Examining racial/ethnic disparities in the association between adolescent sleep and alcohol or marijuana use

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ABSTRACT

Objectives: The current study examines the association between self-reported measures of trouble sleeping, total sleep time (TST), and bedtimes and odds of past month alcohol and marijuana (AM) use in a racially/ethnically diverse sample of adolescents.
Design: This is a Web-based cross-sectional survey.
Setting: The setting is in Los Angeles County, CA.
Participants: The sample is composed of 2539 youth representing 4 distinct racial/ethnic categories (non-Hispanic white, Hispanic, Asian, and "other"; mean age, 15.54; 54.23% female) from Los Angeles.
Measurements: The survey assessed TST and bedtimes (weekdays and weekends), trouble sleeping, and past month AM use as well as relevant covariates (sociodemographics and mental health symptoms).
Results: Although there were significant racial/ethnic differences in the prevalence of sleep problems and AM use, the associations between sleep problems and AM use were consistent across racial/ethnic groups. Specifically, shorter TST, later bedtimes, and trouble sleeping were each associated with significantly higher odds of past month alcohol use, whereas later bedtimes and shorter TST were also associated with increased odds of past month marijuana use, even after adjusting for other known risk factors.
Conclusions: Sleep problems are associated with increased AM use in teens, even after controlling for sociodemographics and mental health symptoms. Further longitudinal research on sleep and AM use is critical to identify novel prevention and intervention efforts to reduce disparities in the relationship between sleep and AM use.

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Adolescence is a developmental period marked by dramatic increases in sleep problems[1] as well as alcohol and marijuana (AM) use.[2,3] Adolescent AM use, in turn, is associated with worse health outcomes,[4] neurocognitive deficits,[5] and an increased likelihood of receiving a diagnosis of abuse or dependence disorder in adulthood.[6] Similarly, adolescent sleep problems are associated with a wide variety of adverse consequences, including increased risk of mood disorders,[7] poorer academic functioning,[8] obesity,[9] cardiovascular risk factors,[10] and motor vehicle accidents.[1]

Previous research suggests that sleep problems are associated with increased risk of AM use both cross-sectionally[11-13] and longitudinally[14-17]; however, to our knowledge, there have been no studies that have examined racial/ethnic differences in sleep-AM use associations, despite known racial/ethnic differences in each of these behaviors. For example, whites and Hispanics are more likely than blacks and Asians to be in heavier using classes for drinking,[18,19] smoking cigarettes,[20] and marijuana use,[21,22] but non-whites tend to experience more social

and health consequences from alcohol and drug use[23,24] compared with whites. There are also well-recognized differences in sleep according to racial/ethnic category with non-whites tending to report more sleep problems than whites[25]; however, most of these studies have focused on white-black comparisons rather than including a broader representation of racial/ethnic groups.[26] Because of the expected increase in non-white populations in the United States and the fact that non-whites tend to experience more social and health consequences from both sleep problems and alcohol or other substance use that may endure into adulthood, it is crucial to evaluate the prevalence of sleep problems and AM use among white as well as non-white adolescents and assess how associations between sleep and AM use may differ across racial/ethnic groups.

Previous research has also tended to use single sleep measures, focused either on sleep duration or insomnia-related symptoms. However, it is important to capture multiple dimensions of sleep simultaneously, including duration, sleep patterns (eg, bedtimes), and insomnia-related symptoms (eg, trouble sleeping) to provide a more thorough understanding of the links between sleep and AM use. In addition, given that there are known sociodemographic[27] (eg, family structure and parent education) and psychosocial risk factors[28] (eg, mental health symptoms)

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that may explain associations between sleep and AM use, it is critical to examine the independent contribution of sleep to AM use after statistically adjusting for these other co-occurring risk factors.

The present study extends the current literature by examining the association between several dimensions of sleep (duration, quality, and bedtimes) and AM use and the degree to which associations differ across 4 different racial/ethnic groups (white, Hispanic, Asian, or "other") in a large sample of adolescents in Southern California. This large and diverse sample and inclusion of other risk factors offer an important opportunity to examine racial/ethnic differences while controlling for key covariates to determine the independent risk for alcohol or marijuana use associated with sleep.

Methods

Youth from this study originated from 16 middle schools across 3 school districts in Southern California that were part of a large, ongoing longitudinal study with a school-based intervention that occurred in 2008.[29] Across all schools, 92% of parents returned a consent form at the baseline, and approximately 71% of parents gave permission for their child to participate in the original study. Ninety-four percent of consented students completed the baseline survey, which is higher or comparable with other school-based survey completion rates with this population.[30] We continued to follow up 2 cohorts of youth (the original 6th grade cohort and the original 7th grade cohort) as they transitioned into high school. Questionnaires for the current study were administered from May 2013 to April 2014 via a Web survey when the sleep measures were added to the survey, and youth were on average 15 ½ years old (n = 2539). For all variables, except mother's education, missingness was less than 0.5% (mother's education missingness was 7%).

Race/ethnicity and covariates

Youth self-reported their racial/ethnic category. Based on the distribution of racial/ethnic categories, the following 4 categories were used in the current analyses: non-Hispanic white (20.99%), Hispanic (43.91%), Asian (20.95%), and "other" (14.4%; which was composed of the following categories: African American, 2.32%; American Indian, 0.83%; Native Hawaiian, 0.79%; and multi-ethnic, 10.20%). In addition to examining racial/ethnic differences in observed associations, we included covariates known to covary with race/ethnicity, sleep, and/or AM: self-reported age, gender, educational attainment of mother (less than high school high school vs greater than high school), family structure (ie, 2-parent household vs single-parent household), and an indicator for whether the student had attended one of the intervention schools. We also included mental health as a covariate. Five items assessed mental health symptoms (Mental Health Inventory [MHI-5][31]) focusing mostly on anxiety and depression symptoms in the past month. Scores were scaled such that they ranged from 0 to 100, with higher scores indicating better mental health (α = .75).

Sleep measures

Self-reported sleep items were added to the ongoing CHOICE survey in 2013. The primary outcomes for the current study were past month bedtimes (weekdays and weekends), total sleep time (TST) (derived from reported bedtimes and waketimes), and a single-item assessing "trouble sleeping" is taken from the Patient Health Questionnaire Somatic Symptom Severity Scale measure.[32] Specifically, the "trouble sleeping" is 1 of 4 response choices for a question which asks: "During the past 4 weeks, how much have you been bothered by any of the following problems?" Given the considerable variability in adolescent sleep patterns during the school week and on the weekends, we analyzed weekday and weekend bedtimes and TST separately.

Past month alcohol and marijuana use

Were assessed using measures well-established with adolescents (eg, California Healthy Kids Survey[33]; Project ALERT.[34]) Past month use was assessed with the item: "During the past month, how many days did you drink at least 1 full drink of alcohol or use marijuana?" ("0" to "20-30 days"). We constructed 2 dichotomous measures to indicate any drinking or marijuana use in the past month. Consistency and reliability of these measures have been shown in numerous studies.[30,35]

Analytic strategy

Sample descriptives and analyses of variance or cross-tabs were conducted for age, sex, sociodemographic characteristics as well as sleep and AM use. Given the unique opportunity to explore racial/ethnic differences, which is critical to inform targeted intervention efforts, we conducted logistic regression models for the total sample and separately by each racial/ethnic category, controlling for age, sex, sociodemographics, an intervention school indicator (0/1), and mental health symptoms. We included race/ethnicity by sleep interactions for all models, and the omnibus test for the interaction term was nonsignificant in all models (analyses available upon request). However, given the unique opportunity with this diverse sample to describe sleep-AM associations in distinct racial/ethnic groups, we report race/stratified models, although results should be considered exploratory and descriptive in nature.

Results

Descriptives for the total sample and for each racial/ethnic category are reported in Table 1. Rates of alcohol use (17% overall) and marijuana use (12% overall) in the past month differed significantly by the different racial/ethnic categories. Non-Hispanic white respondents reported the most drinking (26%) and marijuana use (18%), whereas Asian respondents reported the least amount of past month alcohol or marijuana use (9% and 5%, respectively). On average, teens' self-reported bedtime was 11:00 PM during the week; Asian teens stayed up the latest during the week and Hispanic teens went to bed the earliest. On the weekends, the average bedtime was midnight with Asian and "other" racial/ethnic respondents reporting the latest bedtime (12:15 AM). Overall, a majority of respondents reported "not being bothered" by trouble sleeping (53%); however, teens in the "other" racial/ethnic category were the most likely to report being bothered a lot by trouble sleeping (21%).

Sleep problems and alcohol use

In the total sample, later bedtimes (weekdays and weekends) and shorter TST (weekdays and weekends) were independently associated with increased risk for alcohol use in the past month (Table 2), even after controlling for covariates. For every 10 minutes later that respondents went to bed, there was a 4% (weekday) or 6% (weekend) increase in the odds of past month alcohol use. Similar associations held across all race/ethnic categories for weekend bedtimes, but for weekday bedtimes, the exploratory stratified models indicated that this association was not statistically significant for Asians. In the total sample, longer TST on either the weekends or weekdays was significantly associated with a lower likelihood of past month alcohol use. In the exploratory stratified models, however, longer weekend TST for those reporting "other" race/ethnicity and weekday TST for non-Hispanic whites was significantly associated with a lower likelihood of past month alcohol use. Finally, in the overall sample, we found that trouble sleeping was significantly associated with greater past month alcohol use. Teens who were bothered by trouble sleeping "a little" or "a lot" were 28% or 55%, respectively, more likely to have used alcohol in the past