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Inadequate Sleep as a Mediating Variable between Exposure to Interparental Violence and Depression Severity in Adolescents

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Abstract

Exposure to violence, including interparental and peer dating violence, is a public health concern associated with negative outcomes, including depression. However, little is known about mechanisms by which exposure to violence influences depressive symptoms. One factor that may help explain this association is problematic sleep. This study sought to determine whether short sleep duration mediates the relationship between exposure to violence (interparental and peer dating violence) and depressive symptoms. Structural equation modeling was used to examine the mediating role of short sleep duration from a 3-year longitudinal study of 1,042 high school students. Results demonstrated interparental violence was negatively related to sleep duration (friends dating violence was not), and sleep duration negatively associated with depressive symptoms. Adolescents exposed to violence between their parents obtained less sleep on school nights. In turn, they reported more depressive symptoms. Short sleep duration mediated the relationship between exposure to interparental violence and depression severity.

Keywords

Interparental violence; peer dating violence; sleep; depression

Exposure to violence both within and outside the home is among the most prevalent and preventable public health concerns facing adolescents. Approximately 75% of adolescents report having witnessed verbally aggressive behavior and physical violence (Janosz et al., 2008), with about 30% having been exposed to interparental violence (Temple, Shorey, Tortolero, Wolfe, & Stuart, 2013; Zinzow et al., 2009). Extensive research conducted over the past few decades indicates that exposure to interparental violence puts adolescents at risk

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Compliance with Ethical Standards

Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent: Informed consent was obtained from all individual participants included in the study.

for a host of behavioral, emotional, and cognitive problems (Onyskiw, 2003; Wolak, 1998). Adolescents exposed to violence are more likely to demonstrate higher levels of aggression, substance abuse, hostility, and oppositional behavior compared to their non-exposed peers (Carlson, 2000; Mohr & Tulman, 2000). They also experience more problems at school, are less socially competent and empathetic, have poorer problem-solving and conflict resolution skills, and have greater conduct problems, higher rates of absenteeism, and poorer academic performance (Borofsky, Kellerman, Baucom, Oliver, & Margolin, 2013; Howard, Feigelman, Li, Cross, & Rachuba, 2002; Hurt, Malmud, Brodsky, & Giannetta, 2001; Slopen, Fitzmaurice, Williams, & Gilman, 2012; Sternberg, Lamb, Guterman, & Abbott, 2006). Finally, violence exposed children and adolescents have a heightened risk of psychological effects such as depression, anxiety, low self-esteem, loneliness, and suicidal ideation and attempts (Haj-Yahia & Abdo-Kaloti, 2003; Helweg-Larsen, Frederiksen, & Larsen, 2011; Hindin & Gultiano, 2006; Mrug & Windle, 2010; Slopen et al., 2012; Ward, Flisher, Zissis, Muller, & Lombard, 2001; Yi et al., 2013).

Although results suggest that exposure to violence during childhood and adolescence can lead to many negative consequences that have lasting effects into adulthood, very little is known about the mechanisms by which exposure to violence influences depressive symptoms. Insufficient sleep, though largely overlooked in the violence literature, is one possible explanation for the link between exposure to violence and subsequent depressive symptoms. Although it has been established that adolescents require between 8.5 to 9.25 hours of sleep each night, over one fourth of adolescents report sleeping 6.5 hours or less on a typical night and only 15% report obtaining an adequate amount of sleep of 8.5 hours or more per night (Foundation, 2000). The consequences of insufficient sleep include increased automobile accidents, substance abuse, aggression, delinquency, and school absenteeism; and decreased academic performance (Clinkinbeard, Simi, Evans, & Anderson, 2011; Foundation, 2000; Fredriksen, Rhodes, Reddy, & Way, 2004; Haynes et al., 2006; Moore & Meltzer, 2008; Wolfson & Carskadon, 1998). Furthermore, a link between violence, sleep, and mental health has previously been established in intimate partner violence (IPV) among adults. Victims of IPV have been shown to be two to three times more likely to report sleep disturbance, and sleep was found to partially mediate the relationship between IPV victimization and mental health (Lalley-Chareczko et al., in press). Finally, there is mounting evidence linking insufficient sleep and depressive symptoms (Lehto & Uusitalo-Malmivaara, 2014; Silva et al., 2011; Sivertsen, Harvey, Lundervold, & Hysing, 2013; Wolfson & Carskadon, 1998) and suicidal ideation and attempts in adolescents (Kang et al., 2014; Lee, Cho, Cho, & Kim, 2012; Liu, 2004).

Despite studies characterizing the associations between exposure to violence and depression, and between insufficient sleep and depression, there are somewhat limited data examining the potential mediating role of insufficient sleep on the link between violence exposure and depressive symptom severity. Exposure to parental or peer conflict may affect sleep and underlie shortened sleep duration, which could predict adolescents depressive symptom severity. Using structural equation modeling (SEM) to examine 3 years of longitudinal data, we predicted that adolescents who were exposed to parental or peer violence would report obtaining less total sleep time; and insufficient sleep will, in turn, predict greater severity of depressive symptoms.

Method

Procedure and Participants

Data were drawn from an ongoing longitudinal study, which is a cohort study conducted in Texas focused on teen dating violence, risky behavior, and adolescent health. Data were collected from seven public high schools situated throughout southeast Texas during the spring semester in 2010 (wave1), 2011 (wave2), and 2012 (wave3). Active parental consent and student assent were obtained prior to administering the self-report questionnaires. A total of 1,042 students participated in this study (57% female) at wave1. Participants were Hispanic (31%), White (29%), African American (28%), and Asian/Pacific Islander (8%). At wave1, a majority of the participants (75%) were in the 9th grade, with the remaining in 10th grade (24%) and 11th grade (1%). Mean age was 15.10 (SD = 0.79). The retention rate of wave2 and wave3 were 92.5% and 85.8%, respectively. Participants were compensated with a \$10 gift card following each administration. The study was approved by the relevant institutional review board.

Measurement

Interparental violence (wave1)—Two items adapted from the Family of Origin Violence Questionnaire were used to measure exposure to interparental violence (Holtzworth-Munroe, Meehan, Herron, Rehman, & Stuart, 2000). The following instruction along with nine examples of physical violence (e.g., “push, grabbed, or shoved,” “twisted arm or pulled hair,” “slapped,” “slammed against wall,” “kicked, bit punched, or hit with a fist,” “burned or scalded on purpose,” “choked,” “threatened with a knife or gun”) were provided: “No matter how well parents get along, there are times when they argue, and feel angry towards each other. The following questions deal with things that your father (or male caregiver) and mother (or female caregiver) might have done to each other when they were angry.” Using a 4-point Likert scale (1 = never, 2 = once or twice, 3 = 3–20 times, 4 = more than 20 times), participants reported the number of times their father or mother perpetrated physical violence toward each other, respectively.

Friends’ dating violence (wave1)—Two items, based on existing measures of peer behavior (Dahlberg, Toal, Swahn, & Behrens, 2005), were created to assess exposure to dating violence. Using a 5-point scale (1 = none of them, 5 = all of them), students were asked, “During the last year how many of your friends have hit, slapped, choked, or beat up a boyfriend/girlfriend?” and “During the last year how many of your friends have threatened to hit, slap, choke, or beat up a boyfriend or girlfriend?”

Sleep duration (wave2)—A single item adapted from the Sleep Habits Survey, which has been validated against sleep diary and actigraphy (Wolfson et al., 2003), assessed adolescent sleep duration. Specifically, participants were asked, “How many hours of sleep do you usually get on school nights?” using a 4-point scale (1 = 4 hours or less, 2 = 4–6 hours, 3 = 6–7 hours, and 4 = 8 hours or more).

Depressive symptoms (wave3)—Based on the Center for Epidemiologic Studies Short Depression Scale (Radloff, 1977), 5 items measured symptoms of depression. Specifically,

adolescents reported their depression symptoms during the past week by responding to the following 5 items on a 4-point scale (1 = less than 1 day and 4 = 5–7 days): “I had trouble keeping my mind on what I was doing,” “I felt depressed,” “I felt fearful,” “I felt lonely,” and “I could not get going. ”

Covariates—Gender (0 = male and 1 = female), parental highest degree (1 = did not graduate from high school, 2 = finished high school or got GED, 3 = some college or training after high school, and 4 = finished college), three dummy-coded variables regarding ethnicity (e.g., White = 1, all others = 0; Black = 1, all others = 0; Hispanic = 1, all others = 0), and depression symptoms at wave1 (Internal consistency = .74, $M = 1.78$, $SD = 0.66$) were included in the model as control variables.

Data Analytic Strategy

To examine the hypothesis, SEM in Mplus 7.11 (Muthen, 1998–2013) was used. Full information maximum likelihood method (FIML) was employed to deal with missing data (e.g., attrition and missing responses). The FIML method offers less biased and more efficient estimations (DA, 2003; DL, 2001). Based on Hu and Bentler’s recommendation (Hu, 1999), acceptable model fit is considered as root mean square error of approximation (RMSEA) < .06, comparative fit index (CFI) > .94, and the standardized root mean square residual (SRMR) < .06. To examine the potential mediation effect of sleep duration, indirect (IND) command with 1000 bootstrapping method, which provides a bias-corrected significant mediator effect test and biased-corrected confidence intervals (CIs), was employed (Mackinnon, Lockwood, & Williams, 2004; MacKinnon & Luecken, 2008).

Results

Descriptive statistics including mean, standard deviation, internal consistency, and bivariate correlation for each variable of interest is shown in Table 1.

Role of Sleep Duration as a Mediator Between Interparental/Friends’ Dating Violence and Depressive Symptoms

SEM showed that a mediation model fit the data well, $\chi^2 [78] = 214.98$, $p < .05$; RMSEA = 0.04, 90% CI = .036, .050; CFI = .94, SRMR = .05. When all control variables were included, the mediator model explained 8% of the variance in sleep duration at wave2 and 26% of the variance in depressive symptoms at wave3. Interparental violence was negatively related to sleep duration ($b = -0.27$, $SE = 0.03$, $p = .001$, 95% CI with bootstrapping method = -0.42 , -0.11), whereas friends dating violence was not ($b = -0.01$, $SE = 0.05$, $p = .90$, 95% CI with bootstrapping method = -0.11 , 0.10 ; see Figure 1). Sleep duration was negatively associated with symptoms of depression ($b = -0.08$, $SE = 0.03$, $p = .002$, 95% CI = -0.13 , -0.03). That is, the more youth were exposed to interparental violence the more likely they were to report less total sleep on school nights. In turn, they were more likely to report higher depressive symptoms.

Discussion

Consistent with our hypothesis, insufficient sleep explained the longitudinal relationship between exposure to interparental violence and symptoms of depression. Specifically, youth who reported more exposure to mother-to-father and/or father-to-mother violence at baseline evidenced more symptoms of depression two years later. This finding is in line with a plethora of cross-sectional and retrospective research (Kaslow & Thompson, 2008; McFarlane, Groff, O'Brien, & Watson, 2003; Sternberg et al., 2006) and accumulating longitudinal data (Moylan et al., 2010). For example, in a study of participants 6 to 18 years of age, Moylan and colleagues (Moylan et al., 2010) found that children exposed to family violence had more internalizing symptoms, including depression, than did their non-exposed counterparts. A retrospective French cohort study of 3023 adults found that those who witnessed interparental violence as children exhibited a higher risk of current depression than did adults who were not exposed as children. Notably, this result held even after controlling for other forms of family violence (Roustit et al., 2009). The current study adds to this literature by identifying insufficient sleep as a potential contributor to the link between exposure to interparental violence and depression over time.

It is possible that adolescents exposed to the trauma of interparental violence are “primed” for depressive symptoms and are thus vulnerable to the effects of poor sleep. This finding has important implications for secondary depression prevention programs. Specifically, youth exposed to violence can be identified and targeted to receive psychoeducation on the importance of sleep, adolescent sleep needs, and sleep hygiene skills in addition to more trauma-focused treatments (i.e., psycho education, identifying ways to increase safety at home, building affect regulation skills, identifying safe caregivers who might provide emotional support, and desensitization). For example, battered women’s shelters, which also house a number of children who have inherently been exposed to interparental violence, could augment their services by teaching children the importance of, and skills to obtain, sufficient sleep. Addressing sleep in this environment may be less intimidating to these children and adolescents, who are likely overwhelmed with stress and negative emotions. While mental health should continue to be assessed and directly addressed, programs to improve sleep offer a non-threatening and cost-effective approach to preventing symptoms of depression. Indeed, research has shown that focusing strictly on improving sleep, with no attention to other symptoms of depression, can substantially improve the mood of depressed patients (Taylor, Lichstein, Weinstock, Sanford, & Temple, 2007). Clinicians working with adolescents exposed to violence should consider additional resources as well, such as the National Child Traumatic Stress Network.

Contrary to our hypothesis, having friends who have experienced dating violence was not associated with poor sleep or with symptoms of depression. It is possible that youth do not internalize their friends experiences as they do with parents, and are thus less likely to experience the same stress reactions that result from parental violence. It may be that consistent exposure to parental violence could set the stage for hypervigilance both day and night, thus impacting sleep. Yet, if the violence is occurring outside of the home, nighttime hypervigilance would not be expected. Given the importance of peers at this developmental stage (Windle, 2000), however, it could be that this finding is the result of how adolescents

were asked about friend dating violence in the current study. Specifically, we asked adolescents to report the number of friends who they believe had perpetrated or threatened to perpetrate physical dating violence. We do not know, however, whether adolescents were actually exposed to friend dating violence, and if so, the extent of their exposure. Similar to beliefs about other high risk behavior (e.g., marijuana; D Amico, & McCarthy, 2006), it may be that adolescents assume that many of their friends are in violent relationships, but have never actually witnessed such behavior; which would undoubtedly have less of an impact on their mental health.

Limitations

Our findings should be considered in light of several limitations. First, as with many studies on adolescent sleep (Collings et al., 2015; Paksarian, Rudolph, He, & Merikangas, 2015), sleep duration was based on a single item. In addition, there was some slight overlap in the categories for sleep duration (i.e., 4 hours or less, 4–6 hours, and 6–7 hours), which limit our interpretation. A more comprehensive sleep measure that includes serial assessments of duration or quality of sleep would have improved the study. Second, the use of self-report and reliance on a single source necessarily limits the generalizability of the findings. Third, despite comprising a large, ethnically diverse sample from a wide geographical area, findings may be limited to adolescents in southeast Texas. However, the current sample matches quite well with national samples on a range of behaviors (Temple et al., 2013). Finally, our measure of interparental violence was limited to frequency, as opposed to severity, of violence. It is possible that exposure to a single act of severe violence (e.g., slammed against the wall) is more traumatic than exposure to multiple moderate acts of violence (e.g., pushed). Future studies should include a more comprehensive measure of exposure to interparental violence that includes adolescents perceptions of severity.

Conclusion

Despite these limitations, the current study demonstrated that exposure to interparental violence is longitudinally related to depression in adolescents and that insufficient sleep may help explain this link. While additional research is certainly warranted, these findings suggest the importance of addressing sleep in adolescents exposed to violence as a means of preventing subsequent depression.

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Figure 1.
Mediator

Note. Path coefficients and correlations are completely standardized. Although not shown here, depression symptoms at wave1, gender, and three dummy-coded ethnicities, and parental education were included as covariates in the model. All significant ($p < .05$) paths are highlighted by boldface and marked by asterisks. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 1

Descriptive statistics, bivariate correlation, and reliability.

	Mean(SD)	Range	1	2	3	4
1. Interparental violence	1.43(0.65)	1-4	0.70			
2. Friends' dating violence	1.33(0.65)	1-4	.18***	.86		
3. Sleep duration [§]	2.71(0.80)	1-4	-.14***	-.07*	-	
4. Depressive symptoms	1.78(0.67)	1-4	.14***	.11***	-.023***	0.77

Internal consistencies (Cronbach's α) are reported on the diagonal.

[§]Response format for sleep duration were four (1: 4 hours less, 2: 4-6 hours, 3: 6-7 hours, 4: 8 hours or more)

* $p < .05$,

<.001