Violence Exposure, Sleep Disturbance, and Poor Academic Performance in Middle School

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Abstract

Violence has been linked to poor academic outcomes in youth, but there is little understanding of the mechanisms underlying this relation. This longitudinal survey study investigated whether sleep disturbance potentially mediates the associations between academic achievement and two forms of violence exposure--community violence and peer victimization-- in 498 seventh-grade youth. Structural equation models showed that community violence was associated with lower grade point average (GPA) directly and indirectly via sleep problems, whereas peer victimization was associated with lower GPA just indirectly via sleep problems. The structural models controlled for potential confounds, including depressive symptoms, intrusive thoughts and absenteeism. The findings suggest that failing grades and sleepiness in school may be signs that youth are exposed to violence. Interventions to improve sleep hygiene and reduce violence exposure may help to improve academic outcomes for youth.

Keywords

Violence is a pressing public health problem among adolescents (Finkelhor et al. 2010). Nationally, a little over 50 percent of adolescents have experienced assault, 20 percent have experienced teasing or bullying, and nearly 58 percent have witnessed or experienced indirect violence (Finkelhor et al. 2005; also see Finkelhor et al. 2010). In addition to the social, emotional, and bodily harm caused by violence, there is evidence of adverse academic consequences of violence exposure (Basch 2011; Nakamoto and Schwartz 2010). The current study aims to further our understanding of the relation between adolescents' violence exposure and academic achievement. Specifically, the study investigates the longitudinal relation between two forms of violence exposure, community violence and peer victimization, and grade point average (GPA) in middle-school youth. It also investigates a novel mediator—sleep disturbance—to help explain the link between violence exposure and academic achievement.

Violence and academic achievement in adolescents

Studies using diverse indicators of violence exposure and academic performance have shown an inverse relation between these variables. Exposure to community violence is a risk factor for poorer academic achievement (Overstreet and Braun 1999; Schwab-Stone et al.

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1995; Schwartz and Gorman 2003), as is victimization by peers (Nakamoto and Schwartz 2009). However, there is a need for more longitudinal research in this area that controls for spurious factors and identifies potential mechanisms that link violence exposure to academic achievement (Nakamoto and Schwartz 2009).

One theory is that the adverse emotional and behavioral consequences of violence exposure contribute to poor academic achievement (Henrich et al. 2004; Juvonen et al. 2000; Schwartz and Gorman 2003; Schwartz et al. 2005). For instance, depressive symptoms or intrusive thoughts could interfere with motivation, concentration, and memory functions that are critical to learning and academic performance (Schwartz and Gorman 2003). In a study involving 244 middle-school students, higher peer victimization was associated with poorer psychological adjustment (depression, loneliness and self-worth), which, in turn, was associated with poorer GPA (Juvonen et al. 2000; also see Nishina and Juvonen 2005). Similarly, in a study of 199 elementary-school students, depressive symptoms appeared to explain part of the negative relation between peer victimization and academic performance (Schwartz et al. 2005). In a study of 237 elementary-school children, higher depressive symptoms and disruptive behavior accounted for some of the poorer academic performance among children exposed to community violence (Schwartz and Gorman 2003). However, another study of 759 middle-school students, failed to replicate the findings with elementary-school children: neither depressive symptoms nor disruptive behavior appeared to mediate the relation between community violence and academic performance (Henrich et al. 2004). The mixed findings across studies could be attributed to methodological differences between studies, but also point to the need for additional research.

To our knowledge, there is no research to date examining whether violence exposure might influence academic achievement through its influence on sleep disturbance. Sleep disturbance would likely have a role in explaining the relation between violence exposure and academic achievement given the evidence linking violence exposure to sleep disturbance and the documented importance of sleep for learning, thinking and academic performance. Because level of depressive symptoms in adolescents is positively associated with both violence exposure (Kilpatrick et al. 2003) and sleep disturbance (Morrison et al. 1992), it would be important to adjust for depressive symptoms in any model linking violence exposure and sleep disturbance.

Violence and sleep disturbance in adolescents

Sleep is partially dependent on one's ability to regulate levels of arousal, to relax and to reduce awareness of the environment (Dahl 1996). In the context of actual or perceived threats, individuals are likely to remain alert and vigilant of their environment. Exposure to life stressors, including violence and its associated ruminations (Kliewer et al. 1998) and fear reactions (Overstreet and Braun 2000), may cause adolescents to become hyper-vigilant, aroused, and primed for action (e.g., fight or flight), rather than relaxed and oblivious to their surroundings. Thus, violence exposure could interfere with sleep through stress reactions.

To date there has been scant research on the association between violence exposure and sleep in youth. One study has shown a positive association between self-reported exposure to community violence and trouble falling asleep in a community sample of 64 adolescents (Cooley-Quille and Lorion 1999). Other studies have shown a positive association between self-reported exposure to peer victimization and sleep problems in elementary-school children ($n = 565$) in Italy (Gini 2008) and in the Netherlands ($n = 2766$) (Fekkes et al. 2004). These findings are consistent with prior research showing that abused children are at increased risk for sleep problems (Glod et al. 1997). However, because the evidence linking

peer victimization and community violence to sleep problems is based on cross-sectional data and single-item measures of sleep problems, there is a need for additional longitudinal research with well-validated measures to help disambiguate the observed relations.

Sleep disturbance and academic achievement

The cognitive and academic consequences of sleep disturbance among children and adolescents have been widely studied (Buckhalt et al. 2009b; Buckhalt and Staton 2011; Curcio et al. 2006; Wolfson and Carskadon 2003). Sleep disturbance, particularly sleep deprivation, can undermine attention, cognition, and memory processes relevant to learning and performing well in academic settings (Buckhalt et al. 2009b; Curcio et al. 2006; Sadeh 2007; Wolfson and Carskadon 2003). Evidence linking sleep deprivation to daytime sleepiness and learning-memory deficits is strong (Buckhalt et al. 2009b) and has been observed across a variety of indicators, including GPA, achievement tests, teacher ratings, parent reports, and neurocognitive tests. Although much of the research in this area consists of cross-sectional correlational data, there are some stronger longitudinal and experimental data on the adverse cognitive and academic consequences of sleep deprivation (Buckhalt et al. 2009a; Curcio et al. 2006).

Objectives and hypotheses

The objective of this longitudinal study was to investigate the relations between exposure to community violence and peer victimization, sleep disturbance, and academic achievement in a sample of 7th grade youth. The study included controls for variables found to be associated with violence exposure, sleep disturbance and academic outcomes in previous studies— namely depressive symptoms (Juvonen et al. 2000; Schwartz and Gorman 2003; Schwartz et al. 2005) and school attendance (Paavonen et al. 2002)--in order to isolate the specific role of sleep disturbance in the relation between violence exposure and academic achievement. In addition, a measure of intrusive thoughts about violence was included as a covariate. Previous research has linked intrusive thoughts to disturbed sleep and difficulty concentrating in school among children exposed to violence (Pynoos et al. 1987).

We hypothesized that violence exposure in the community or via peer victimization would be positively associated with sleep disturbance, which, in turn, would be negatively associated with GPA, after adjusting for covariates. In addition, we explored whether the tested models worked differently for boys versus girls or for minority versus non-minority youth. Prior research has shown that boys and youth from racial/ethnic minority groups, respectively, are more likely to be victims of violence than girls or Caucasian youth (Crouch et al. 2000; Furlong et al. 1995). In one meta-analytic review, sex did not appear to be a moderator of the relation between violence exposure (peer victimization) and academic outcomes (Nakamoto and Schwartz 2009). Methodological limitations of studies reviewed in the meta-analysis prevented the authors for evaluating the moderating role of race/ethnicity.

Method

Overview

Data for this study were collected as part of a multi-site, multi-wave two-group randomized controlled trial. This study used the first two waves of data from participants in the attention control arm of the trial. The trial tested the efficacy of a behavioral intervention designed to promote adjustment among youth exposed to community violence and peer victimization using expressive writing (Lepore and Smyth 2002). In the experimental arm of the trial, youth wrote for 20 minutes once a week for six sessions about their thoughts and feelings

related to violence. In the attention control arm of the trial, youth wrote for the same amount of time and number of sessions as the intervention group, but focused on non-emotional topics that were unrelated to violence (e.g. daily routines, eating and physical activities).

Participants

Participants were 498 seventh grade youth from three public middle schools, one in Philadelphia and two from greater Richmond, VA. Of the 1,274 students eligible to participate in the larger trial, 986 students received parental consent and provided assent to participate (77% recruitment rate). Of these 986 students, 498 were randomized to the control group. The mean age of the sample was 12.8 years ($SD = 0.44$ years); a little more than half (56%) of the sample was female; 43% identified as White/Caucasian, 24% as Latino/Latina, 24% as Black/African American, and 9% other race/ethnicity.

Procedures

The Institutional Review Board at the study institutions approved study procedures. The measures were administered using a computer-assisted survey interview (CASI, Saw tooth Software, Inc.). Each respondent was provided with a headset-equipped laptop and completed the CASI during a class period. Via CASI, the respondent can hear and read each question on the laptop before selecting an answer. Data from the first measurement wave (Time 1 = T1) were collected in the middle of the fall semester and data from the second measurement wave (Time 2 = T2) were collected six months later.

Measures

Community violence—Level of witnessing and experiencing community violence was assessed at T1 using a modified version of the Survey of Children's Exposure to Community Violence (Richters & Saltzman, 1990). This self-report index assesses the frequency with which a child has been directly victimized (e.g., "hit, slapped, or punched") or has witnessed (e.g., "heard gunfire near school") different forms of violence. Although this is called a measure of community violence, some of the items could refer to violence experienced or witnessed in the home, possibly by parents or other relatives. Thus, it is a broad measure of violence exposure. Respondents indicated how often (1 = never to 6 = 20 or more times) they had been directly victimized (7 items) or witnessed violence (13 items) in the past year. Because some of the items were extreme and rare (e.g., gunfire), the time frame covered an entire year. Items were summed to create each subscale. This measure has been used in dozens of studies of violence exposure and has strong validity (Fowler et al., 2009). The total measure has a reported test-retest correlation of .81 (Richters& Martinez, 1993). The two subscales, direct victimization and witnessing violence, were used as indicators of the latent construct "community violence" in the analytic model. The two subscales were positively correlated ($r = .50$, $p < .001$).

Peer victimization—Peer victimization was measured at T1 using the relational and physical victimization subscales of the Problem Behavior Frequency Scales (Farrell et al. 2000; Kliewer et al. 2012). This validated, 12-item self-report measure assesses the frequency (1 = never to 6 = 20 or more times) of victimization by peers in the prior 30 days. The relational victimization subscale assesses peer threats or attempts at harming the youth's peer relationships (e.g., "someone spread a false rumor about you"). The physical victimization subscale assesses peer threats or attempts to harm the youth's physical well-being (e.g., "hit by another kid"). A mean item score was computed for each subscale. Cronbach's alpha was acceptable (relational = .83 T1; physical = .75 T1). The two subscales, relational and physical victimization, were used as indicators of the latent

construct "peer victimization" in the analytic model. The two measures were positively correlated ($r = .62$, $p < .001$).

Sleep problems—Sleep problems were measured at T1 and T2 with the Sleep/Wake Behavior Problems scale (Clarkson, 1991; Wolfson & Carskadon, 1998). This validated, 10-item self-report measure assesses the frequency (1 = never to 5 = every day/night) with which a child experiences erratic sleep-wake behaviors (e.g., "extremely hard time falling asleep," "felt tired, dragged out or sleepy during the day") over the prior two weeks. Items were summed to create a total sleep problem score. Cronbach's alpha was acceptable (= . 73 T1; = .82 T2). T1 and T2 scores were used as indicators of the latent construct "cumulative sleep problems" in the analytic model. The test-retest correlation was positive and moderately high ($r = .69$, $p < .001$).

Control variables—T1 level of depressive symptoms was measured with the 10-item Children's Depression Inventory Short Form, which is a widely used, reliable and validated measure(Kovacs, 1985). It is comprised of 10 sets of three statements that follow the same question stem, and respondents pick which statement best describes them (e.g. "I did not feel alone; I felt alone many times; I felt alone all the time") over the prior two weeks. Items were summed to create a depressive symptoms score. Cronbach's alpha was acceptable (= .85). T1 level of intrusive thoughts was measured with the 4-item intrusions subscale of the Children's Revised Impact of Events Scale, which has acceptable reliability and has been validated in groups of youth exposed to trauma (Giannopoulou et al. 2006). Youth indicated the extent (0 = not at all, 1 = rarely, 3 = sometimes, and 5 = often) to which they experienced intrusions in the past two weeks. A sample item is: "Did you think about it, the violence or aggression you've seen or experienced, even when you didn't mean to?" Responses were summed to create a total intrusive thoughts score. Cronbach's alpha was acceptable (= .79). Absence rate was defined as total days absent from school over the academic year divided by the number of school days. This measure was derived from school records at the end of the academic year.

Cumulative GPA—Schools provided final cumulative report cards. GPA was calculated based on averaging grades (A = 4, B = 3, C = 2, D = 1, F = 0) across students' four major subjects areas: English, Math, Social Studies, and Science.

Results

Attrition analyses

Participants who completed both waves of the study ($n = 485$) were compared with participants who completed the first wave only ($n = 13$) on demographics, community violence exposure, peer victimization, and sleep/wake problems at T1 using Chi-square or t-tests as appropriate. Although overall attrition was low (< 3%), racial/ethnic minority youth were more likely than non-Hispanic Whites to be lost to follow-up, Chi Square (1) = 6.6, $p < .01$ (all reported p values are two-tailed). There were no other significant group differences.

Descriptive statistics and correlations among study variables

Means, standard deviations, and Pearson correlations among the study variables are presented in Table 1. To address the skewed distribution of the victimization, depressive symptoms, intrusive thoughts, and absence rate measures, a log transformation was applied to scores on these variables prior to analysis (Tabachnick and Fidell 2007). As shown in Table 1, all violence measures were significantly and inversely correlated with GPA. Level of sleep problems at each wave was significantly and positively correlated with level of

violence exposure, depressive symptoms, intrusive thoughts, absenteeism, and GPA. There also was a negative association between absenteeism and grades. As shown in Table 2, a high proportion of youth in the sample reported exposure to various forms of community and peer-related violence.

Overview of structural equation modeling (SEM) analyses

Mplus Version 4 (Muthen and Muthen 1998) was used to analyze data with structural equation modeling (SEM). SEM was used to test the hypothesis that community violence exposure and victimization by peers would be positively associated with sleep problems, which in turn would be associated with lower grades, controlling for depressive symptoms and absence rate. Community violence exposure, peer victimization, and sleep problems each were modeled as latent variables. Separate models were run with community violence and peer victimization exposures as the predictor, because the time frame for these constructs differed. Error associated with both the latent and manifest variables was taken into account in the analyses.

Prior to modeling the structural paths, measurement models were run to determine the extent to which the observed variables (i.e., scale scores) were actually measuring the hypothesized latent variables. Using the approach suggested by Schumacker and Lomax (2004), measurement models were run unconstrained and constrained across gender and across race/ethnicity to examine the measurement invariance of the models. Unconstrained models, which allowed the factor loadings to vary across groups, were compared to constrained models, which fixed the factor loadings to be equal across gender or race/ethnicity.

Several goodness-of-fit indices were used to evaluate the measurements models, including the comparative fit index (CFI), the root mean square error of approximation (RMSEA), the χ^2 test, and the Bayesian information criterion (BIC) (Martens 2005). Models with a χ^2 probability of .05 or greater, a RMSEA value below .08, and/or a CFI value of .90 or larger were considered to have good fit (Suhr 2003). When comparing models using the BIC, differences in values greater than 10 or more indicated differences between the models with lower values favoring the more parsimonious, constrained model (Raferty 1993). Lastly, differences in χ^2 values between the constrained and unconstrained models were calculated using the likelihood ratio test described in Schumacker and Lomax (2004). Using a χ^2 distribution table, model difference values found to be above the critical value indicated for $p < .05$ were significant and considered to favor the unconstrained models, suggesting measurement model differences by group.

Overview of measurement models

For all analyses the fit of the unconstrained and constrained measurement models were examined across gender and race/ethnicity. In all analyses the constrained models were a better fit than the unconstrained models. This indicated that the factors loadings for the latent variables were equivalent across males and females and non-Hispanic whites compared to other youth. (Tables documenting these analyses are available from the second author.) On the basis of the results across the hypothesized measurement models, factor loadings were constrained to be equal for all subsequent analyses of structural models.

Overview of the structural models

The next step in the analysis was to test the hypothesized structural models to determine the extent to which the proposed theoretical relations among the latent and manifest variables in the model were supported by the data. First, multiple-group analyses were conducted to examine differences in the fix of the models across gender and race/ethnicity. Similar to the measurement model analyses, the two hypothesized models were each run unconstrained to

allow paths and correlations to vary across groups and constrained to fix path coefficients and correlations to be equal across gender or race/ethnicity. Path coefficients, or beta weights, were used to report the strength of the relations between the exogenous manifest variables and endogenous latent variables. Structural models were tested for acceptable fit using the goodness-of-fit indices described earlier (see Table 3). In all cases the data favored the constrained model over the unconstrained model, indicating that the structural models were equivalent across gender and race/ethnicity. On the basis of these results, analysis of the models was repeated with the full sample and results are reported below.

Structural models including community violence exposure, sleep problems and cumulative GPA

The first model evaluated the relations between community violence exposures, sleep problems, and cumulative GPA, controlling for T1 depressive symptoms, intrusive thoughts and absence rate (Figure 1). The fit of this model was acceptable, $N = 498$; $x^2 (13) = 62.30$, $p < .001$; CFI = .947; RMSEA = .087 [90% CI = 0.066, 0.110]. Consistent with the zero-order correlation results, there was a significant positive association between community violence exposure and sleep problems, and a significant negative association between level of sleep problems and GPA. Level of depressive symptoms and intrusive thoughts both were positively and significantly associated with sleep problems, but not associated with GPA. Absence rate was negatively and significantly related to GPA. There also was a significant, negative path between community violence exposure and GPA. Syntax recommended by MacKinnon (2008) was used to determine the proportion of effects that were direct versus indirect. Forty-three percent of the total effect of community violence on GPA was indirect via sleep problems.

Structural models including peer victimization sleep problems and cumulative GPA

The second model evaluated the relations between peer victimization, sleep problems, and cumulative GPA, controlling for T1 depressive symptoms, intrusive thoughts and absence rate (Figure 2). The fit of this model was acceptable, $N = 498$; $x^2 (10) = 77.70$, $p < .001$; CFI = .934; RMSEA = .100 [90% CI = 0.079, 0.122]. Consistent with the zero-order correlation results, there was a significant positive association between peer victimization and sleep problems, and a significant negative association between level of sleep problems and GPA. As with the first model, level of depressive symptoms and level of intrusive thoughts both were positively and significantly associated with sleep problems but not associated with GPA. Absence rate was negatively and significantly related to GPA. Eight-five percent of the total effect of peer victimization on GPA was indirect via sleep problems.

Discussion

Consistent with expectations, a higher level of violence exposure was significantly associated with poorer sleep and lower academic performance (GPA) among 7th grade youth. Structural models showed that community violence was significantly associated with lower GPA directly and indirectly via sleep problems, whereas peer victimization was significantly associated with lower GPA just indirectly via sleep problems. The structural models controlled for potential confounds, such as depressive symptoms, intrusive thoughts and absenteeism. Other strengths of the study include the longitudinal analysis, which helps to reduce ambiguity in the direction of the relations, and the use of GPA as an outcome, which reduces potential subjective biases in the outcome. These findings suggest that multiple types of violence can increase risk for poorer academic outcomes among youth and suggest a novel mechanism of sleep problems to help account for how violence exposure might affect academic performance.

There are numerous factors that can potentially influence both sleep and academic performance in youth, including parenting styles and involvement, stressful life events (e.g., parental divorce), circadian rhythm, physical health (e.g., asthma), and lifestyle factors (e.g., exercise, drug and alcohol use) (cf. Buckhalt et al. 2009b; Wolfson and Carskadon 2003). Our data suggest that community violence exposure and peer victimization can be added to this list. Youth who routinely exhibit sleepiness in the classroom and academic problems should be assessed for potential clinical problems and asked about potential problems they may be experiencing outside of the classroom. Youth may be reluctant to report about violence they have experienced or witnessed due to fear of retribution. Thus, it may be necessary to probe if there is suspicion that a child has been exposed to violence. In the context of this research study, youth freely reported on a wide range of violent acts that they had witnessed or experienced, including physical assault, gang violence, name calling, and verbal threats. Those youth who participated in the expressive writing intervention (not included in this analysis) wrote in great detail about their experiences with violence. A number of youth also took advantage of an opportunity to talk with a school counselor about fears and concerns related to violence after they finished their writing. Anecdotally, counselors reported to us that they never would have guessed that some of these youth were harboring these concerns. The empirical findings and anecdotal observations from this study suggest that youth will share their experiences with violence if given the opportunity.

Another implication of the present findings is that sleep hygiene is an important target for intervention in high-risk students and schools. School counselors and health educators have a potential role in educating youth about how they can improve their sleep using evidence-based approaches (Buckhalt et al. 2009b), as well as by addressing some of youths' concerns related to violence. For high-risk schools, individual-level interventions may be less effective than changing policies related to school start times. Schools that have moved start times later have seen a number of positive outcomes, including improved attendance and enrollment rates (Wahlstrom 2002), as well as student reports of fewer depressive symptoms, less fatigue and daytime sleepiness, and greater feelings of self efficacy (Owens et al. 2010). In addition, evidence-based psychological treatments (Cohen et al. 2000) or school-based psychological interventions (e.g., Kliewer et al. 2011), might help youth to cope with violence exposure, reduce stress, and potentially improve sleep outcomes. Although depressive symptoms and intrusive thoughts did not appear to account for the associations between violence exposure and sleep disturbance, it is possible that other psychological outcomes of violence, such as fear, hyper-vigilance, and anxiety could play a role in sleep disturbance and be amenable to psychological intervention. These variables should be investigated in future research.

In addition to targeting sleep hygiene, it is obviously important to reduce violence exposure in order to improve the sleep outcomes and academic performance of youth. Recent trend data (Finkelhor et al. 2010) suggest that violence exposure is on the decline, but the levels are still unacceptable. For youth living in communities with high levels of violence, it is necessary for ongoing vigilance and actions by parents, schools, and community-based organizations to keep youth safe from violence. Policies and interventions that promote safe, violence-free community, household and school environments are likely to have the greatest impact on protecting youth from violence (Luthar and Goldstein 2004). For instance, school-wide bullying prevention programs appear to be effective at reducing the amount of peer victimization to which youth are exposed (Swearer et al. 2010). Results of a meta-analysis suggest that after students have participated in bullying prevention programs, they are less likely to be victimized (Wong 2009). However, youth can also be exposed to violence at home or in their community outside of the school walls.

Secondary violence prevention, or addressing violence exposures, is also important. However, data from studies on individual and familial factors that protect youth from the adverse effects of violence exposure suggest that interventions targeting variables at this level are likely to yield modest or negligible benefits if violence exposure is not curtailed. For example, emotion regulation skill appears to be more effective at reducing internalizing symptoms in youth with relatively low violence exposure than in youth with relatively high violence exposure (Kliewer et al. 2004). Similarly, high levels of parental monitoring and family support appear to be more effective at reducing initiation of alcohol and cigarette use in youth with relatively low violence exposure than in youth with relatively high violence exposure (Sullivan et al. 2004).

One area for future research is to investigate the different consequences of community violence versus peer victimization for psychological, behavioral and academic outcomes in youth. These different forms of violence had similar correlations with outcomes in the present study. However, in the structural models, community violence had both direct and indirect effects on GPA, whereas peer victimization only had indirect effects. There are likely to be factors associated with exposure to community violence that are not associated with peer victimization, and some of these factors may help to explain why community violence predicts GPA independent of sleep problems. For example, peer victimization (teasing, emotional bullying) is common to youth in all socioeconomic strata, but community violence exposure is more common among youth from lower rather than higher socioeconomic strata (Finkelhor et al. 2005; also see Garbarino 1999). Low socioeconomic status can affect GPA through a variety of mechanisms, including parenting styles and expectations, access to cognitively stimulating resources and experiences, and exposure to stressors other than violence (Bradley and Corwyn 2002). It is beyond the scope of this paper to identify or control for all of the correlates of violence and GPA, but the differences in the results of our community violence and peer victimization models suggest that these unique types of violence exposures may have unique consequences. Future investigations should continue to refine our understanding of the unique risks associated with different types of violence by measuring and comparing the outcomes of different kinds of violence rather than studying them in isolation, as is the usual practice in violence research.

Despite the strengths of the present study, including longitudinal analyses, use of multiple indicators for critical variables, and an objective outcome, it also has some limitations. A primary one is the correlational nature of the data. Without experimental data, it is difficult to assert that violence caused poor sleep and academic outcomes. Three potential confounds--depressive symptoms, intrusive thoughts, and absenteeism--were statistically controlled in the models. However, it is possible that other unmeasured variable caused some youth to be exposed to high levels of violence and to have poor sleep and academic outcomes. It is not ethical to randomly expose youth to violence. However, it would be possible to experimentally test whether improving sleep outcomes can improve academic outcomes among youth with high exposure to violence. Another limitation of the study is that the violence and sleep measures were both self-report, which leaves them subject to sources of bias (e.g., poor memory for events in the distant past). Future research could include more fine-grained observational or physiological measures to reduce these sources of bias in assessment of the variables.

In conclusion, this study converges with the growing evidence that violence exposure is a risk factor for academic outcomes in youth. To our knowledge, it is the first to show evidence that sleep problems associated with violence exposure may be a factor contributing to poor academic outcomes. These findings suggest that youth who evidence sleep and academic problems may be witnessing or directly experiencing violence in their life.

Parents, teachers, and school counselors need to be aware of these signs and prepared to intervene appropriately.

Acknowledgments

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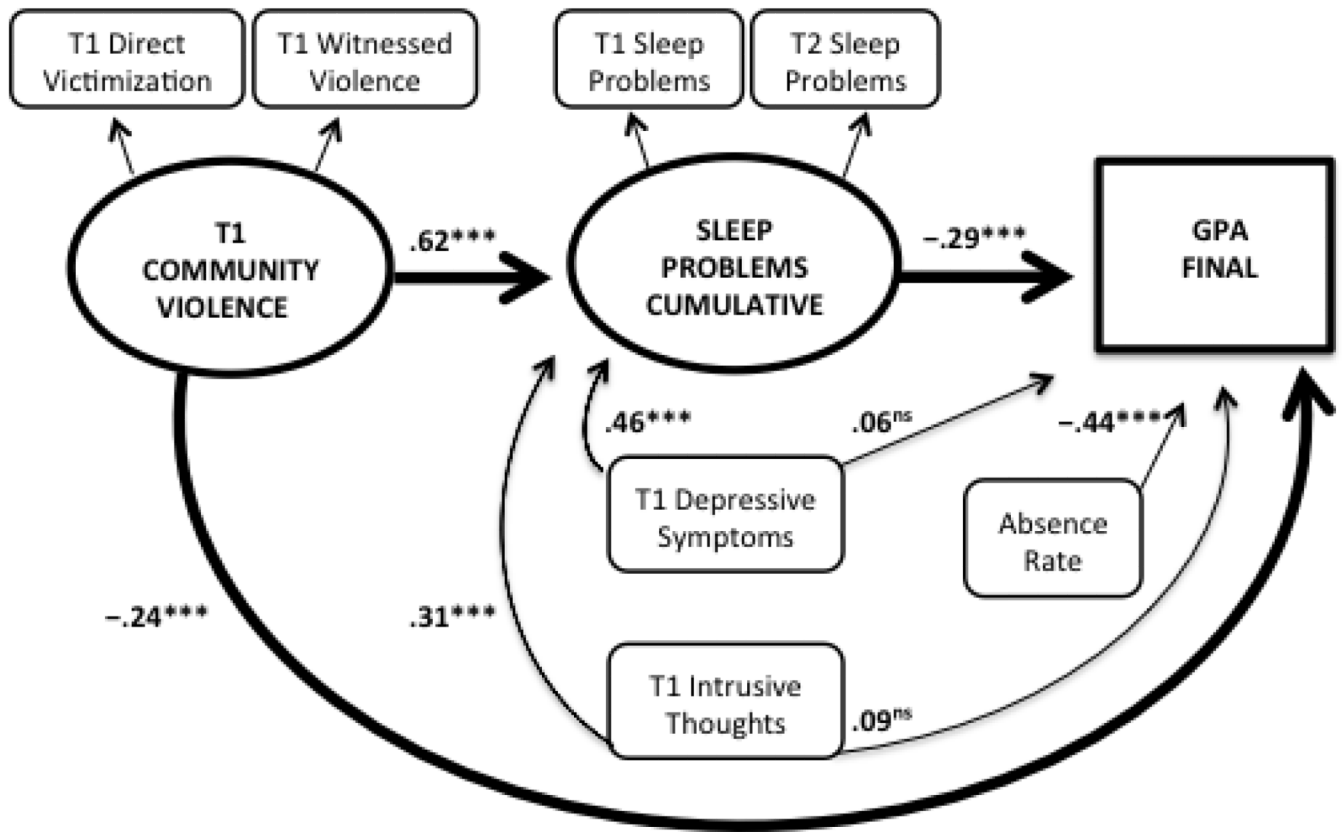
Figure 1.
Community violence model.
Notes: χ^2 (13) = 62.30, $p < .001$; CFI = .947; RMSEA = .087; T1 = Time 1; T2 = Time 2
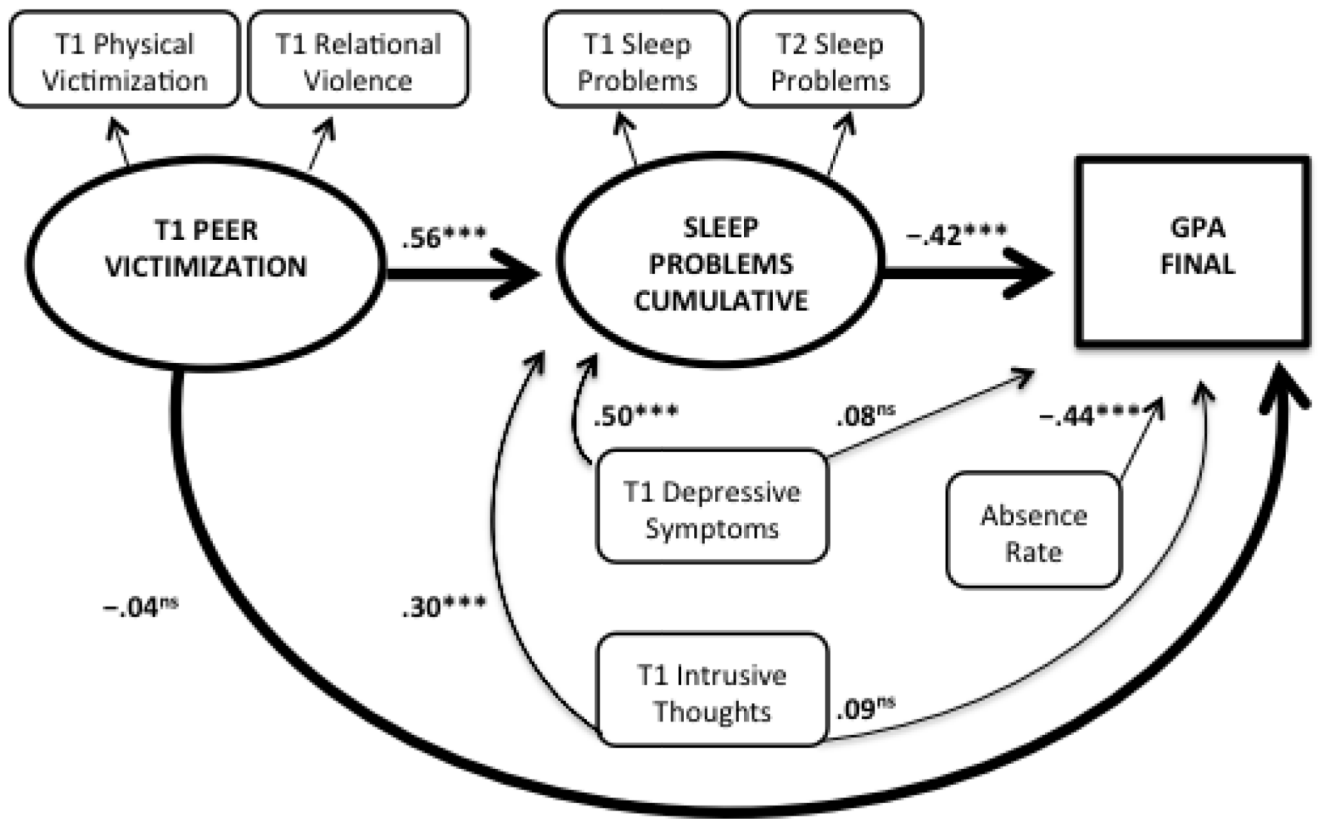* $p < .05$
** $p < .01$
*** $p < .001$

Figure 2.
Peer victimization model.
Notes: χ^2 (13) = 77.70, p < .001; CFI = .934; RMSEA = .100; T1 = Time 1; T2 = Time 2
* p < .05
** p < .01
*** p < .001

Table 1

Means, standard deviations (SD), and Pearson's zero-order correlations among model variables.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	Mean	(SD)
1. T1 CV Direct Victimization										8.26	(2.23)
2. T1 CV Witnessing Violence	.50 ***									18.38	(7.53)
3. T1 Peer Physical Vicitmization	.57 ***	.37 ***								1.39	(0.55)
4. T1 Peer Relational Victimization	.41 ***	.31 ***	.62 ***							1.36	(0.61)
5. T1 Sleep problems	.31 ***	.46 ***	.38 ***	.35 ***						18.85	(6.07)
6. T2 Sleep problems	.27 ***	.37 ***	.33 ***	.28 ***	.69 ***					19.00	(6.60)
7. T1 Depressive Symptoms	.28 ***	.22 ***	.38 ***	.45 ***	.38 ***	.32 ***				2.15	(3.11)
8. T1 Intrusive Thoughts	.26 ***	.32 ***	.24 ***	.23 ***	.21 ***	.19 ***	.29 ***			3.83	(5.55)
9. Absence Rate	.09 ***	.22 ***	.05	-.03	.19 ***	.20 ***	.03	.02		3.94	(4.24)
10. GPA Cumulative	-22 ***	-35 ***	-23 ***	-20 ***	-37 ***	-35 ***	-14 ***	-04	-40 ***	3.02	(0.79)

Notes. Sample size ranged from 402 to 497 due to non-response and attrition on some measures. CV = Community Violence. T1 = Time 1 survey. T2 = Time 2 survey. Means presented are untransformed to facilitate interpretation.

*
  $p<.05$

**
  $p<.01$

***
  $p<.001$

Table 2

Proportion of youth exposed to different types of community violence in past year and peer victimization in past month.

<u>Community Violence: Direct Victimization</u>	
Slapped, hit, or punched	44.2%
Chased by gangs/older kids	10.3%
Beaten up or mugged	6.7%
Threatened with harm	5.8%
Asked to use or sell drugs	4.6%
Attacked with a knife	3.0%
Shot at	2.2%
<u>Community Violence: Witnessed</u>	
Someone slapped, hit, or punched	54.5%
Heard gunfire near the home	46.0%
Someone using or selling drugs	32.1%
Someone carrying a weapon	31.5%
Someone chased by gangs	27.0%
Someone beaten up or mugged	26.0%
Someone threatened with harm	23.8%
Someone seriously wounded	19.9%
Heard gunfire near school	10.1%
Someone knifed	9.5%
Someone shot	9.5%
Someone killed	5.6%
Seen or heard gun fired in the home	3.0%
<u>Peer Physical Victimization</u>	
Kid yelled at you or called you mean names	39.3%
Pushed or shoved by another kid	39.9%
Hit by another kid	33.4%
Another kid tried to get you to fight	26.1%
Another kid threatened to hit or physically harm you	15.5%
Threatened or injured by someone with a weapon	4.5%
<u>Peer Relational Victimization</u>	
Someone spread a false rumor about you	33.9%
A kid tried to keep others from liking you by saying mean things	32.7%
A kid told lies about you to make other kids not like you	25.5%
Left out on purpose by other kids when time for an activity	16.5%
A kid who was mad at you tried to get back at you by not letting you be in his or her group	12.9%
Had a kid say they wouldn't like you unless you did what he or she wanted	10.2%

Table 3

χ^2 Tests and Measures of Overall Fit for the Structural Models

Structural Models	χ^2	df	CFI	RMSEA	BIC
Model 1: Community Violence Exposure as the Predictor					
Unconstrained across sex	99.5*	30	.926	.096	10306.5
Constrained across sex	112.2*	38	.921	.089	10269.5
Unconstrained across race	95.3*	30	.929	.094	10052.0
Constrained across race	110.5*	38	.921	.088	10017.5
Model 2: Peer Victimization as the Predictor					
Unconstrained across sex	118.8*	30	.913	.109	10248.0
Constrained across sex	134.6*	38	.906	.101	10214.1
Unconstrained across race	97.5*	30	.930	.095	10169.4
Constrained across race	109.9*	38	.926	.087	10132.2

*
p<.001