The Association Between Sleep Duration and Mental Health Among U.S. High School Students

Han Shin | QAC 201 | Wesleyan University

Introduction

- Mental health among U.S. adolescents is a growing concern, with many students experiencing stress, anxiety, and depressive symptoms during their high school years.
- Adolescence is a critical developmental period — physically, mentally, and cognitively — in which sleep plays an essential role in emotional stability, mood regulation, and daily functioning.
- Research suggests that sleep problems are common among adolescents, with many experiencing insufficient or poor-quality sleep on a regular basis (Howarth & Miller, 2024; Sexton-Radek, 2025).
- Studies show that adolescents with poorer sleep quality consistently report worse mental health outcomes compared to those with healthier sleep patterns (Tokur-Kesgin & Kocoglu-Tanyer, 2021; Muller et al., 2023).

Research Question

- Is getting less sleep associated with worse mental health outcomes among U.S. high school students?
- Do health-related behaviors — screen time, physical activity, and breakfast consumption — further explain mental health outcomes beyond sleep alone?

Methods

Data Source

- Adolescent Behaviors and Experiences Survey (ABES) — a nationally representative survey conducted by the Centers for Disease Control and Prevention (CDC).
- Survey collected self-reported data from students in grades 9–12 attending public and private high schools across the U.S.

Sample

- Final analytic sample: N = 7,705 students who provided complete responses on all key measures.
- Unit of analysis: the individual student.

Measures

- Mental Health (Q85): How often was mental health not good in the past 30 days? Includes experiences of stress, anxiety, and depression. Coded 0 = good mental health, 1 = poor mental health.
- Sleep Duration (Q86): Average hours of sleep on a school night. Coded 0–6.
- Screen Time (Q78): Daily hours on electronic devices for non-schoolwork activities (watching videos, playing games, social media). Coded 0–5.
- Physical Activity (Q77): Number of days physically active for at least 60 minutes in the past 7 days. Coded 0–7.
- Breakfast Consumption (Q76): Number of days breakfast was eaten in the past 7 days. Coded 0–7.

References

Howarth & Miller (2024). Sleep, sleep disorders, and mental health: A narrative review. Heart and Mind, 8(3), 146–158.

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Sexton-Radek, K. (2025). Sleep factors affecting mental health: Mechanics and trigger factors. Frontiers in Sleep, 4, 1441521.

Tokur-Kesgin, M., & Kocoglu-Tanyer, D. (2021). Pathways to adolescents' health: chronotype, bedtime, sleep quality and mental health. Chronobiology International, 38(10), 1441–1448.

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Results

Univariate

- Most students (approximately 56%) reported getting 6–8 hours of sleep on a school night (Fig. 2).
- About 29% of students reported that their mental health was poor most of the time or always during the past 30 days (Fig. 1).

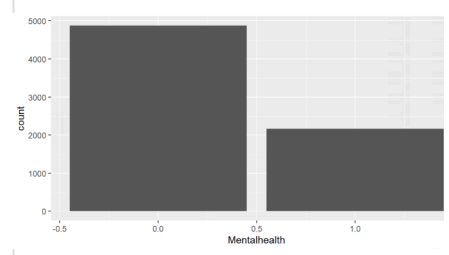

Figure 1. Distribution of Mental Health (0 = good, 1 = poor mental health)

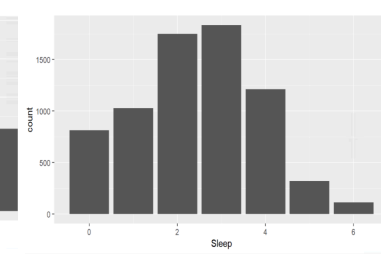

Figure 2. Distribution of Sleep Duration (0 = ≤4 hrs per night … 6 = 10+ hrs per night)

Bivariate — Chi-Square Test of Independence

A chi-square test revealed that sleep duration and mental health were significantly associated in the ABES sample, **$\chi^2 = 401.5$, df = 6, $p < .0001$.** Students reporting lower sleep levels were **significantly more likely to report poor mental health,** suggesting a strong relationship between sleep duration and mental health outcomes.

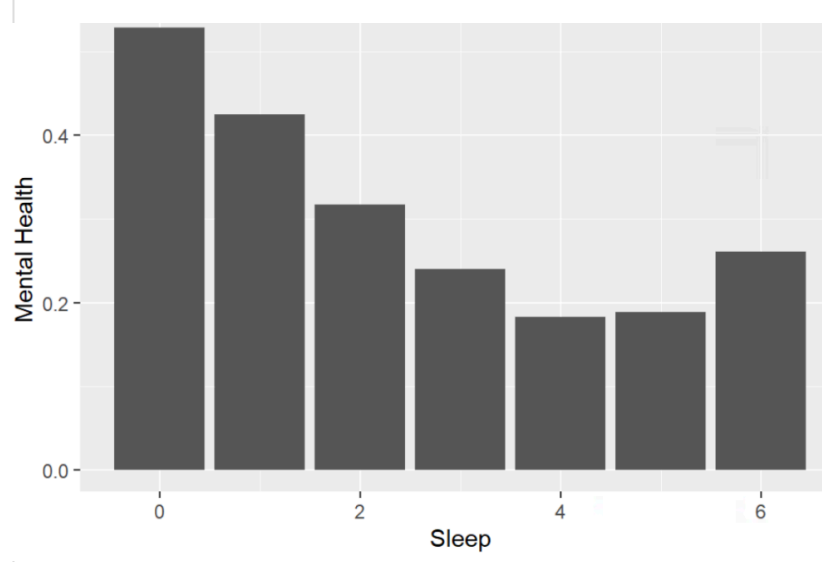

Figure 3. Proportion of students reporting poor mental health by sleep duration level (0 = ≤4 hrs/night … 6 = 10+ hrs/night). A higher bar indicates a greater proportion of students at that sleep level reporting poor mental health.

Post-Hoc Results

- Significant differences in mental health rates existed between most lower sleep groups — those sleeping the least had notably worse mental health outcomes than those sleeping more (Fig. 3).
- Significant differences were also observed between several adjacent sleep groups (e.g., sleep levels 1 vs. 2 and 2 vs. 3), indicating that each additional hour of sleep at lower levels matters meaningfully for mental health.
- Differences between many higher sleep categories (3 vs. 5, 3 vs. 6, 4 vs. 5, 4 vs. 6, and 5 vs. 6) were not statistically significant — indicating that mental health outcomes become more similar once students reach moderate-to-high levels of sleep.
- These findings suggest a threshold effect: gains in mental health are greatest when moving from very low to moderate sleep levels, with diminishing returns at higher sleep levels (Fig. 3).
- The non-significant differences among higher sleep groups also highlight the importance of ensuring students reach at least a moderate level of sleep, as even moving from very poor to adequate sleep is associated with substantial improvements in mental health.

Multivariate Results

Linear Regression

Sleep (Beta = −0.073, CI: −0.080, −0.065, $p < .001$) was **significantly and negatively associated with mental health.** On average, for each additional unit increase in sleep duration, mental health scores decreased by 0.073 units — indicating improved mental health outcomes (Fig. 4). When physical activity was added as a third variable, it did not substantially alter the relationship between sleep and mental health.

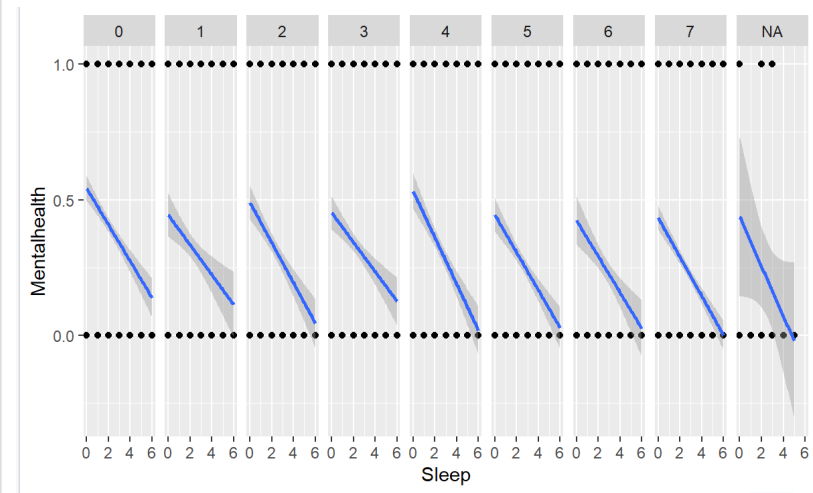

Figure 4. Mental health by sleep duration, faceted by physical activity level (0–7 active days per week). Each panel represents one level of physical activity. The consistent downward slope across all panels confirms that more sleep is associated with better mental health regardless of physical activity level.

Logistic Regression — Predicting Poor Mental Health

After controlling for screen time, physical activity, and breakfast consumption:

- Sleep (O.R. = 0.74, CI: 0.72–0.78, $p < .001$): Each additional level of sleep duration is associated with a 26% reduction in the odds of reporting poor mental health, holding all other variables fixed (Fig. 4).
- Screen Time (O.R. = 1.16, CI: 1.12–1.21, $p < .001$): Each additional level of daily screen time is associated with 16% higher odds of reporting poor mental health, holding all other variables fixed.
- Breakfast Consumption (O.R. = 0.91, CI: 0.90–0.94, $p < .001$): Students who eat breakfast more frequently have lower expected odds of reporting poor mental health, holding all other variables fixed.
- Physical Activity (O.R. = 0.95, CI: 0.93–0.97, $p < .001$): Students who are more physically active have lower expected odds of reporting poor mental health, holding all other variables fixed.

Discussion

- Sleep duration is a significant and independent predictor of adolescent mental health — students who sleep less are substantially more likely to report poor mental health outcomes (Figs. 3 & 4).
- The association between sleep and mental health persisted after controlling for screen time, physical activity, and breakfast consumption, suggesting that sleep has a unique and direct effect on mental health beyond other health behaviors.
- Screen time was negatively associated with mental health outcomes (Fig. 4), consistent with existing literature linking high screen use to poorer sleep quality and worse psychological well-being among adolescents.
- Physical activity and regular breakfast consumption were both found to be protective factors for mental health, consistent with broader literature on health behavior and adolescent well-being.
- These findings support school-based interventions that promote healthy sleep habits, reduce recreational screen time, and encourage physical activity and regular breakfast consumption among adolescents.