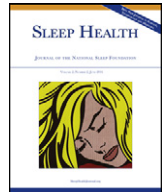




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Sleep duration and risk of physical aggression against peers in urban youth[☆]



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ABSTRACT

Purpose: Optimal sleep takes up one-third of a person's day and is known to be an important component of health and well-being. Shortened sleep duration in adolescence has been found to be associated with adverse health outcomes. In this study, we examined the association between sleep duration and physical aggression against peers among a large representative sample of urban youth, hypothesizing that shorter sleep would lead to more physical aggression.

Participants and methods: Data came from the 2008 Boston Youth Survey, an in-school survey of 1878 public high school students. We calculated adjusted odds ratios of past month perpetration of physical aggression, categorized as minor, moderate, or severe, adjusting for school clustering, sex, age, race and ethnicity, hours spent on homework, time watching television, and peer influences.

Results: Sixty-one percent of students reported insufficient sleep, categorized as 7 or less hours of sleep per school night. Approximately 40% of students reported perpetrating some form of physical aggression at school or in their neighborhood in the past month. Individuals reporting longer sleep duration were significantly less likely to report moderate physical aggressive behavior against peers (adjusted odds ratio = 0.90, 95% confidence interval = 0.81–1.00).

Conclusion: In light of the inverse association between hours of sleep and perpetration of aggression, efforts to decrease physical aggression among high school students should include attention to ensuring healthy sleep, including education on the importance of getting 9 hours of sleep each night.

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Introduction

Perpetration of physical aggression among adolescents is highly prevalent in the United States. Data from the 2009 Youth Risk Behavior Surveillance System (YRBS) show that 17.5% of high school students in

the United States had carried a weapon and 31.5% reported that they were in a physical fight at least once in the past year.¹ Boys report higher levels of perpetrating aggression,² and evidence suggests that they are more often the aggressors in dating violence.³ Perpetrators are at risk for delinquency, drug and alcohol abuse, and later-life

[☆] Implications and contributions: There is a dearth of evidence examining the relationship of sleep deprivation and perpetration of physical aggression among youth. Shortened sleep duration has been linked to perpetration of physical aggression in animals and small select populations of humans. Anecdotal evidence from clinicians supports this association in youth. Our finding linking shortened sleep duration to moderate physical aggression in this large representative sample of urban youth informs public health practitioners, educators, and providers on the value of adequate sleep in preventing fights among adolescents. The significant association between sleep duration and aggression in this large representative sample of urban youth, adjusting for multiple covariates of interest to this association, adds to the literature on the importance of sleep for youth.

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psychiatric comorbidities.⁴ Victims often suffer from depression, social isolation, and low self-image.⁵ Indeed, this has become a nationally-recognized problem, as Healthy People 2020 goals include a new section on adolescent health, focusing in part on behavioral health and the prevention of violence.⁶

Although there is a substantial body of literature devoted to identifying risk factors for youth violence, sleep is rarely considered.^{7,8} However, evidence from both animal and human studies reveals that sleepiness may be a plausible mechanism for aggressive behaviors among children.^{9,10} Experimental animal studies have shown increased aggression in sleep-deprived rats. This body of research suggests that sleep deprivation is stressful and increases irritability, a known risk factor for aggression.^{9,11} Results of small studies on humans also suggest that there may be an association.^{12–16} Specifically, an association between insufficient sleep and aggression has been found among youth transitioning to high school,¹⁵ incarcerated youth,¹⁴ and adolescents in a substance abuse treatment program.¹³ In a related clinic-based study, Chervin et al¹² showed that 2- to 14-year-olds with sleep-disordered breathing and who therefore had chronically low-quality sleep were more likely than other patients to engage in bullying and other aggressive behaviors ($n = 872$). Recent work with children in grades 2 to 5 found an association between sleep-disordered breathing and aggressive behavior ($n = 341$).¹⁶ Using an experimental design ($n = 40$), Haack and Mullington¹⁷ observed an increase in mean scores of aggression across days 3–9 among the sleep-restricted subjects (4 h/d). Short sleep time as assessed by parent or self-report is associated with increased externalizing behavior problems in preschoolers¹⁸ and increased social problems in adolescents,¹⁹ and as assessed by actigraphy was associated with higher aggressive and delinquent behaviors in 7- to 12-year-olds²⁰ and high prevalence of conduct problems in 6- to 11-year-olds²¹ in cross-sectional studies.

Sleep quality and total sleep time have been associated with delinquent behavior in kids between 5 and 12 years of age in both cross-sectional and prospective studies,^{22,23} as well as significantly influencing daytime functioning in adolescents.²⁴ A few longitudinal studies have shown the impact of sleep quality on aggression, with habitual snoring significantly associated with bad conduct and hyperactivity 1 year later²⁵; persistent sleep problems at age 3–6 significantly increasing risk of aggression, social, and attention problems 4 years later²⁶; sleep problems at age 4 predicting aggression and emotional problems 11 years later²⁷; and shortened sleep duration and sleep problems predicting misconduct and low emotional well-being 1 year later in adolescents.²⁸

Taken as a whole, correlational and prospective evidence supports the connection between sleep duration and aggressive behavior problems in children and adolescents.

Nationwide, in 2007, 68.9% of high school students report less than 7 hours of sleep each night,²⁹ well below the recommendation by the National Sleep Foundation of 8–10 hours.³⁰ Report from the YRBS of insufficient sleep (<7 hours) was higher among females (71.3%) compared with males (66.6%) and among black (71.2%) compared with Hispanic students (65.6%). Insufficient sleep increased over the 4 years of high school, with seniors reporting the highest percentage of insufficient sleep (78.2%).²⁹ In addition to aggression, mood disturbance, poor academic performance, and adverse physical health are also associated with a lack of sleep among school children.^{16,31,32}

Insufficient sleep is likely driven by a multitude of factors, including school-level factors. Healthy People 2010 states, “Schools have more influence on the lives of young people than any other social institution except the family and provide a setting in which friendship networks develop, socialization occurs, and norms that govern behavior are developed and reinforced”.³³ One such factor that has been identified is school start time. One review found that later school start times is associated with more sleep in students when

comparing between schools, within groups of students, and within individuals over time primarily because of the time students awaken, not a change in bedtimes.³⁴ Analyses of start times and their association with sleep duration have been conducted in an effort to explore the role of school start time policy as a contributor to the epidemic sleep deprivation in teens.^{35,36} Wahlstrom³⁷ examined sleep habits and daytime function of students ($n = 7168$) from Minneapolis school districts and found that students with later start times reported an additional hour of sleep on school days ($P < .001$). In a survey of 800 preadolescent students in 18 schools, students in schools that started later (ie, 8:00 AM) reported longer nighttime sleep durations compared with those in schools with earlier (ie, 7:15 AM) start times (ie, 9.1 vs 8.7 hours on school nights). The American Academy of Pediatrics (2015),³⁸ along with the Centers for Disease Control and Prevention (2015), recommends later school start times for high schools.³⁹

This study seeks to examine the association between sleep duration and the perpetration of physical aggression against peers in a large, diverse, and representative population of urban public high school students from Boston, MA. Multilevel methods were used to examine both individual- and contextual-level school factors that may contribute to the epidemic of aggression among teens. Furthermore, this analysis seeks to test for differences in this association by sex.

Methods

Conceptual framework

The aims of this study were to (1) determine whether sleep duration is associated with minor and moderate aggression and (2) examine how much of the association between sleep duration and aggression is explained by a contextual-level factor, school start time (Fig. 1).

Sampling design

Data for this study came from the 2008 administration of the Boston Youth Survey (BYS), a biennial paper-and-pencil survey of high school students (9th–12th graders) in Boston Public Schools (BPS). All 32 eligible high schools within the BPS system were invited to participate in the BYS. Ineligible schools were those that served adults (ie, “night school”), students transitioning back to school after incarceration, suspended students, and a school serving special-needs children. A total of 22 of the schools participated in the survey (69%). There were no significant differences in school factors (attendance, students with individualized education plans, annual dropout rate, racial composition of students and teachers, or standardized tests) across participating and nonparticipating schools.

To generate a random sample of students, a numbered list of humanities classrooms (ie, a required course) within each school was generated. Classrooms were stratified by grade and then selected using a random number strategy. Selection of classrooms continued until the total number of students surveyed ranged from 100 to 125 per school. Every student within the selected classrooms was invited to participate. In the 2 schools with total enrollments close to 100, all classrooms were invited to participate.

Survey administration and response

The BYS 2008 instrument covered a range of topics and had an emphasis on violence. The paper-and-pencil survey was administered to students by trained staff. Passive consent from students’ parents/guardians was obtained. Survey administrators read a statement on informed assent to all students when they handed out the survey. Students were given 50 minutes to complete the survey. Surveys were not marked with any information that could identify an individual. Of the 2725 students selected for participation, 1878

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