms. The effect of males' 6th grade CV exposure on their 7th grade aggressive behavior, and the effect of males' 7th grade aggressive behavior on suicide attempts remained significant after adjusting for prior aggressive behavior, suggesting that CV predicts changes in males' aggressive behavior, which in turn are associated with suicide attempts for males.

Discussion

This study identified concurrent and longitudinal associations between community violence exposure and suicide ideation for an urban and predominantly African American sample of adolescents. CV exposure was associated with later depressive symptoms which, in turn, were associated with suicidal ideation; however, this indirect association was due in part to stability in depressive symptoms. For males, there was a significant indirect effect of CV exposure on suicide attempt two years later; specifically, CV exposure was associated with increased aggressive behavior, which in turn was associated with males' report of suicide attempts.

The observed associations between CV exposure and concurrent suicide ideation and attempt are consistent with prior cross-sectional research documenting increased suicidal behavior for youth exposed to CV [14,15,16]. That the association between CV exposure and suicide attempt was stronger for females than males was counter to expectation because males typically have more frequent exposure to CV and experience more severe CV events than females [7]. Findings suggest that males' most immediate reactions to CV exposure may include suicide ideation, but instead of immediately acting on this ideation, males may find means of coping with CV exposure or managing their distress. Males exposed to CV may express their feelings of distress by engaging in aggressive acts [30] and may perceive aggression as a means of self protection against possible future CV exposure; in some settings, aggression may be adaptive [31,32]. However, aggression increases males' risk for later suicide attempts.

In terms of long-term effects of CV exposure on suicide ideation and attempt, no direct effects of CV exposure were observed. Partial support was found for an indirect effect of CV exposure on suicide ideation due to increased depressive symptoms for youth exposed to CV; however, this association likely reflected stability in depressive symptoms which often co-occur with CV exposure [7]. While prior research has suggested that depressive symptoms may better predict suicide ideation for females than males [14,33], no gender differences were observed in these data. The available literature suggests that aggressive behavior as a risk factor for males' suicide ideation [34]. However, impulsive anger may prove a better predictor of suicide ideation than aggressive behavior alone, and aggressive behavior may better predict suicide attempts [35], as was observed for males in this study. Interestingly, all females who attempted suicide also reported suicide ideation. In contrast, only 1/3 of males who attempted suicide reported ideation. This suggests that in addition to suicide ideation, males' suicide attempts may be linked to other risk factors such as aggression and impulsivity, as suggested in the literature [35].

Results of this research suggest several implications for intervention. Given the immediate and long-term association between CV exposure and suicide, intervention efforts should endeavor to reduce youth exposure to CV. Neighborhood and societal level interventions are certainly needed to address the high rates of violence perpetration and consequent youth exposure to violence. For example, neighborhood economic processes, social organization, and violent crime are directly relevant for youth CV exposure. In addition, recent research has identified malleable individual characteristics (e.g., aggressive behavior, deviant peer affiliation, depressive symptoms) that predict CV exposure and may be useful intervention targets [36]. Intervention efforts also should include strategies for dealing with CV exposure. These

prevention strategies are particularly important for youth at increased risk for CV exposure by virtue of their residence in dangerous environments. In addition, interventions for youth exposed to CV should emphasize strategies for managing negative affect, including depression and aggression.

This study is among the first to examine longitudinal associations between CV exposure and suicide ideation and attempt. Nonetheless, it should be noted that these results may only generalize to urban youth from similar socioeconomic and ethnic backgrounds. It will be important to examine longitudinal associations between CV and suicide behaviors with other samples. In this research, CV witnessing and victimization were examined together given the failure of factor analytic studies to discriminate CV witnessing and victimization, and the lack of consistent evidence that these forms of exposure lead to different outcomes [37]. However, there is not yet consensus regarding methods for assessing CV. In future research, it will be important to examine the discriminative validity of CV witnessing and victimization. Relatedly, four types of CV exposure were assessed in this study; the relatively low rates of CV victimization may be a result of our CV measurement. In addition, a more extensive measure of community violence exposure might show stronger associations with suicide behaviors. It is important that future research include more comprehensive assessments of suicide behaviors and related concerns (e.g., including hopelessness and suicide intent) to gain a more complete understanding of how CV and suicide are related. Finally, in future research it will be important to explore other possible explanations for the observed cross-sectional co-occurrence of CV exposure and suicide behaviors, such as common risk factors (e.g., aggressive behavior).

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Figure 1.

Path analysis for indirect associations between 6th grade community violence exposure and 8th grade suicide ideation and attempt for males.

Figure 2. Path analysis for indirect associations between 6th grade community violence exposure and 8th grade suicide ideation and attempt for females.

Table 1
Means and Standard Deviations of Study Variables for Total Sample and By Gender

Variable	Mean	(SD)	Total Sample Range	Maximum Range	M	Males (SD)	Females (SD)	T-test/ Chi square ^a
CV Exposure (6 th)	.56	(.87)	1-4	0-7	.66	(.93)	(.78)	2.62**
Suicide Ideation ^a (6 th)	.05	(.23)	0-1	0-1	.06	(.23)	(.22)	0.09
Suicide Attempt ^a (6 th)	.01	(.11)	0-1	0-1	.02	(.12)	(.10)	0.42
Depressive Symptoms (7 th)	.63	(.40)	1-2.62	0-3	.59	(.36)	(.43)	2.18*
Aggressive Behavior (7 th)	1.69	(.65)	1-4.33	1-6	1.85	(.70)	(.53)	5.92***
Suicide Ideation ^a (8 th)	.03	(.18)	0-1	0-1	.20	(.14)	(.21)	2.53 ⁺
Suicide Attempt ^a (8 th)	.02	(.13)	0-1	0-1	.01	(.11)	(.15)	.84

^a Dichotomous variables; means represent proportion of sample.

⁺ $p > .05$.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 2
Correlations Among Study Variables for Males and Females

Variable	1	2	3	4	5	6	7
1. CV Exposure (6 th)	---	.08	.13 ⁺	.15 [*]	.11	.07	.11
2. Suicide Ideation (6 th)	.16 [*]	---	.20 ^{***}	.16 [*]	-.01	.05	-.04
3. Suicide Attempt (6 th)	-.02 ^{**}	.25 ^{***}	---	.14 [*]	.05	-.02	-.02
4. Depressive Symptoms (7 th)	.17 ^{**}	.15 [*]	-.07	---	.06	.25 ^{***}	.12 ⁺
5. Aggressive Behavior (7 th)	.17 ^{**}	-.04	-.03	.15 [*]	---	-.03	.01
6. Suicide Ideation ^a (8 th)	.02	.21 ^{**}	-.02	.08	.04	---	.70 ^{***}
7. Suicide Attempt ^a (8 th)	.04	.13 [*]	.28 ^{***}	.04	.11 ⁺	.25 ^{***}	---

Note. Correlations for females are above the diagonal; correlations for males are below the diagonal.

⁺ $p > .05$.

^{*} $p < .05$.

^{**} $p < .01$.

^{***} $p < .001$.