

Associations Between Sleep and Health-Risk Behaviors in a Rural Adolescent Population

David A. Reichenberger, BA, Clayton J. Hilmert, PhD, Leah A. Irish, PhD, Molly Secor-Turner, PhD, MPH, & Brandy A. Randall, PhD

ABSTRACT

Introduction: Insufficient sleep has been associated with engagement in a number of health-risk behaviors in adolescents, including substance use and sexual activity. Associations between sleep and health-risk behaviors in adolescents living in rural areas of the United States are not well investigated. In rural settings, adolescents' sleep patterns, lifestyle factors, and health-risk opportunities may differ from those of urban adolescents, making the independent study of sleep and health behavior associations necessary.

Method: This study examined data from the Rural Adolescent Health Survey ($N = 322$) administered in rural North Dakota. **Results:** Rural adolescents who reported engaging in smoking, alcohol use, or drug use slept significantly less than adolescents who did not report engaging in these activities.

Discussion: Sleep was not associated with chewing tobacco use or risky sexual activity, which may reflect an effect of rural cultural values on sleep and health-risk behavior associations. *J Pediatr Health Care.* (2016) 30, 317-322.

KEY WORDS

Adolescent, rural, sleep, substance use, health behavior

David A. Reichenberger, Graduate Student, Department of Psychology, North Dakota State University, Fargo, ND.

Clayton J. Hilmert, Associate Professor, Department of Psychology, North Dakota State University, Fargo, ND.

Leah A. Irish, Assistant Professor, Department of Psychology, North Dakota State University, Fargo, ND.

Molly Secor-Turner, Associate Professor, Department of Nursing, North Dakota State University, Fargo, ND.

Brandy A. Randall, Associate Professor, Department of Human Development and Family Science, North Dakota State University, Fargo, ND.

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Correspondence: Clayton J. Hilmert, PhD, Department of Psychology - 2765, North Dakota State University, P.O. Box 6050, Fargo, ND 58108; e-mail: clayton.hilmert@ndsu.edu.

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The [National Sleep Foundation \(2014\)](#) recommends that adolescents get between 8.5 and 9.25 hours of sleep each night to avoid decrements in attention and coordinated activities and increased risk of obesity, diabetes, heart disease, and psychiatric conditions. Approximately 45% of adolescents sleep less than 8 hours each night ([National Sleep Foundation, 2006](#)). Insufficient sleep is also associated with health-risk behaviors (HRBs), including substance use and risky sexual activity ([O'Brien & Mindell, 2005](#)). These associations have not been investigated in rural adolescents, whose sleep patterns, lifestyle, and health-risk opportunities may differ from those of (sub)urban adolescents. To begin developing a better understanding of sleep and health behavior associations in this understudied population, sleep associations with tobacco use, alcohol use, illicit drug use, and risky sexual activity were examined in a sample of more than 300 adolescents living in rural North Dakota.

According to the U.S. Office of Rural Health Policy, a rural area is an area of at least 400 square miles with a

population density of no more than 35 people. In 2010, about one fifth of the U.S. population lived in rural areas (U.S. Census Bureau, 2010). A number of documented differences between rural and urban populations suggest likely differences in associations between sleep and HRBs. For instance, compared with their urban peers, rural populations are more often employed in agriculture and small business (Myers, 1990), have higher rates of obesity (Jackson, Doescher, Jerant, & Hart, 2005) and suicide (Eberhardt, Ingram, & Makuc, 2001; Opoliner, Azrael, Barber, Fitzmaurice, & Miller, 2014; Singh & Siahpush, 2002), and engage in higher rates of HRBs, including adolescent tobacco and alcohol use (Gfroerer, Larson, & Colliver, 2007). Thus an independent line of research aiming to identify influences on these unhealthy behaviors and other health-related factors in rural populations is warranted.

In many cases it appears that insufficient sleep and HRBs are bidirectionally associated, with one exacerbating the other. Studies have shown that insufficient sleep adversely affects decision making (Carskadon, 1990), thereby increasing the likelihood of deciding to participate in risky behaviors. Conversely, research has found that drug and alcohol use lead to reduced total sleep time and altered sleep architecture (Ebrahim, Shapiro, Williams, & Fenwick, 2013; Schierenbeck, Riemann, Berger, & Hornyak, 2008). Bidirectional causation between substance use and insufficient sleep is clear. However, for some HRBs, such as risky sexual behavior, an association with sleep is more likely unidirectional (McKnight-Eily et al., 2011)—that is, insufficient sleep may increase the likelihood of risky sexual activity

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by affecting decision making, but it is not clear how risky sexual activity would cause or exacerbate a regular pattern of insufficient sleep.

The significance of causal directionality driving associations between HRBs and sleep has not been closely investigated. It is not completely clear if the more toxic influence in the association involves the effect of insufficient sleep on HRBs or the effect of HRBs on sleep. By considering an array of HRBs in the present study, including risky sexual behaviors and substance use, the results of this study may provide some insights regarding this issue, particularly as they apply to rural adolescents.

Using data from the Rural Adolescent Health Survey (RAHS), we compared the rates of various HRBs among adolescents in a rural setting who get at least the minimum recommended amount of sleep (8.5 hours/night)

and those who get less than the recommended amount of sleep. Behaviors that have been shown to have a bidirectional association with sleep (i.e., alcohol, nicotine, and drug use) and those that are less likely to have a bidirectional association (i.e., risky sexual behaviors) were assessed. Furthermore, whether the mode of substance use (e.g., smoking vs. chewing tobacco) differed in their associations with sleep was explored. This study is the first to take an in-depth look at sleep and these behaviors in a rural adolescent population.

METHODS

The RAHS was an anonymous self-report survey of 322 ninth- to twelfth-grade students attending four secondary schools in frontier counties that were not adjacent to a metro area. Ninety-eight percent of eligible students participated in the survey. Survey items were developed using validated national youth surveys (Secor-Turner, Randall, Brennan, Anderson, & Gross, 2014). All study procedures were approved by the participating schools and the North Dakota State University Institutional Review Board.

The RAHS assessed rural adolescents' health and HRBs, including reports of the time participants usually went to bed and woke up, the number of days they used specific drugs or alcohol in the last month, and the number of different sexual partners they had during the past 12 months.

Measures

In the current study, the following measures of sleep and HRBs were examined. Sleep duration was determined by asking participants to provide the time at which they usually go to bed at night and usually wake up in the morning. Amount of sleep was determined by the number of hours between reported bedtime and waking time.

Tobacco use behaviors were assessed with two questions that asked the frequency (i.e., number of days) during the past 30 days that participants (a) smoked cigarettes or (b) chewed tobacco or used snuff. Similarly, alcohol use was assessed with multiple questions that asked how often participants (a) had at least one drink of alcohol (equivalent to one can of beer, glass of wine, or shot or mixed drink of liquor), and (b) had five or more drinks of alcohol within a couple of hours during the past month. Two questions asked about drug use, specifically, how many times a participant had (a) smoked marijuana and (b) used other drugs (e.g., cocaine, crack, meth, acid, ecstasy, speed, and heroin). For analyses, participants were dichotomized into those reporting they did not engage in the specific behavior (0 days) and those reporting engagement in the behavior (≥ 1 to 2 days).

To assess risky sexual behavior, participants were asked a number of questions. As with tobacco, alcohol, and drug use responses, responses pertaining to sexual

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