



# Polyvictimization, Related Symptoms, and Familial and Neighborhood Contexts as Longitudinal Mediators of Racial/Ethnic Disparities in Violence Exposure Across Adolescence

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## Abstract

African American and Hispanic adolescent experience more violence exposure relative to White youth. The present study examined the mediating role of posttraumatic stress symptoms (PTSS), delinquency, earlier victimization, and familial and neighborhood factors in disparities in future victimization. The study utilized data from the National Survey of Adolescents-Replication (N = 3,312), which consists of three waves of data collected approximately 1 year apart. A series of path models, tested polyvictimization, PTSS, delinquency, familial socioeconomic factors, and neighborhood safety as mediators of disparities in new polyvictimization. All cross-lagged and autoregressive paths positively predicted past-year polyvictimization and mediated longitudinal disparities. Familial socioeconomic variables and neighborhood safety mediated initial violence exposure disparities. Overall, results indicate that prior violence exposure, related mental health symptoms, and familial and neighborhood factors account for significant portions of disparities in new violence exposure across adolescence.

**Keywords** Racial/ethnic disparities · Violence victimization · Mental health · Prospective/longitudinal

## Introduction

African American and Hispanic adolescents experience significantly higher rates of violence victimization compared with White adolescents [1–8]. This includes greater degrees of child physical abuse [4, 9], witnessing community violence (e.g., someone being shot) [1, 9, 10], physical assault [1], violence severity, and types of violence [2, 7, 11]. Such disparities are particularly problematic because of the various harmful sequelae of violence, which include mental, behavioral, and physical health outcomes [7, 12–16]. The number of types of violence reported by adolescents, also

referred to as polyvictimization, appears to account for much of the relation between individual types of violence exposure (e.g., child physical abuse) and mental health outcomes [11] and may also predict posttraumatic stress disorder symptoms (PTSS) better than sums of exposure to the same type of violence [8, 11]. PTSS, as defined by the Diagnostic and Statistical Manual, fifth edition [17], include negative alterations in mood, avoidance of reminders of the traumatic event, hyperarousal, and various forms of re-experiencing the traumatic event (e.g., intrusive thoughts or memories). Recent cross-sectional research also indicates that polyvictimization mediates racial/ethnic disparities in depression and PTSS for African American and Hispanic adolescents [7]. Further, Hispanics and African Americans experience disparities across multiple environmental and contextual factors, such as neighborhood poverty [18] or disparate criminal justice involvement [19, 20], that in turn may increase disparities in violence exposure and related symptoms [21–25]. Limited research, however, has longitudinally examined the factors that lead to racial/ethnic disparities in violence polyvictimization.

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## Violence Exposure and Future Risk

One key factor in explaining victimization disparities in adolescence may be that African American and Hispanic adolescents are more likely to experience violence in childhood (e.g., before age 10) compared with White adolescents [11]. Adolescents exposed to a given type of violence are more likely to experience that type of violence in the future compared with adolescents who have not been exposed [26–31]. Initial investigations suggest that experiencing violence in one domain also increases the risk of experiencing violence in additional domains [31, 32]. Thus, if African American and Hispanic adolescents experience greater polyvictimization, they may be at risk for experiencing multiple forms of violence in the future, similar to a cascade effect in which early exposure differences may increase the risk of future negative outcomes, altogether altering their developmental trajectory [33]. Disparities in the initiation of these trajectories may also reflect disparities in the context in which violence exposure occurs, such that earlier violence exposure may reflect neighborhood and familial contexts with heightened risk of violence. Examples include situations in which familial and community resources are low and limit the degree to which families and communities respond to and prevent violence (e.g., improving educational access or involvement in youth activities that reduce violence exposure risk).

## Reciprocal Risk with Posttraumatic Stress Symptoms (PTSS) and Delinquency

Potential cascade effects in polyvictimization may be further perpetuated by reciprocal risk patterns in violence exposure and multiple adolescent mental health outcomes. In addition to the effects of polyvictimization on PTSS, PTSS also increase the risk of future violence exposure [27, 29, 34, 35], though little research has examined whether PTSS increase the risk of greater polyvictimization specifically. Still, PTSS may increase risk of violence victimization as PTSS may disrupt threat and/or risk detection [29, 36–38]. In turn, PTSS may at least be a marker of behaviors that increase the risk of future victimization for adolescents, which may further racial/ethnic disparities, though this has yet to be tested directly.

Impulsivity and risk recognition symptoms are also present in delinquent behavior [39–41], which is also strongly linked to violence polyvictimization [42–45]. Further, delinquency substantially increases the risk of future violence victimization [46, 47]. Further, biases in

perceptions of African American and Hispanic adolescents appears to increase the likelihood of interactions with police and other authority figures, which directly and indirectly can increase delinquent behaviors (e.g., disparities in detention leading to greater exposure to peers with delinquent behavior) [19]. Such disparities in initial delinquency may further exacerbate the violence exposure and symptom cascades. Relatedly, while similar high-risk behaviors such as substance or alcohol use may also mutually increase victimization risk, delinquency is among the only other mental health or behavioral outcomes across which racial/ethnic disparities consistently occur for African American and Hispanic adolescents [40, 45, 46, 48, 49]. In contrast, African American adolescents frequently report lower rates and Hispanic adolescents often report similar or lower levels of substance and alcohol use compared with White adolescent [50–52]. Given data on their disparities across race/ethnicity and their roles in predicting violence victimization, PTSS and delinquency may therefore serve as ideal candidates for mediating violence exposure disparities, but this has yet to be tested directly. Further, longitudinal tests of these effects may be ideally suited for adolescence (defined as approximately 10 to 19 years of age [53]). Violence that occurs prior to adulthood may have stronger effects than when experienced in adulthood [54]. Additionally, disparities in prior victimization are already present at this developmental epoch [1–8]. PTSS and delinquency most commonly emerge during adolescence reaching its peak in late adolescence (i.e., 17–19 years of age) [55]. Finally, disparities in these cascades may be best understood in the context of low-resource familial and environmental environments that may increase risk of initial violence exposure and impede access to recovery resources.

## Purpose and Hypotheses

The current study sought to examine the cascade effects among violence polyvictimization, PTSS, and delinquent behavior as mediators of violence exposure disparities among African American and Hispanic adolescents. The study also examined the extent to which indicators of familial and environmental resources accounted for disparities in these cascades—specifically, markers of familial socioeconomic status (poverty and head of household education), caregiver and adolescent perceptions of neighborhood safety, and head of household marital status. Four specific hypotheses were tested:

**H1** African American and Hispanic adolescents will evidence greater degrees of violence exposure, including polyvictimization.

**H2** PTSS and delinquency will mediate the relationship between polyvictimization and future violence exposure, such that polyvictimization positively predicts PTSS and delinquency, which in turn, positively predict future violence exposure.

**H3** Racial/ethnic disparities in polyvictimization and its effects on PTSS and delinquent behavior will mediate disparities in future violence exposure.

**H4** Racial/ethnic disparities in environmental and familial factors reflective of low-resource environments will account for disparities in cascades of violence exposure, PTSS, and delinquent behavior.

## Method

### Procedures

Data were drawn from the National Survey of Adolescents-Replication (NSA-R). The NSA-R was initiated in 2005 with adolescents ages 12–17 years using computer-assisted telephone interviewing technology and national household probability sampling with random-digit dialing. Oversampling occurred in urban areas to ensure representation of racial/ethnic groups (49.5% of caregivers reported living in an urban area, with 35.0% and 15.5% reporting living in suburban and rural areas, respectively). Three waves of data were collected and were spaced approximately 1 year apart, such that adolescents were approximately ages 13 to 18 years at Wave 2 and 14 to 19 years at Wave 3. Additional information regarding sampling and measures have been described previously [56]. All procedures were approved by the institutional review board at the Medical University of South Carolina.

In total, 3,614 adolescents and their caregivers agreed to participate. After informed consent was obtained, a brief caregiver interview was conducted. Of these caregivers, 2846 (85.9%) reported being the biological parents of the participants. Then, adolescent assent was obtained. Interviews assessed household characteristics, traumatic event exposure, mental health symptoms, and demographics. During Wave 2 and 3 interviews, assessments of traumatic event exposure and mental health symptoms were repeated and were identical to their Wave 1 counterparts. Attrition occurred at each follow-up interview with 2511 completing Wave 2 (68.5% retention) and 1653 completing Wave 3 (45.7% retention). In both cases, most attrition occurred because participants could not be reached for follow-up interviews. Race, PTSS, and violence exposure were all associated with attrition ( $p$ -values < 0.05). At each wave,

adolescents participants were compensated \$10 for their participation in the interview.

### Participants

Analyses of the present study were conducted with the 3312 adolescents who had completed interviews and self-identified as Hispanic ( $n = 409$ , 12.3%), non-Hispanic Black ( $n = 557$ , 16.8%), or non-Hispanic White ( $n = 2,346$ , 70.8%) during the first wave of data collection. Table 1 contains additional demographic information.

### Measures

#### Violence exposure and polyvictimization

Violence exposure was assessed using standardized, highly-structured interviews within the following categories: physical assault, sexual assault, physical abuse, sexual abuse, and witnessed violence in the home, school, or community. These were further broken down into 22 sub-categories with yes/no items. To increase accuracy of responses, the interview included behaviorally-specific terminology [57]. Wave 1 interviews assessed lifetime exposure whereas Waves 2 and 3 assessed past-year exposure. This allowed us to examine the effect of any prior exposure on the emergence of new violence victimization. Similar to previous studies on polyvictimization [2, 5, 7, 8, 11, 58–62], event types were then summed. Table 1 includes descriptive information. For additional detailed description of individual traumatic events within each category, see Cisler and colleagues [63].

#### PTSS

PTSS were assessed utilizing a structured interview of DSM-IV-TR disorder criteria. The interview was adapted from the National Women' Study PTSD module, which was also used in field trials of DSM-IV criteria [64]. In this trial, the PTSD module evidenced significant concurrent validity ( $\kappa = 0.71$ ) with the Structured Clinical Interview for DSM-III, a clinical gold standard for PTSD assessment at the time [65]. In order to capture wider variability in PTSD compared to discrete diagnostic categories, continuous symptom counts were used. The number of symptoms participants endorsed over the past six-months were then totaled. Table 1 contains additional descriptive information.

#### Delinquency

The delinquency interview was based on the Self-Report Delinquency Scale [66, 67]. It assessed domains of physical assault, selling drugs, burglary or robbery, motor vehicle theft, using force to obtain money or things from others,

**Table 1** Participant demographic information and descriptive statistics of study variables

	Total sample N or mean (SD or %)	Non-hispanic black N or mean (SD or %)	Hispanic N or mean (SD or %)	Non-hispanic white N or mean (SD or %)
Gender				
Male	1,648 (49.8%)	268 (48.1%)	200 (48.9%)	1,180 (50.3%)
Female	1,664 (50.2%)	289 (51.9%)	207 (51.1%)	1,166 (49.7%)
Income category <sup>A,B</sup>				
Poverty	418 (12.6%)	168 (30.2%)	73 (17.8%)	177 (7.5%)
Non-poverty	2,894 (87.4%)	345 (61.9%)	308 (75.3%)	2,008 (85.6%)
Age	14.67 (1.66)	14.60 (1.65)	14.62 (1.63)	14.70 (1.67)
Perception of neighborhood safety <sup>‡</sup>				
Adolescent <sup>A,B</sup>	2.95 (0.99)	2.70 (1.05)	2.72 (1.05)	3.05 (0.95)
Parent <sup>A,B</sup>	2.47 (0.96)	1.74 (0.85)	2.20 (0.92)	2.70 (0.89)
Head of household marital status <sup>A,B</sup>				
Married	2,358 (71.2%)	238 (42.7%)	260 (63.6%)	1,860 (79.3%)
Not married	954 (28.8%)	314 (57.3%)	149 (36.4%)	486 (20.7%)
Head of household education <sup>A,B</sup>				
No formal schooling	3 (0.1%)	0 (0.0%)	0 (0.0%)	3 (0.1%)
1st through 7th grade	18 (0.5%)	2 (0.4%)	11 (2.7%)	5 (0.2%)
Completed 8th grade	22 (0.7%)	3 (0.5%)	6 (1.5%)	13 (0.6%)
Some high school	186 (5.6%)	52 (9.3%)	36 (8.8%)	98 (4.2%)
High school graduate	870 (26.3%)	196 (35.2%)	113 (27.6%)	561 (23.9%)
Some college	952 (28.7%)	176 (31.6%)	132 (32.3%)	644 (27.5%)
4-year college graduate	698 (21.1%)	78 (14.0%)	66 (16.1%)	554 (23.6%)
Some graduate school	84 (2.5%)	5 (0.9%)	12 (2.9%)	67 (2.9%)
Graduate degree	467 (14.1%)	43 (7.7%)	30 (7.3%)	394 (16.8%)
Any wave 1 viol. Exp. <sup>A,B</sup>	1,638 (49.5%)	347 (62.3%)	224 (54.8%)	1,067 (45.5%)
New wave 2 viol. Exp. <sup>A,B</sup>	543 (24.5%)	116 (35.3%)	78 (30.4%)	349 (20.2%)
New wave 3 viol. Exp. <sup>A,B</sup>	266 (17.5%)	55 (28.9%)	32 (21.9%)	199 (15.1%)
Polyvictimization <sup>1</sup>				
Wave 1 <sup>2,A,B</sup>	1.40 (4.08)	1.83 (4.51)	1.71 (5.14)	1.25 (3.71)
Wave 2 <sup>A,B</sup>	0.42 (0.82)	0.66 (1.11)	0.58 (1.15)	0.36 (0.70)
Wave 3 <sup>A,B</sup>	0.29 (0.55)	0.52 (0.93)	0.42 (0.83)	0.29 (0.44)
PTSS <sup>1</sup>				
Wave 1	1.64 (8.52)	1.81 (9.59)	1.91 (8.84)	1.55 (8.19)
Wave 2 <sup>A</sup>	2.00 (12.37)	2.61 (17.78)	2.36 (12.63)	1.83 (11.18)
Wave 3	1.71 (11.19)	2.03 (13.65)	2.09 (10.29)	1.62 (10.86)
Delinquency <sup>1</sup>				
Wave 1 <sup>A,B</sup>	722 (21.8%)	194 (34.8%)	114 (27.9%)	414 (17.6%)
Wave 2 <sup>A</sup>	239 (10.4%)	53 (16.1%)	29 (11.3%)	157 (9.1%)
Wave 3 <sup>A</sup>	149 (9.9%)	30 (15.8%)	18 (12.5%)	101 (8.6%)

Note PTSS-Posttraumatic Stress Symptoms;

<sup>1</sup>Sample sizes vary for polyvictimization, PTSS, and delinquency measures due to attrition across waves of data collection

<sup>2</sup>Wave 1 polyvictimization scores represent lifetime polyvictimization at the wave, whereas Wave 2 and Wave 3 polyvictimization scores represent past-year polyvictimization

<sup>A</sup>Unadjusted *p*-values < 0.01 for comparisons of African American youth to White youth

<sup>B</sup>Unadjusted *p*-values < 0.01 for comparisons of Hispanic youth to White youth

<sup>‡</sup>Measures for perceptions of safety differed slightly across parents and adolescents, in that parent items focused on worries about the adolescent's safety in various contexts and the adolescent items focused on perceptions of crime and violence in their neighborhood. See Measures section for more details

attacking someone with a weapon, and attacking someone with intent to seriously hurt or injure. Wave 1 assessed lifetime and Waves 2 and 3 examined past-year delinquent behavior. Table 1 contains descriptive information.

### Adolescent and Caregiver Perceptions of Neighborhood Safety

Both adolescents and the caregivers interviewed were asked about their perceptions of neighborhood safety. Specifically, caregivers were asked how concerned they were for their child's safety while in school, in the neighborhood, and the broader community. Responses ranged from 1 (very concerned) to 4 (not at all concerned), such that higher scores reflected higher perceptions of safety. Internal consistency of these items was high (Hispanic  $\alpha = 0.82$ , African American  $\alpha = 0.83$ , White  $\alpha = 0.78$ ). Adolescents answered similar questions regarding the degree to which physical assault, sexual assault, and drug abuse were significant problems in their community. Responses ranged from 1 (a big problem) to 4 (not at all a problem). Internal consistency for this measure was modest (Hispanic  $\alpha = 0.62$ , African American  $\alpha = 0.65$ , White  $\alpha = 0.60$ ).

### Demographics and Socioeconomic Indicators

Adolescents reported their gender, age, and race/ethnicity. Income was assessed during the caregiver portion of the survey, with three household income categories: (1) Below \$20,000, (2) between \$20,000 and \$50,000, (3) above \$50,000. The first category approximately corresponds with the 2005 U.S. federal poverty level for a four-person household (\$19,350) and 200% of the U.S. federal poverty level for a two-person household (\$19,140) [68], which, respectively, represent the average (*Mean* = 4.17, *Median* = 4.00) and smallest household sizes of the adolescents included in the current study. No differences were found between the second and third income groups across violence exposure, mental health symptoms, age, gender, or the primary hypothesized relations (*p*-values > 0.05). As a result, these groups were combined and dichotomous groups were utilized to conduct analyses. Head of household marital status was also assessed and was collapsed into two categories for the purposes of analyses—married and not married. Head of household educational attainment was assessed across nine categories ranging from no formal schooling to graduate or professional degree.

### Analytic Approach

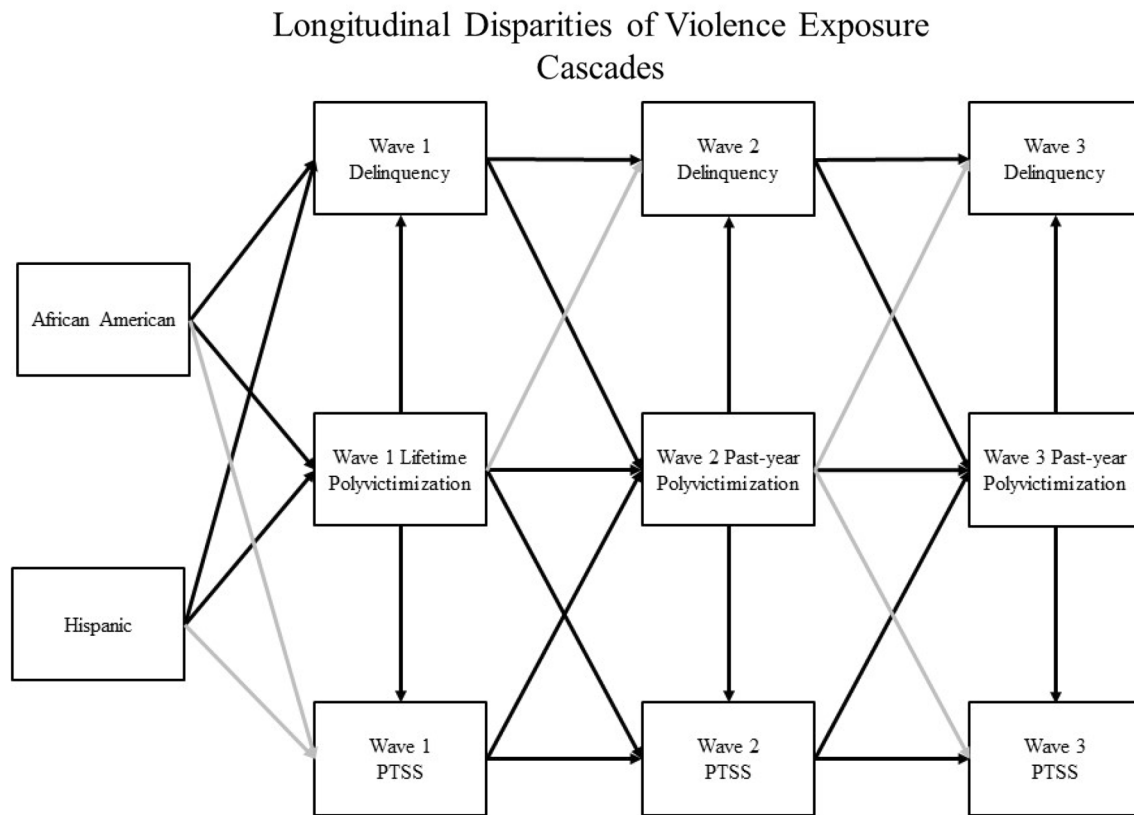
First, racial/ethnic disparities in each outcome were tested using a path model with dummy-coded race/ethnicity variables (White adolescents were the referent group) as

predictors of PTSD symptoms, polyvictimization, and delinquency across all waves with age and gender as control covariates (referred to as Model 1). An additional path model with dichotomized violence exposure variables further examined victimization disparities across each wave.

Following this, an autoregressive and cross-lagged structure was constructed utilizing the variables from Model (1). This is referred to as Model (2). For autoregressive paths, earlier wave variables are examined as predictors of subsequent wave variables (e.g., Wave 1 PTSS predicts Wave 2 PTSS, and Wave 2 PTSS predicts Wave 3 PTSS). Cross-lagged paths are similar, except that predictors are also examined longitudinally between symptoms and predictive paths occur in both directions (e.g., Wave 1 delinquency predicts Wave 2 new violence exposure and Wave 1 polyvictimization predicts Wave 2 delinquency). The model differed from typical cross-lagged and autoregressive models in that violence exposure was examined as a within-wave predictor of PTSS and delinquency. This mirrors other cross-lagged studies of PTSS and violence exposure [35]. Figure 1 shows the model configuration for the cross-lagged and autoregressive model. Following this, environmental (caregiver and child perceptions of neighborhood safety) and familial factors (head of household education, head of household marital status, and household poverty) were added as mediators between race/ethnicity variables and each of the variables in the violence exposure and symptom cascades (Fig. 2). This is referred to as Model (3). Gender invariance tests were also conducted and were not significant. As a result, models are presented with male and female adolescents together. The following recommendations by Hu and Bentler [69] were used to assess model fit: CFI  $\geq 0.95$  and RMSEA  $\leq 0.06$ . The measure of WRMR < 1.50 was also used as an indicator of acceptable model fit.

Given missing data patterns, data were estimated using multiple imputation, which has been previously shown to reduce biases in missing data estimation relative to multiple other estimation methods [70]. Inverse propensity score weighting was also used to further reduce biases of attrition across waves. The data were also significantly multivariate kurtotic and weighted least squares mean and variance adjusted estimation (WLSMV) was used as this has been shown to be robust against biases from non-normality [71].<sup>1</sup>

<sup>1</sup> Alternate models were examined in which the direction of the paths were reversed (e.g., Wave 2 PTSS predicting Wave 2 violence exposure), but evidenced poorer model fit. Additionally, models with correlations (i.e., non-directional paths) between all within-wave variables did not significantly improve model fit. Thus, the model with predictive paths from violence exposure to within-wave symptoms was retained.



**Fig. 1** The cross-lagged and autoregressive path model depicting longitudinal disparities in violence exposure cascades. Gray lines depict non-significant paths. Black lines depict significant paths. All significant paths formed part of significant indirect, or mediational, paths.

All significant relations displayed here are positive (e.g., higher polyvictimization at Wave 2 predicts higher polyvictimization at Wave 3). The figure is based on a path model examining cascades in violence exposure and related symptoms. PTSS-Posttraumatic stress symptoms

## Results

### Model 1: Racial/Ethnic Disparities in Violence Exposure and Related Symptoms

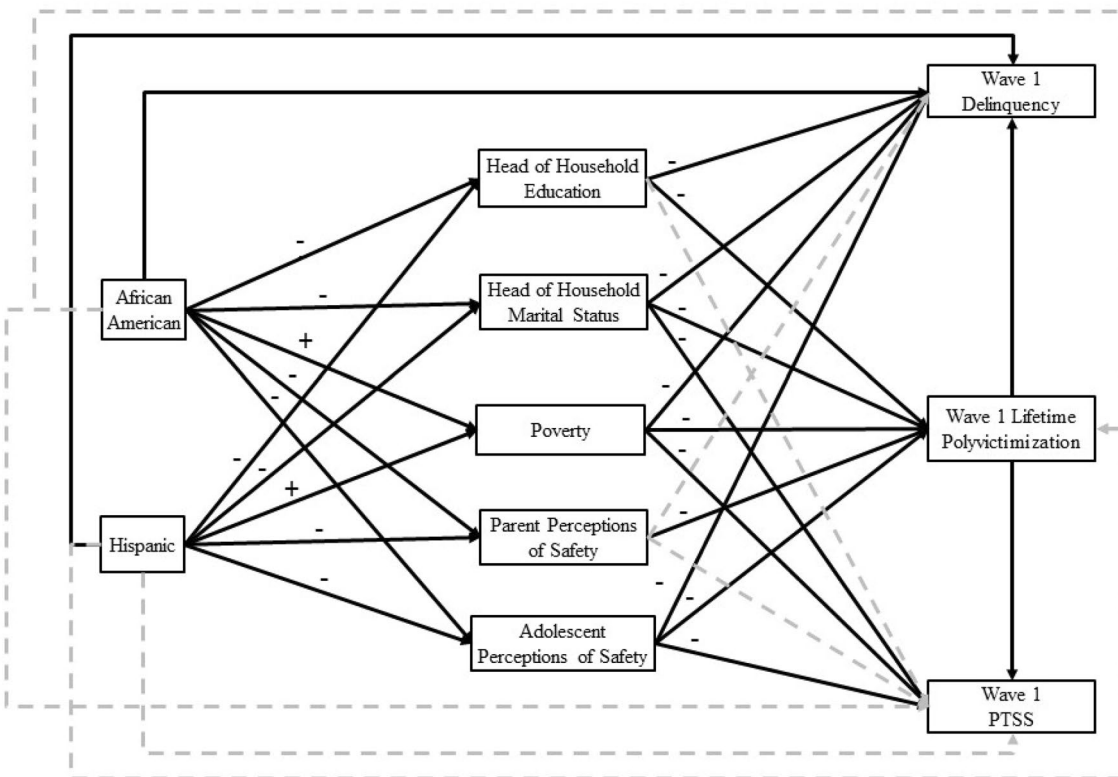
After controlling for age and gender, African American (aOR = 1.90,  $p < 0.001$ ) and Hispanic adolescents (aOR = 1.49,  $p = 0.001$ ) reported experiencing any prior violence exposure at higher rates at Wave 1 compared with White adolescents. Similar results were found for any past-year violence at Wave 2 for African American (aOR = 2.39,  $p < 0.001$ ) and Hispanic adolescents (aOR = 1.62,  $p = 0.001$ ) compared with White adolescents. At Wave 3, significantly more African American adolescents (aOR = 2.68,  $p < 0.001$ ) but not Hispanic adolescents (aOR = 1.43,  $p = 0.059$ ) reported experiencing violence in the past-year relative to White adolescents. African American and Hispanic adolescents also reported experiencing more lifetime polyvictimization at Wave 1 ( $p$ -values  $< 0.001$ ) and more new polyvictimization at both Waves 2 and 3 ( $p$ -values  $< 0.01$ ). Additional information regarding differences in violence exposure can be found in Table 1.

Hispanic and African American adolescents reported more PTSS at Wave 2 ( $p$ -values  $< 0.05$ ) compared with White adolescents, but Wave 1 and 3 differences were not significant ( $p$ -values  $> 0.05$ ). With regard to delinquency, compared to White adolescents, more Hispanic adolescents reported having engaged in delinquent behavior at Wave 1 and past-year delinquency at Wave 2 ( $p$ -values  $< 0.05$ ), but did not significantly differ in past-year delinquency at Waves 3 ( $p = .321$ ). Compared with White adolescents, more African American adolescents reported having engaged in delinquent behavior at each wave ( $p$ -values  $< 0.01$ ). Table 2 contains additional details regarding racial/ethnic differences in baseline outcomes and Table 3 contains details regarding differences in subsequent waves.

### Model 2: Cross-Lagged and Autoregressive Paths

The cross-lagged and autoregressive path model examining mediation across violence exposure cascades evidenced good model fit across most indicators,  $\chi^2 = 260.38$ ,  $df = 13$ ,  $p < 0.001$ , CFI = 0.97, RMSEA = 0.08, WRMR = 1.21. After controlling for cross-lagged and autoregressive paths,

### Family and Neighborhood Mediators of Violence Cascades



**Fig. 2** This shows the potential mediational roles of head of household education, head of household marital status, poverty, caregiver perceptions of safety, and caregiver perceptions of community order and resources. Poverty and head of household marital status were categorical variables with dichotomous coding reflecting poverty (1) vs. non-poverty (0) groups and married (1) vs. not married (0). For all other variables, higher scores represent higher degrees of the construct represented (e.g., higher perceived safety). Positive relations are indicated by ‘+’ and negative relations are indicated by ‘-’

above each significant path. Significant paths are bolded in black and non-significant paths are gray. Additionally, gender and age were also examined as covariates but are not displayed here. The cross-lagged and auto-regressive relationships between violence and related symptoms at follow-up assessments (i.e., the violence and symptom cascades) were also included in this model, but are not displayed here in order to enhance clarity in the mediational roles here. The autoregressive and cross-lagged configuration is the same as the one depicted in Fig. 1

African American youth no longer evidenced disparities in new polyvictimization in both Waves 1 and 2 ( $p$ -values  $> 0.05$ ) and Hispanic youth only evidenced disparities in new polyvictimization at Wave 2 ( $\beta = 0.05, p = 0.011$ ), but not Wave 3 ( $\beta = -0.01, p = 0.855$ ). With regard to symptoms, only Wave 1 differences in delinquency remained significant ( $p$ -values  $< 0.001$ ). Table 2 contains additional information on results for baseline outcomes and Table 3 contains additional information on outcomes at follow-up waves.

At both Wave 2 and Wave 3, new violence exposure was positively predicted by violence exposure, PTSS, and delinquency from the previous wave ( $p$ -values  $< 0.05$ ). Wave 1, 2, and 3 PTSS were positively predicted by concurrent wave and prior wave violence exposure ( $p$ -values  $< 0.01$ ) and prior wave PTSS ( $p$ -values  $< 0.001$ ). Delinquency at Wave 1, 2, and 3 was positively predicted by concurrent-wave violence

exposure ( $p$ -values  $< 0.05$ ) and for Waves 2 and 3, prior wave delinquency ( $p$ -values  $< 0.001$ ), but not prior wave violence exposure ( $p$ -values  $> 0.05$ ).

#### Tests of Indirect Effects in Violence Exposure Cascades

For both African American and Hispanic adolescents, Wave 1 initial polyvictimization accounted for significant portions of racial/ethnic differences in past-year polyvictimization at Wave 2 ( $p$ -values  $< 0.001$ ), while Wave 2 differences in past-year polyvictimization accounted for significant portions of racial/ethnic differences in past-year polyvictimization at Wave 3 ( $p$ -values  $< 0.01$ ). Further, the double mediational path leading in which racial/ethnicity predicted Wave 1 polyvictimization, Wave 1 lifetime polyvictimization predicted Wave 2 past-year polyvictimization, and Wave 2 past-year polyvictimization predicted Wave 3 past-year

**Table 2** Racial/ethnic differences in baseline violence exposure and related symptoms with and without mediators

	Model 1		Model 2		Model 3	
	$\beta$	<i>p</i>	$\beta$	<i>p</i>	$\beta$	<i>p</i>
<b>Wave 1 lifetime polyvictimization</b>						
African American vs White	0.10	<0.001	0.10	<0.001	0.01	0.237
Hispanic vs White	0.08	<0.001	0.08	<0.001	0.02	0.613
Age in years	0.21	0.495	0.21	<0.001	0.17	0.019
Gender (female vs. male)	0.01	<0.001	0.01	0.493	−0.03	0.024
Caregiver perception of neighborhood safety					−0.05	0.034
Adolescent perception of neighborhood safety					−0.21	<0.001
Head of household marital status (married vs. not married)					−0.23	<0.001
Head of household education					−0.09	0.012
Poverty (high vs. low income)					−0.18	0.022
<b>Wave 1 PTSD</b>						
African American vs White	0.03	0.163	−0.01	0.450	−0.02	0.415
Hispanic versus White	0.04	0.071	0.01	0.769	<0.01	0.832
Age in years	0.14	<0.001	0.05	0.008	0.04	0.067
Gender (female vs. male)	0.14	<0.001	0.13	<0.001	0.19	<0.001
Wave 1 lifetime polyvictimization			0.41	<0.001	0.38	<0.001
Caregiver perception of neighborhood safety					0.01	0.511
Adolescent perception of neighborhood safety					−0.10	<0.001
Head of household marital status (married vs. not)					−0.11	0.005
Head of Household Education					0.02	0.471
Poverty (high vs. low income)					−0.12	0.029
<b>Wave 1 lifetime delinquency</b>						
African American versus White	0.21	<0.001	0.08	<0.001	0.12	<0.001
Hispanic versus White	0.12	<0.001	0.16	<0.001	0.06	0.019
Age in years	0.27	<0.001	0.18	<0.001	0.17	<0.001
Gender (female vs. male)	−0.22	<0.001	−0.23	<0.001	−0.25	<0.001
Wave 1 lifetime polyvictimization			0.45	<0.001	0.41	<0.001
Caregiver perception of neighborhood safety					−0.04	0.191
Adolescent perception of neighborhood safety					−0.07	0.006
Head of household marital status (married vs. not)					−0.17	0.002
Head of household education					−0.14	<0.001
Poverty (high vs. low income)					−0.18	0.015

*Model 1* examined racial/ethnic differences in violence exposure and symptoms while controlling for only age and gender, *Model 2* examined violence exposure and symptom cascades as potential mediators of racial/ethnic differences, *Model 3* added familial and contextual variables to *Model 2* in order to examine the degree to which these variables explain disparities in the initiation of violence exposure and symptom cascades

polyvictimization was also significant for both African American and Hispanic adolescents ( $p$ -values < 0.001).

Examining the role of delinquency in violence disparities, for both Waves 2 and 3, prior wave differences in delinquency appeared to account for a significant portion of differences in past-year polyvictimization ( $p$ -values < 0.001). Additionally, prior wave delinquency and violence exposure evidenced significant indirect effects indirect effects of double and triple mediation (e.g., race/ethnicity predicts Wave 1 polyvictimization, which in turn predicts Wave 1 delinquency, which in turn predicts Wave 2 polyvictimization;  $p$ -values < 0.05). Results with PTSS evidenced a different pattern in that the

only significant indirect effects with PTSS involved another mediator that was directly predicted by race/ethnicity (e.g., race/ethnicity predicting polyvictimization at Wave 1, which in turn predicts Wave 1 PTSS, which in turn predicts Wave 2 polyvictimization;  $p$ -values < 0.05). Table 4 outlines direct and indirect pathways and their results.

### **Model 3: Familial and Neighborhood Variables as Mediators of Violence Cascade Disparities**

After adding head of household education, head of household marital status, household poverty, and caregiver



**Table 3** Autoregressive and cross-lagged effects of violence exposure, posttraumatic stress symptoms, and delinquency with covariates

	Model 1		Model 2		Model 3	
	$\beta$	<i>p</i>	$\beta$	<i>p</i>	$\beta$	<i>p</i>
<b>Wave 2 new violence exposure</b>						
African American versus White	0.11	<0.001	0.04	0.066	0.03	0.273
Hispanic versus White	0.09	<0.001	0.05	0.011	0.04	0.045
Age in years	0.07	<0.001	−0.05	0.027	−0.05	0.024
Gender (female vs. male)	−0.02	0.409	<0.01	0.850	−0.01	0.599
Wave 1 PTSS			0.09	<0.001	0.07	<0.001
Wave 1 delinquency			0.16	<0.001	0.15	<0.001
Wave 1 violence exposure			0.30	<0.001	0.29	<0.001
Caregiver perception of neighborhood safety					−0.04	0.087
Adolescent perception of neighborhood safety					−0.05	0.033
Head of household marital status (married vs. not)					−0.10	0.056
Head of household education					−0.07	0.034
Poverty (high vs. low income)					−0.16	0.043
<b>Wave 2 PTSS</b>						
African American versus White	0.07	0.001	0.03	0.167	0.03	0.281
Hispanic vs White	0.06	0.021	0.01	0.564	0.01	0.725
Age in Years	0.10	<0.001	0.01	0.746	0.01	0.531
Gender (female vs. male)	0.15	<0.001	0.10	<0.001	0.11	<0.001
Wave 1 violence exposure			0.08	<0.001	0.08	<0.001
Wave 2 new violence exposure			0.26	<0.001	0.33	<0.001
Wave 1 PTSS			0.47	<0.001	0.46	<0.001
Caregiver perception of neighborhood safety					0.05	0.167
Adolescent perception of neighborhood safety					0.03	0.314
Head of household marital status (married vs. not)					0.35	<0.001
Head of household education					0.15	0.003
Poverty (high vs low income)					0.49	<0.001
<b>Wave 2 delinquency</b>						
African American versus White	0.13	0.007	−0.02	0.741	−0.04	0.448
Hispanic vs White	0.08	0.028	−0.01	0.788	−0.02	0.599
Age in years	0.08	0.023	−0.11	0.002	−0.09	0.018
Gender (female vs. male)	−0.14	<0.001	−0.01	0.898	<0.01	0.952
Wave 1 violence exposure			0.02	0.700	<0.01	0.952
Wave 2 new violence exposure			0.16	<0.001	0.19	<0.001
Wave 1 delinquency			0.61	<0.001	0.59	<0.001
Caregiver perception of neighborhood safety					0.08	0.071
Adolescent perception of neighborhood safety					<0.01	0.957
Head of household marital status (married vs. not)					0.03	0.694
Head of household education					0.02	0.692
Poverty (high vs. low income)					0.20	0.048
<b>Wave 3 new violence exposure</b>						
African American versus White	0.10	<0.001	0.03	0.087	0.02	0.577
Hispanic versus White	0.06	0.003	0.01	0.457	0.01	0.679
Age in Years	0.01	0.643	−0.04	0.045	−0.05	0.021
Gender (female vs. male)	−0.03	0.143	−0.03	0.137	−0.06	0.014
Wave 2 PTSS			0.19	<0.001	0.24	<0.001
Wave 2 delinquency			0.19	<0.001	0.16	0.003
Wave 2 new violence exposure			0.25	<0.001	0.19	<0.001
Caregiver perception of neighborhood safety					−0.08	0.012
Adolescent perception of neighborhood safety					−0.04	0.121

**Table 3** (continued)

	Model 1		Model 2		Model 3	
	$\beta$	$p$	$\beta$	$p$	$\beta$	$p$
Head of household marital status (married vs. not)					-0.24	0.002
Head of household education					-0.10	0.011
Poverty (high vs. low income)					-0.34	<0.001
<b>Wave 3 PTSS</b>						
African American versus White	0.01	0.238	-0.04	0.051	-0.07	0.052
Hispanic versus White	0.03	0.601	-0.01	0.558	-0.02	0.343
Age in Years	0.07	0.016	0.01	0.749	-0.02	0.624
Gender (female vs. male)	0.12	<0.001	0.02	0.247	-0.02	0.321
Wave 2 new violence exposure			-0.08	<0.001	-0.18	0.048
Wave 3 new violence exposure			0.14	<0.001	0.08	<0.001
Wave 2 PTSS			0.62	<0.001	0.69	<0.001
Caregiver perception of neighborhood safety					-0.09	0.001
Adolescent perception of neighborhood safety					-0.10	0.005
Head of household marital status (married vs. not)					-0.40	0.001
Head of household education					-0.21	0.006
Poverty (high vs. low income)					-0.57	<0.001
<b>Wave 3 delinquency</b>						
African American versus White	0.13	<0.001	0.06	0.124	0.03	0.441
Hispanic versus White	0.04	0.321	-0.01	0.855	-0.02	0.666
Age in years	0.08	0.040	0.04	0.338	0.03	0.507
Gender (female vs. male)	-0.13	<0.001	-0.05	0.136	-0.08	0.036
Wave 2 new violence exposure			-0.01	0.873	-0.04	0.413
Wave 3 New Violence Exposure			0.11	0.003	0.07	0.058
Wave 2 delinquency			0.52	<0.001	0.52	<0.001
Caregiver perception of neighborhood safety					-0.11	0.026
Adolescent perception of neighborhood safety					-0.04	0.304
Head of household marital status (married vs. not)					-0.32	<0.001
Head of household education					-0.22	<0.001
Poverty (high vs. low income)					-0.49	<0.001

*Note* PTSS-Posttraumatic stress symptoms. Estimates were derived from a cross-lagged and auto-regressive path model that is depicted in Fig. 1.

*Model 1* examined racial/ethnic differences in violence exposure and symptoms while controlling for only age and gender, *Model 2* examined violence exposure and symptom cascades as potential mediators of racial/ethnic differences, *Model 3* added familial and contextual variables to Model 2 in order to examine the degree to which these variables explain disparities in the initiation of violence exposure and symptom cascades

and adolescent perceptions of neighborhood safety, the model evidenced good fit across most indicators,  $\chi^2 = 186.17$ ,  $df = 13$ ,  $p < 0.001$ ,  $CFI = 0.98$ ,  $RMSEA = 0.06$ ,  $WRMR = 0.69$ . Among specific paths, no racial/ethnic differences in violence exposure remained significant ( $p$ -values  $> 0.05$ ). Examining differences in PTSS, violence exposure and delinquency across each wave, only racial/ethnic differences in Wave 1 delinquency remained significant ( $p$ -values  $< 0.001$ ). All significant cross-lagged and auto-regressive paths from Model 2 remained significant ( $p$ -values  $< 0.001$ ). All five familial and neighborhood variables evidenced significant differences, with African American youth and their caregivers reporting greater rates of poverty

( $p$ -values  $< 0.001$ ) and lower levels of perceived neighborhood safety reported by caregivers and adolescents, lower rates of head of household marriage, and lower head of household education compared with White adolescents and their caregivers ( $p$ -values  $< 0.001$ ). All five of these variables negatively predicted Wave 1 polyvictimization ( $p$ -values  $< 0.05$ ). Adolescent perception of safety, head of household education and marital status, and household poverty predicted delinquency ( $p$ -values  $< 0.01$ ). Similarly, adolescent perception of neighborhood safety, head of household marital status, and household poverty predicted Wave 1 PTSS ( $p$ -values  $< 0.01$ ). The same pattern emerged for indirect effects of familial and neighborhood variables.

**Table 4** Indirect effects (IEs) with and without family and neighborhood mediators of violence exposure cascades

	$\beta$	<i>p</i>
IEs of hispanic disparities in wave 2 violence exposure		
Before family and neighborhood mediators (model 2)	0.05	<0.001
After adding family and neighborhood mediators (model 3)	0.05	<0.001
Only family and neighborhood mediators (model 3)	0.02	<0.001
Only non-family and neighborhood mediators (model 3)	0.02	0.061
IEs of African American disparities in wave 2 violence exposure		
Before family and neighborhood mediators (model 2)	0.07	<0.001
After adding family and neighborhood mediators (model 3)	0.08	<0.001
Only family and neighborhood mediators (model 3)	0.04	<0.001
Only non-family and neighborhood mediators (model 3)	0.02	0.070
IEs of hispanic disparities in wave 3 violence exposure		
Before family and neighborhood mediators (model 2)	0.05	<0.001
After adding family and neighborhood mediators (model 3)	0.05	0.002
Only family and neighborhood mediators (model 3)	0.02	<0.001
Only non-family and neighborhood mediators (model 3)	0.02	0.049
African American disparities in wave 3 violence exposure		
Before family and neighborhood mediators (model 2)	0.07	<0.001
After adding family and neighborhood mediators (model 3)	0.09	<0.001
Only family and neighborhood mediators (model 3)	0.03	<0.001
Only non-family and neighborhood mediators (model 3)	0.02	0.045

Each accounted for a significant portion of racial/ethnic differences in Wave 1 polyvictimization ( $p$ -values < 0.05), while each variable except caregiver perception of neighborhood safety accounted for racial/ethnic differences in Wave 1 delinquency ( $p$ -values < 0.05). Sensitivity analyses were also conducted to examine the robustness of the single mediator effects against potential unexamined confounders. These analyses indicated that a large effect of a confounder would need to be observed before the indirect effects were no longer significant ( $\rho \geq 0.35$ ). Individual paths predicting Wave 1 outcomes are contained in Tables 2 and 3 contains individual paths predicting Wave 2 outcomes. Indirect effects with and without familial and neighborhood variables are in Table 4. Figure 2 shows the familial and neighborhood context mediation.

## Discussion

Results from the current study largely supported study hypotheses and provide two novel findings regarding violence exposure disparities. First, racial/ethnic differences in violence exposure appear to increase across adolescence and these differences are largely accounted for by prior exposure to violence and its related symptoms, which indicates racial/ethnic disparities occur in a cascade of violence exposure across adolescence. Second, familial and neighborhood context variables appear to account for

initial differences in violence exposure and this mediational relation appears to account for racial/ethnic disparities in violence exposure cascades across adolescence. In other words, neighborhood and familial factors appear to be at least markers of contexts that give rise to racial/ethnic disparities in violence exposure that are then subsequently perpetuated by a cascade of violence exposure and related symptoms.

The current manuscript is among the first to simultaneously and prospectively examine how familial and neighborhood differences account for an intersecting combination of racial/ethnic disparities in violence exposure, PTSS, and delinquency. Within these mediational pathways, violence exposure disparities appear to accelerate across adolescence as a result of their impact on mental health outcomes that operate as a feedback loop to further increase violence exposure risk. This conforms with prior work suggesting that prior violence exposure [26–32], PTSS [27, 29, 34, 35], and delinquency [46, 47] increase the risk of future violence victimization. These results further expand on prior work by suggesting that these cascades may initiate with differences across neighborhood and familial resource contexts. Importantly, several of these contextual factors have been previously linked to systemic disparities, such as discriminatory housing policies [72]. Future studies may benefit from more direct assessments of these factors that may explain the contextual and familial differences.

## Strengths, Limitations and Future Directions

Notable strengths from the current study include the use of longitudinal data and thorough screening of posttraumatic stress symptoms and violence exposure; however, findings from the current study are tempered by multiple limitations, particularly those related to assessment methodologies. The study relied exclusively on self-report of delinquent behavior, which may result in underreporting by adolescents. Additionally, PTSS may only serve as a marker for many of the mechanisms that lead directly to violence exposure risk. Similarly, neighborhood contextual factors were assessed through caregiver and adolescent report of perceived neighborhood characteristics. Such variables may be inflated by caregiver or adolescent symptomology that may artificially inflate their relations with adolescent variables and PTSS, in particular. Attrition was also significant in this study, but is similar to other longitudinal, phone-based interview studies and multiple techniques were employed to reduce potential biases. Results may not generalize to clinical populations or populations outside the U.S., as the current sample represents a general sample of U.S. adolescents. Moving forward, research may benefit from examining the degree to which the mediational paths found here are equal across racial/ethnic groups. While beyond this scope of this study, which focused on mediational effects, the differential risk of future violence exposure may provide a fuller picture of racial/ethnic disparities.

## Conclusion

The current research is among the first to demonstrate that violence exposure cascades longitudinally mediate racial/ethnic disparities in expanding violence exposure across adolescence. Similarly, this study provides novel findings that these disparities may be initiated by earlier differences in neighborhood and familial context differences. Such results are critical for understanding racial/ethnic disparities in violence exposure and related outcomes. This research also provides evidence supporting the need for additional treatment and prevention efforts targeting African American and Hispanic adolescents in order to address expanding disparities in violence exposure and related symptoms. These efforts may need to include both community intervention efforts to reduce violence and improve conditions associated with violence as well as expansion of evidence-based treatments for reducing PTSS and delinquent behavior.

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