The impact of short sleep duration on five latent classes among adolescents with distinct mental and behavioral health profiles

Daphne Lew, MPH[1], Hong Xian, PhD[1], Travis Loux, PhD[1], Zhengmin Qian, PhD[1], Michael Vaughn, PhD[2]

[1] Department of Epidemiology and Biostatistics, College for Public Health and Social Justice, Saint Louis University
[2] School of Social Work, College for Public Health and Social Justice, Saint Louis University

SAINT LOUIS UNIVERSITY
COLLEGE FOR PUBLIC HEALTH AND SOCIAL JUSTICE

Introduction

There are many well-known risk and protective factors associated with specific adolescent risk-taking behaviors and adverse mental health outcomes. These risk-taking behaviors and mental health outcomes are known to co-occur. However, little has been done to characterize the co-occurrence of different types of adverse outcomes and examine factors impacting these outcomes.

Short sleep duration is associated with many adverse outcomes among adolescents. The CDC recommends that adolescents (age 12 – 17) sleep an average of 8 hours or more per night. Nearly two-thirds of adolescents in the US do not meet these recommendations.

Research Questions

I. Are there latent classes of adolescents with distinct mental and behavioral health profiles?
II. Is short sleep duration differentially associated with these classes?

Data and Analytic Sample

Data source

- Youth Risk Behavior Surveillance System 2015 data
- Nationally-representative survey data collected by the CDC from 9th-12th grade students (n = 15,624)
- Removed observations with missing data for demographic covariates (gender, grade, sexual identity, race, and BMI percentile) or short sleep duration variable (n = 12,581)

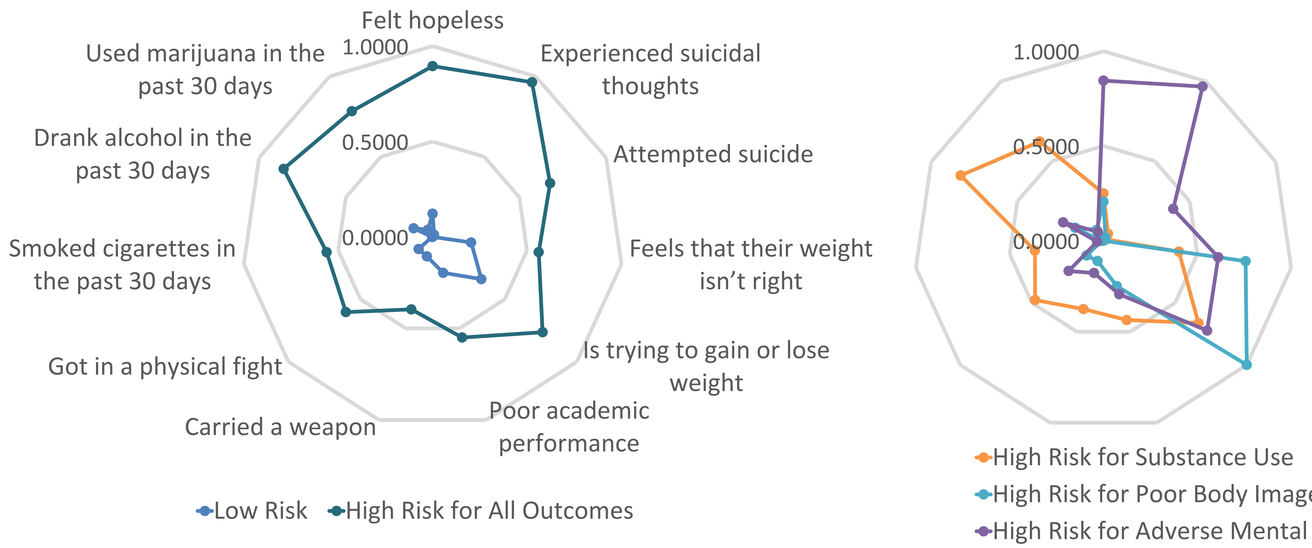
Propensity score matching

- Calculated propensity scores for short sleep duration based on demographic covariates
- Utilized a one-to-one matching algorithm to match individuals with sufficient sleep to those with short sleep duration, based on propensity scores (n = 7,350)

Analytic Methods

- Propensity score matching was performed to ensure covariate balance between sleep duration groups, in order to simulate conditions of a randomized trial
- Latent class analysis (LCA) was used to identify distinct profiles of adolescent behavior and mental health
- Multinomial logistic regression was used to determine whether short sleep duration (< 8 hours per night) is associated with membership in the latent classes
- All analyses were performed in R software version 3.3.2

Figure 1. Radar Plots of Item Endorsement Probabilities for each LCA class



Results

Adolescents' mental health and behavioral outcomes can be classified into five specific profiles: low risk, high risk for adverse mental health, high risk for poor body image, high risk for substance use, and high risk overall.

Individuals reporting less than 8 hours of sleep per night have significantly increased odds of being in any of the high risk classes when compared to their peers reporting sufficient sleep.

Among students reporting short sleep duration, odds of being in the high risk overall class are significantly higher than odds for the body image and substance use risk classes.

Table 1. Adjusted** odds of class membership for students reporting short sleep duration

	Odds ratio	95% CI
Low risk	Reference	
High risk for poor body image*	1.32	(1.17, 1.49)
High risk for adverse mental health*	1.78	(1.50, 2.13)
High risk for substance use*	1.38	(1.21, 1.57)
High risk for all outcomes*	2.47	(1.96, 3.11)

CI: confidence interval
* Statistically significant at α= 0.05
** Adjusted for age, grade, sexual identity, race, and BMI percentile

Discussion and Implications

Future studies should examine the direction of causation between sleep and co-occurring adverse outcomes among adolescents to identify the specific mechanism of association.

Strengths: large sample size, propensity score matching, use of LCA to identify classes of adolescents with co-occurring adverse outcomes

Limitations: no measure of socio-economic status, residual confounding, self-reported data may lead to misclassification

Improving the health and well-being of adolescent's is one of the nation's newest *Healthy People 2020* goals.

Practitioners working to improve the overall health and well-being of adolescents may benefit from emphasizing the importance of sufficient sleep, especially among those individuals exhibiting multiple risk behaviors.