

# Adolescent Sleep and Mental Health Across Race/Ethnicity: Does Parent-Child Connectedness Matter?

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**ABSTRACT:** *Objective:* Sleep is vital for healthy development, yet most adolescents do not meet recommended nightly hours. Although racial/ethnic minorities often experience relatively worse sleep outcomes compared with White peers, little is known about how the sleep-mental health relationship holds across diverse groups or how family relationships affect this association. *Method:* Using data on 8th, 9th, and 11th grade public school respondents to the 2016 Minnesota Student Survey (N = 113,834), we conducted univariate, bivariate, and multivariate analyses to examine whether sleep duration was associated with depressive symptoms, suicide ideation, and suicide attempt, adjusting for sociodemographic covariates. Furthermore, we examined the effect of the parent-child connectedness by sleep interaction on these relationships. Analyses were conducted for 9 racial/ethnic groups collectively and separately. *Results:* Overall, youth sleep duration and parent-child connectedness were independently associated with reduced rates of depressive symptoms, suicide ideation, and suicide attempt. There was significant interaction between parent-child connectedness and sleep, demonstrating that connectedness magnifies the benefits of the sleep-mental health relationship. Main effects of sleep and parent-child connectedness for mental health were similar for most individual racial/ethnic groups, although magnitudes varied. The connectedness-sleep interaction only remained significant for White and Asian youth on select suicide-related outcomes. *Conclusion:* Despite racial/ethnic differences, adolescent sleep and parent-child connectedness both seem to buffer youth from poor mental health in a large, multiethnic sample. On the whole, these factors demonstrate a synergistic protective effect and reflect promising intervention targets. The extent to which their interactive benefit translates across diverse populations requires additional study.

(*J Dev Behav Pediatr* 00:1–9, 2021) **Index terms:** sleep, adolescent health, parent-child relations, race factors, minority health.

**A**dequate sleep is essential for cognitive, socioemotional, and physical health throughout adolescence.<sup>1,2</sup> However, many adolescents experience disruptions to normative sleep-wake patterns and shorter sleep duration compared with children in younger age groups. Indeed, national data indicate that 73% of US high school adolescents do not get the recommended 8 to 10 hours of sleep per night advised by the American Academy of Sleep Medicine.<sup>1</sup> Furthermore, there are concerning disparities in sleep du-

ration and quality for minority youth compared with their White counterparts.<sup>3,4</sup> Health and education sectors have thus accorded particular attention to understanding and intervening on the determinants of inadequate sleep during this developmentally sensitive period, including features of family systems, to optimize long-term academic, health, and socioeconomic outcomes.<sup>2,5</sup>

A robust line of evidence has documented associations between sleep duration, consistency, and quality with young people's emotional and behavioral states. Adolescents who face trouble falling and staying asleep experience greater subsequent risk of suicidal thoughts and behaviors.<sup>6</sup> Inadequate sleep may lead to depressive symptomatology, potentially through physiologic pathways, such as alterations to hypothalamus-pituitary-adrenal axis functioning<sup>7</sup> or neural reward circuitry,<sup>8</sup> or through social-behavioral pathways, such as impaired academic performance<sup>9</sup> or low daytime energy.<sup>9</sup> Adding to the complexity, others have proposed that adolescent sleep behavior may mediate deficits in innate neurobiological characteristics (e.g., inhibitory control) and consequent internalizing or externalizing behavior problems.<sup>10</sup> Finally, both sleep and mental health may be affected by a common influential factor, such as family socioeconomic disadvantage<sup>11</sup> or impairments to brain regions governing mood and arousal.<sup>12</sup>

Irrespective of the precise mechanism, the literature remains unequivocal that intervening on adolescent

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Received October 2020; accepted February 2021.

This study was supported by the Max Seham Award, University of Minnesota Department of Pediatrics to M. So; grant #R305A180265, US Department of Education Institute of Educational Sciences to A. J. Barnes; and grant #T73MC12835, US Health Resources and Services Administration to A. J. Barnes and A. D. Langenfeld.

The research presented in this paper is that of the authors and does not reflect the views or opinions of the US Departments of Education or Health and Human Services. A preliminary version of this analysis was presented at the Society for Adolescent Health and Medicine and the Society for Developmental and Behavioral Pediatrics 2020 Annual Meetings.

Disclosure: The authors declare no conflict of interest.

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sleep can foster mental health, prevent mental illness, and improve functioning.<sup>2,12,13</sup> Although actions to promote adolescent sleep typically address factors germane to individuals (e.g., sleep hygiene and caffeine),<sup>13,14</sup> targeting of broader determinants across the social ecology remains a gap in research and practice. A robust body of literature has shown that the presence of caring, responsive relationships between parents and adolescents can buffer the mental health impacts of adverse circumstances, in some cases even attenuating neurophysiologic disturbances that arose from early life stressors.<sup>15,16</sup> However, it remains to be seen whether parent-child connectedness or a sense of emotional security confers similar benefits for the sleep-mental health relationship. As others note, services or programs endeavoring to enhance adolescent sleep need to take family systems into account, given most adolescents' reliance on caregivers for material and social support, and the reciprocal effects of family and household environment on youth sleep behavior.<sup>14,17</sup>

As efforts to augment adolescent sleep expand, emphasis must be given to racial-ethnic minorities, many of whom bear an outsized burden of sleep problems that emerge early in life.<sup>3</sup> These differential sleep outcomes have been linked to household (e.g., family functioning) and neighborhood (e.g., police contact) contexts that typically differ by race/ethnicity.<sup>4,11</sup> Although differences in the adolescent mental health disorder prevalence by race/ethnicity vary depending on the condition, definition (e.g., diagnosis vs symptom), informant, and other factors,<sup>18,19</sup> it is clear that minority youth often encounter barriers to accessing mental health services, accentuating the urgency of promoting sleep and mental health across a broad range of communities.<sup>18</sup> Of note, intervention evaluations for ethnically diverse groups remain nascent,<sup>3</sup> with some studies raising the concern that the effectiveness of available programs may not generalize beyond non-Hispanic White communities.<sup>20,21</sup> Investigations with large, representative samples are needed to clarify the extent to which the sleep-mental health relationship holds across diverse subpopulations and probe for differential effects by sociodemographic characteristics.

This study sought to understand the association between sleep duration and mental health outcomes among adolescents and characterize this relationship across a diverse set of racial-ethnic categories. In addition, with an interest in the prevention of adverse mental health outcomes, we examined whether parent-child connectedness moderated this association.

## METHODS

### Data Source

We conducted a secondary analysis of data from the 2016 Minnesota Student Survey (MSS), a triennial statewide survey of adolescents attending public, charter, and tribal schools.<sup>22</sup> The English-language survey asks about a range of risk and protective factors for healthy adolescent development in both online and paper formats. In

2016, every public school in Minnesota was recruited, with 85.5% deciding to participate. Both parents and youth were informed of survey administration dates through letters sent home in English, Spanish, Somali, and Hmong, and both were given the opportunity to opt-out. At participating schools, all students were invited to take the survey, including those with disabilities; accommodations were made in compliance with federal and state educational laws such as screen-readers and text-to-speech options (Ann Kinney, PhD, e-mail communication, January 2021). The MSS Interagency Team eliminates surveys with highly inconsistent or exaggerated responses (1.6% of 8th, 1.8% of 9th, and 2.2% of 11th grade respondents).<sup>22</sup>

## Measures

### Sleep Duration

Respondents reported on the number of hours they slept "during typical school nights" on a 7-point ordinal scale, ranging from "4 hours or less" to "10 or more hours."

### Depressive Symptoms

The MSS contains 2 items from the Patient Health Questionnaire-2, a validated instrument widely used as an initial screen for potential depressive symptoms.<sup>23</sup> Items reflect core symptoms of depression, asking how often youth had been bothered by "little interest or pleasure in doing things" and "feeling down, depressed, or hopeless," scored from 0 (not at all) to 3 (nearly every day). They were then summed to obtain an overall score of 0 to 6 ( $\alpha = 0.80$ ). We used a cutoff of  $\geq 3$  to classify adolescents with symptoms suggestive of depression who would merit more thorough evaluation. This choice was made to optimize sensitivity and specificity among adolescents (74% and 75%, respectively<sup>24</sup>). The instrument's internal consistency and validity among this age group have been detailed elsewhere.<sup>24</sup>

### Suicidal Thinking and Suicide Attempt

Youth responded to 2 questions related to suicide. As done previously,<sup>25</sup> youth who responded "yes, during the last year" to "Have you ever seriously considered attempting suicide?" or "Have you ever seriously actually attempted suicide?" were classified as reporting suicidal thinking and suicide attempt, respectively. For both questions, youth providing any other response ("no," "yes, over a year ago") were categorized as not reporting suicidal thinking or suicide attempt.

### Parent-Child Connectedness

Youth responded to 2 questions about their relationships with their parents, "Can you talk to your father about problems you are having?" and "Can you talk to your mother about problems you are having?" Respondents were categorized as having high parent-child connectedness if they answered "yes, most of the time," or "yes, some of the time" to either question. Respondents that replied with other response options ("no, not very often," and "no, not at all") were categorized as having low parent-child connectedness, consistent with previous MSS work.<sup>25</sup>

## Demographics

We used MSS items collected on youth sociodemographic characteristics, including dichotomous variables for sex, grade, and poverty status (operationalized based on the receipt of free/reduced-price lunch). To characterize the region, we classified respondents as living in the 7-county Twin Cities metropolitan area versus all other rural and nonmetropolitan areas in Minnesota. Determinations for these variables were made based on previous MSS studies.<sup>16,25</sup> Four questions on students' self-described race and ethnicity were used to create 9 mutually exclusive groups: White, Black, Hispanic/Latinx, Asian, American Indian or Alaska Native, Pacific Islander, Hmong, Somali, and Multiracial.

## Statistical Analysis

We restricted our analytic sample to public school 8th, 9th, and 11th graders with valid responses for our key independent and dependent variables; we excluded fifth graders because they were not asked about suicidality. We calculated univariate and bivariate statistics and multivariate logistic regressions to examine whether average school night sleep duration was independently associated with depressive symptoms, suicidal thinking, and suicide attempt. We confirmed the data set's normality of distribution using quantile-quantile plots. There was less than 6% missingness for our set of variables, which we handled using full information maximum likelihood estimation. Multivariate models were adjusted for child age, sex, region, and poverty; covariates were selected based on theoretical potential to confound associations between independent and dependent variables as documented elsewhere.<sup>17,19,26</sup> Furthermore, we included an interaction term in final models to test whether parent-child connectedness moderated the putative association between sleep duration and each outcome. Models were run for average effects in the overall sample and each racial/ethnic group separately. We conducted 2-tailed analyses using Mplus version 8 (Muthén & Muthén, Los Angeles, CA) and set a significance level at 0.05.

The University of Minnesota Institutional Review Board deemed this study exempt from human subjects review.

## RESULTS

### Overall Findings

Descriptive statistics of the analytic sample are described in Table 1, overall and by depressive symptoms, suicidal thinking, and suicide attempt ( $N = 113,834$ ). Relative proportions of racial/ethnic groups ranged from 0.2% (Pacific Islander) to 71.0% (White) of the sample. Most respondents slept less than 8 hours per night (62.3%) and reported a high degree of parent-child connectedness (90.2%), with variation by race/ethnicity (Fig. 1). The proportion of youth sleeping less than 8 hours on average ranged from 48.1% (Somali) to 68.3% (Hmong); rates of high parent-child connectedness

ranged from 75.9% (Hmong) to 92.4% (White). Bivariate analyses indicated significant associations between certain demographic characteristics (sex, race/ethnicity, and poverty) with all 3 mental health outcomes (all  $p < 0.01$ ). Student grade level was significantly associated with depressive symptoms ( $p < 0.01$ ) and suicide attempt ( $p < 0.01$ ), and region was significantly associated with contemplating ( $p = 0.03$ ) or attempting suicide ( $p < 0.01$ ). Youth sleep duration and parent-child connectedness both significantly correlated with depressive symptoms, suicidal thinking, and suicide attempt (all  $p < 0.01$ ).

The overall models indicated that sleep duration and parent-child connectedness both were associated with all 3 mental health outcomes, after adjusting for pertinent covariates (all  $p < 0.01$ ; Table 2). With each additional hour in sleep duration, we observed lowered odds for depressive symptoms (−24%), suicidal thinking (−29%), and suicide attempt (−26%). Youth who reported high parent-child connectedness also had lower odds for depressive symptoms (−58%), suicidal thinking (−55%), and suicide attempt (−56%). The overall models also showed that girls (compared with boys) and youth living in poverty (compared with those not in poverty) were more likely to demonstrate each negative mental health outcome. The parent-child connectedness by sleep interaction was significantly correlated with depression, such that for youth who report high parent-child connectedness, each additional hour of sleep decreased the estimated odds of depressive symptoms by 27%, whereas unit increases in sleep for youth with low parent-child connectedness decreased odds by 24% ( $p = 0.05$ ). A similar pattern was observed for the other outcomes, with unit increases in sleep duration reducing the odds for suicidal thinking ( $p < 0.01$ ) and suicide attempt ( $p < 0.01$ ) to a greater extent for youth with high parent-child connectedness compared with youth with low parent-child connectedness (Table 2).

### Findings by Race/Ethnicity

Certain racial/ethnic groups evidenced disproportionate over-representation for each of the adverse mental health outcomes relative to their share of the population, including American Indian or Alaska Native (AI/AN), Hispanic/Latinx, Multiracial, and Pacific Islander youth. On the other hand, Somali and White youth reported lower rates of depressive symptoms, suicide ideation, and suicide attempt in relation to their population size (Table 1). Similar to the overall sample, increases in sleep duration for Asian, Black, Hispanic/Latinx, Multiracial, and White youth were significantly associated with decrements in depressive symptoms, suicidal thinking, and suicide attempt (all  $p < 0.05$ ; Table 3). Sleep duration was associated with lower odds for depressive symptoms and suicidal attempt among Somali and Hmong youth and lower odds for suicidal thinking and attempt among AI/AN youth (all  $p < 0.05$ ). For

**Table 1.** Descriptive Statistics by Mental Health Outcomes in a Statewide Survey of Adolescents' Grades 8, 9, and 11—Minnesota, 2016

Variable	Overall Sample	Depressive Symptoms		Suicidal Thinking		Suicide Attempt	
	n (%)	n (%)	Test Statistic <sup>c</sup>	n (%)	Test Statistic <sup>c</sup>	n (%)	Test Statistic <sup>c</sup>
Sex			$\chi^2: 27.3^{**}$		$\chi^2: 75.1^{**}$		$\chi^2: 96.6^{**}$
Male	56,541 (49.7)	9,345 (38.1)		4,131 (30.7)		1,153 (28.3)	
Female	57,293 (50.3)	15,185 (61.9)		9,319 (69.3)		2,928 (71.8)	
Grade			<i>F</i> : 19.1 <sup>**</sup>		<i>F</i> : 366.2		<i>F</i> : 20.6 <sup>**</sup>
8th	40,515 (35.6)	8,315 (33.9)		4,720 (35.1)		1,519 (37.2)	
9th	40,302 (35.4)	8,690 (35.4)		4,771 (35.5)		1,509 (37.0)	
11th	33,017 (29.0)	7,525 (30.7)		3,959 (29.4)		1,053 (25.8)	
Poverty <sup>a</sup>			$\chi^2: 19.0^{**}$		$\chi^2: 19.2^{**}$		$\chi^2: 65.2^{**}$
In poverty	30,764 (27.0)	8,842 (36.1)		4,856 (36.1)		1,809 (44.3)	
Not in poverty	83,070 (73.0)	15,688 (64.0)		8,594 (63.9)		2,272 (55.7)	
Region			$\chi^2: 0.0^{**}$		$\chi^2: 0.2^*$		$\chi^2: 2.5^{**}$
7-county Twin Cities	59,763 (52.5)	12,972 (52.9)		6,946 (51.6)		2,000 (49.0)	
Greater Minnesota	54,071 (47.5)	11,558 (47.1)		6,504 (48.4)		2,081 (51.0)	
Race/ethnicity			<i>F</i> : 315.1 <sup>**</sup>		<i>F</i> : 304.0 <sup>**</sup>		<i>F</i> : 52.9 <sup>**</sup>
AI/AN	1,335 (1.2)	397 (1.6)		252 (1.9)		124 (3.0)	
Asian	3,811 (3.4)	865 (3.5)		420 (3.1)		100 (2.5)	
Black	4,734 (4.2)	1,187 (4.8)		547 (4.1)		208 (5.1)	
Hispanic or Latinx	10,455 (9.2)	2,741 (11.2)		1,526 (11.4)		666 (16.3)	
Hmong	2,741 (2.4)	788 (3.2)		324 (2.4)		86 (2.1)	
Multiracial	8,354 (7.3)	2,421 (9.9)		1,519 (11.3)		528 (12.9)	
Pacific Islander	168 (0.1)	49 (0.2)		26 (0.2)		15 (0.4)	
Somali	1,416 (1.2)	246 (1.0)		71 (0.5)		25 (0.6)	
White	80,820 (71.0)	15,836 (64.6)		8,765 (65.2)		2,329 (57.1)	
Sleep duration			$\chi^2: 44.7^{**}$		$\chi^2: 71.7^{**}$		$\chi^2: 75.4^{**}$
Less than 8 hr	70,951 (62.3)	18,661 (76.1)		10,694 (79.5)		3,261 (79.9)	
8 hr or more	42,883 (37.7)	5,869 (23.9)		2,756 (20.5)		820 (20.1)	
Parent-child connectedness <sup>b</sup>			$\chi^2: 48.7^{**}$		$\chi^2: 95.7^{**}$		$\chi^2: 143.7^{**}$
High connectedness	102,673 (90.2)	19,366 (79.0)		9,854 (73.3)		2,794 (68.5)	
Low connectedness	11,161 (9.8)	5,164 (21.1)		3,596 (26.7)		1,287 (31.5)	
Total	113,834	24,530	—	13,450	—	4,081	—

\* $p < 0.05$ , \*\* $p < 0.01$ . <sup>a</sup>Youth were classified as being in poverty if they responded "yes" to currently receiving free or reduced-price lunch at school; all other youth were classified as not in poverty. <sup>b</sup>Youth were classified as having high connectedness if they responded, "yes, all of the time" or "yes, most of the time" to 1 or both of 2 questions asking if they could talk to their mother or father about problems they were having; all other youth were classified as having low connectedness. <sup>c</sup>Based on comparisons to the overall sample using  $\chi^2$  (for binary variables) and 1-way analysis of variance tests (for categorical variables). AI/AN, American Indian/Alaska Native.

Pacific Islanders, sleep duration was not significantly associated with any mental health outcome.

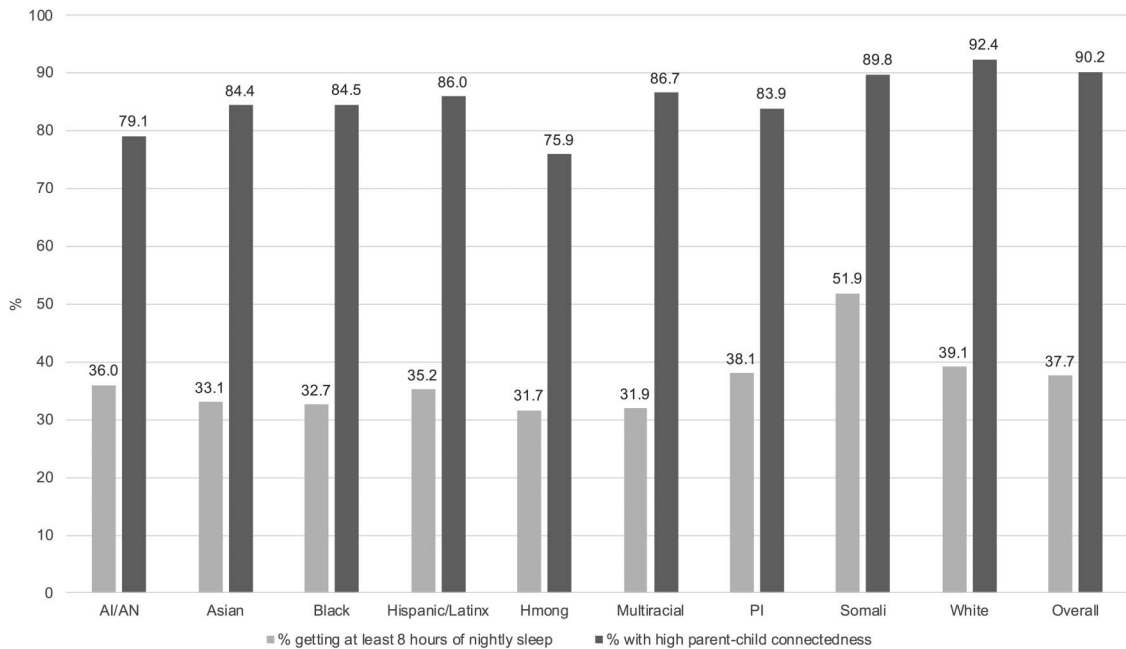
Having high parent-child connectedness also demonstrated inverse associations for mental health outcomes in various racial/ethnic groups. Specifically, relative to their peers with low connectedness, AI/AN youth with high parent-child connectedness observed reduced odds for suicidal thinking and attempt (both  $p < 0.01$ ). Hmong and Somali youth with high parent-child connectedness demonstrated decreased odds for depressive symptoms and suicide attempt, compared with counterparts with low connectedness (both  $p < 0.01$ ). For Pacific Islander youth, connectedness correlated with suicide attempt only ( $p < 0.01$ ). For Hispanic/Latinx, Black, Asian, Multiracial, and White youth, high parent-

child connectedness was associated with reduced odds for all 3 outcomes (all  $p < 0.01$ ).

Within-group analyses by race/ethnicity showed that the parent-child connectedness by sleep interaction was significant only for White (for suicidal thinking and suicide attempt; both  $p < 0.01$ ) and Asian (for suicide attempt;  $p = 0.02$ ) youth. As above, this finding indicates that within these 2 groups, high parent-child connectedness moderates the effect for certain mental health outcomes as sleep duration increases.

## DISCUSSION

Drawing from a statewide sample of public school students, we documented the prevalence of, and relationships between, adolescent sleep, parent-child



**Figure 1.** Proportion of youth getting at least 8 hours of nightly sleep and with high parent-child connectedness by race/ethnicity in a statewide survey of adolescents' grades 8, 9, and 11—Minnesota, 2016. AI/AN, American Indian or Alaska Native; PI, Pacific Islander.

connectedness, and key mental health outcomes. The analysis revealed that sleeping less than 8 hours on school nights and having high parent-child connectedness are relatively common experiences, both across and within 9 racial/ethnic groups. In addition, multivariate results showed that, holding demographic factors constant, youth who get more hours of nightly sleep or have a parent they can talk to about problems report lower rates of suicide ideation, suicide attempt, and clinically meaningful depressive symptoms. Collectively, our findings corroborate correlational<sup>12,16,26</sup> and longitudinal<sup>7,9,15</sup> relationships observed elsewhere but also surface a novel interaction between sleep duration and parent-child connectedness on depression and suicidality such that the graded relationship between greater sleep and youth mental health is synergistically higher when having a parent they can talk to about problems.

Findings specific to race/ethnicity indicated that for most groups, sleep duration had a negative association with depressive symptoms (7 of 9 groups), suicidal thinking (6 of 9 groups), and suicide attempt (8 of 9 groups); a similar pattern was found for connectedness with these outcomes. Thus, although there is sociocultural diversity in conceptions and practices surrounding sleep and adult-youth relationships, these elements largely seem to be important for the mental health of adolescents. The populations that did not show significant associations for certain outcomes were the smallest subgroups (American Indian or Alaska Native [AI/AN], Pacific Islander, Somali, and Hmong) and still demonstrated the expected inverse direction of effect, which could suggest that null findings are a function of insufficient statistical power. For the parent-child connectedness by sleep interaction, only White and Asian

groups experienced significant effect modification for suicide-related outcomes. The lack of significant interaction for other groups might again be due to underpowered analyses or the presence of other contextual factors that supersede parent-child relationships' protective influence on mental health.<sup>20,27</sup> Nonetheless, studies on the adolescent sleep-mental health relationship among non-White populations remain scarce<sup>3,28</sup>—a striking gap in light of inequities both in mental health burden among, and responsive programs for, racial/ethnic minority youth.<sup>21</sup> This study lays the epidemiologic groundwork for necessary additional studies to distinguish the mechanisms underlying differences, compare against other data sources, and devise both targeted and universal interventions. In particular, studies that more fully characterize mental health outcomes (e.g., by gender) within the smaller ethnic groups would shed light on optimal means for supporting these youth.

### Limitations and Strengths

Our analysis has notable limitations. First, the Minnesota Student Survey (MSS) is a cross-sectional survey limiting our ability to understand temporality or causation. Subsequent research may use causal-oriented approaches, such as path analysis, to more firmly assess directionality and mediators of effects. Qualitative approaches could advance our understanding of the mechanisms by which the factors studied herein operate across and within ethnic groups—for example, in what ways does having a parent to talk to about problems influence depressive and suicidal symptoms?

Second, all data were provided by student self-report, which could have introduced unintended response biases; triangulation of findings against parent and

**Table 2.** Adjusted Odds Ratios (aORs) and Regression Coefficients from Logistic Regressions Predicting Depression, Suicidal Thinking, and Suicide Attempt in a Statewide Survey of Adolescents' Grades 8, 9, and 11—Minnesota, 2016

Model	$\beta$ (SE)	aOR <sup>a</sup> (95% CI)	<i>p</i>
Depression			
Sleep	−0.28 (0.02)	0.76 (0.74–0.78)	<0.01
Sex	0.40 (0.02)	1.49 (1.43–1.56)	<0.01
Age	0.01 (0.01)	1.01 (1.00–1.02)	0.02
Region	−0.01 (0.01)	0.99 (0.96–1.01)	0.35
Poverty	−0.47 (0.01)	0.63 (0.62–0.64)	<0.01
Parent-child connectedness	−0.87 (0.07)	0.42 (0.40–0.44)	<0.01
Parent-child connectedness × sleep	−0.03 (0.02)	0.97 (0.94–1.00)	0.05
Suicidal thinking			
Sleep	−0.34 (0.02)	0.71 (0.69–0.73)	<0.01
Sex	0.41 (0.02)	1.51 (1.43–1.59)	<0.01
Age	0.05 (0.01)	1.05 (1.03–1.07)	<0.01
Region	0.18 (0.02)	1.20 (1.14–1.27)	<0.01
Poverty	−0.55 (0.03)	0.58 (0.56–0.59)	<0.01
Parent-child connectedness	−0.79 (0.07)	0.45 (0.42–0.49)	<0.01
Parent-child connectedness × sleep	−0.10 (0.02)	0.90 (0.87–0.94)	<0.01
Suicide attempt			
Sleep	−0.30 (0.01)	0.74 (0.72–0.76)	<0.01
Sex	0.58 (0.02)	1.78 (1.64–1.92)	<0.01
Age	0.04 (0.01)	1.04 (1.02–1.05)	<0.01
Region	0.12 (0.02)	1.13 (1.09–1.16)	<0.01
Poverty	−0.30 (0.02)	0.74 (0.72–0.76)	<0.01
Parent-child connectedness	−0.81 (0.06)	0.44 (0.42–0.47)	<0.01
Parent-child connectedness × sleep	−0.11 (0.02)	0.90 (0.88–0.93)	<0.01

<sup>a</sup>Adjusted for child age, sex, region (7-county Twin Cities vs Greater Minnesota), and poverty (based on receipt of free/reduced-price lunch). CI, confidence interval.

teacher reports would help substantiate our findings. Relatedly, although we were able to incorporate a validated-screening instrument for depression, objective measures were unavailable for other variables, such as actigraphy to assess sleep. Third, our sample was limited to youth attending public schools present on the day of survey administration, excluding youth in other educational settings (e.g., tribal schools) and conceivably high-risk absent students, such as those with severe functional impairment. Finally, our parent-child connectedness variable addressed relationships between youth with mothers or fathers, which may inadvertently exclude nontraditional families. Relatedly, operationalizing connectedness based on communication alone may not capture other facets of the dyadic relationship (e.g., responsiveness and disciplinary practices<sup>16,29</sup>); the construct as a whole may also vary across cultural contexts.

Despite these concerns, this study offers data from a reputable, population-based sample with a commendable response rate, lending support to the study's external validity. Furthermore, the study expands our understanding of sleep issues in ethnically diverse samples beyond young children<sup>3,30</sup> into the peripubertal

period, when key physiologic and social changes occur. We had sufficient subgroup sizes to characterize the sleep-mental health relationship for groups sometimes unavailable or obscured into an “other” category within reports from state and national surveillance systems, such as the Youth Risk Behavior Survey. Stratifying analyses by race/ethnicity also allowed us to center both needs and strengths of understudied adolescent populations (e.g., AI/AN and Multiracial) in a manner that did not simply model these groups' needs relative to non-Hispanic White peers. Stakeholders that focus on particular ethnocultural groups may therefore find these data valuable in filling knowledge gaps and planning services or supports.

Our findings also add nuance to extant evidence—for example, although Black youth in our sample less often met recommended sleep duration (32.7%), consistent with other literature,<sup>1,3,31</sup> Somali youth more often met them (51.9%). Similarly, Asian and Hmong youth reported distinct prevalence of, and correlations between, key study variables. Such variability may be due to greater representation of refugee families among the Somali and Hmong subpopulations when compared with respective

**Table 3.** Adjusted Odds Ratios and Interaction Regression Coefficients from Logistic Regressions Predicting Depression, Suicidal Thinking, and Suicide Attempt by Race/Ethnicity in a Statewide Survey of Adolescents' Grades 8, 9, and 11—Minnesota, 2016

Racial/Ethnic Category	Depression				Suicidal Thinking				Suicide Attempt			
	Sleep Main Effect	PCC Main Effect	Interaction <sup>b</sup>	β (SE)	Sleep Main Effect	PCC Main Effect	Interaction <sup>b</sup>	β (SE)	Sleep Main Effect	PCC Main Effect	Interaction <sup>b</sup>	β (SE)
	aOR <sup>c</sup> (95% CI)	aOR <sup>c</sup> (95% CI)			aOR <sup>c</sup> (95% CI)	aOR <sup>c</sup> (95% CI)			aOR <sup>c</sup> (95% CI)	aOR <sup>c</sup> (95% CI)		
American Indian/Alaska Native	0.93 (0.79–1.10)	0.63 (0.38–1.07)	–0.10 (0.10)	–0.10 (0.10)	0.73** (0.64–0.83)	0.43** (0.30–0.62)	0.04 (0.12)	0.04 (0.12)	0.79** (0.70–0.89)	0.41** (0.31–0.55)	–0.01 (0.10)	–0.01 (0.10)
Asian	0.74** (0.66–0.82)	0.34** (0.27–0.42)	0.04 (0.08)	0.04 (0.08)	0.67** (0.57–0.77)	0.46** (0.31–0.67)	–0.07 (0.13)	–0.07 (0.13)	0.80** (0.72–0.88)	0.51** (0.39–0.66)	–0.17* (0.07)	–0.17* (0.07)
Black	0.89* (0.79–0.99)	0.63* (0.46–0.87)	–0.07 (0.07)	–0.07 (0.07)	0.80** (0.72–0.88)	0.29** (0.24–0.34)	0.05 (0.09)	0.05 (0.09)	0.82** (0.75–0.89)	0.54** (0.42–0.68)	–0.07* (0.06)	–0.07* (0.06)
Hispanic or Latinx	0.78** (0.72–0.84)	0.48** (0.38–0.60)	0.00 (0.06)	0.00 (0.06)	0.67** (0.62–0.73)	0.39** (0.32–0.46)	0.04 (0.08)	0.04 (0.08)	0.74** (0.69–0.80)	0.46** (0.39–0.54)	–0.04 (0.05)	–0.04 (0.05)
Hmong	0.72** (0.59–0.88)	0.17** (0.14–0.21)	0.17 (0.14)	0.17 (0.14)	0.88 (0.56–1.37)	0.35 (0.17–0.70)	–0.04 (0.28)	–0.04 (0.28)	0.77* (0.62–0.96)	0.29** (0.20–0.40)	–0.03 (0.17)	–0.03 (0.17)
Multiracial	0.75* (0.70–0.80)	0.39** (0.36–0.41)	0.04 (0.05)	0.04 (0.05)	0.78** (0.73–0.83)	0.45** (0.43–0.47)	–0.08 (0.05)	–0.08 (0.05)	0.76** (0.72–0.80)	0.37** (0.35–0.39)	–0.02 (0.04)	–0.02 (0.04)
Pacific Islander	0.67 (0.0–86.39)	0.13 (0.0–12.12)	0.19 (3.72)	0.19 (3.72)	0.95 (0.19–4.72)	0.80 (0.05–13.49)	–0.40 (0.92)	–0.40 (0.92)	0.52 (0.22–1.23)	0.07** (0.04–0.13)	0.27 (0.87)	0.27 (0.87)
Somali	0.77** (0.67–0.88)	0.44** (0.31–0.61)	0.04 (0.10)	0.04 (0.10)	0.84 (0.70–1.00)	1.04 (0.40–2.68)	–0.16 (0.13)	–0.16 (0.13)	0.70** (0.64–0.77)	0.41** (0.32–0.53)	0.03 (0.09)	0.03 (0.09)
White	0.74** (0.72–0.77)	0.38** (0.36–0.41)	–0.04 (0.02)	–0.04 (0.02)	0.69** (0.67–0.72)	0.45** (0.41–0.49)	–0.13** (0.03)	–0.13** (0.03)	0.73** (0.71–0.75)	0.41** (0.39–0.44)	–0.12** (0.02)	–0.12** (0.02)
Overall	0.76** (0.74–0.78)	0.42** (0.40–0.44)	–0.03* (0.02)	–0.03* (0.02)	0.71** (0.69–0.73)	0.45** (0.42–0.49)	–0.11** (0.02)	–0.11** (0.02)	0.74** (0.72–0.76)	0.44** (0.42–0.47)	–0.10** (0.02)	–0.10** (0.02)

\**p* < 0.05; \*\**p* < 0.01; †Adjusted for child age, sex, region, and poverty; ‡PCC by the sleep interaction term; aOR, adjusted odds ratio; CI, confidence interval; PCC, parent-child connectedness.

populations of Black and Asian students. Previous research highlights that several factors, including exposure to traumatic events and challenges in navigating systems postmigration, may be especially salient for forcibly displaced populations. These experiences can situate refugee and refugee-descendant youth within unique risk and resilience profiles that may explain variation observed.<sup>32</sup> Unfortunately, a paucity of items on immigration status precluded us from investigating this idea further. Clearly, analyses that interrogate the intersectionality of race/ethnicity with immigration status along with other important features of young people's lives (e.g., sociocultural norms<sup>29</sup>) are warranted. Our findings also illustrate how traditional approaches within developmental research of broadly aggregating racial categories may conceal the health needs of subcommunities, possibly influencing the allocation of clinical and preventative resources.

### Implications for Providers and Systems

Coupled with insights from longitudinal studies,<sup>7,15</sup> our findings attest that medical and behavioral health providers may be well positioned to leverage sleep and parent-child connectedness as plausible strategies for preventing depression and suicide-related behaviors. This approach is opportune in adolescence and can potentially reinforce healthy development garnered in childhood or rectify previous deficits and maladaptive behaviors. One first step may be for providers to consistently assess for sleep difficulties and family relationship quality as elements of a comprehensive mental health assessment. Although addressing individual knowledge, behavior, and organic etiologies (e.g., parasomnias) is necessary, it is evident that social determinants are prominent drivers of sleep adequacy and can be more challenging for clinicians to overcome.<sup>11</sup> Our results point to connectedness as an intermediary target to address directly or refer for, especially for youth who might otherwise struggle to achieve adequate sleep because of social risks. Structured or unstructured therapeutic models that promote parenting skills and parent-child communication can be considered, as can family-focused interventions delivered within primary care.

Providers must carefully balance acknowledging racial/ethnic disparities in sleep and mental health while remaining cognizant that racial categorizations used here reflect heterogeneous, social constructions.<sup>27</sup> A culturally humble, tailored approach to addressing young people's sleep behaviors and mental health that accounts for race/ethnicity in concert with other identities, such as sexual orientation, is vital for quality, patient-centered care.<sup>31</sup> For instance, one's racial/ethnic identity can serve as an asset for some (e.g., positive racial socialization) while presenting challenges for others (e.g., discrimination); oftentimes, these experiences coexist within individuals and become embodied through implicit and explicit pathways. Mental health interventions adapted to enhance cultural alignment have, on average,

been shown to improve therapeutic outcomes at the population level,<sup>33</sup> but cultural incongruence may not necessarily be the primary barrier to health for a given family. Eliciting a clear picture of how risk and protective factors play out in the lives of youth presenting for care will aid providers in avoiding indiscriminate referral for services, instead offering timely, appropriate supports.

That sleep and parent-child connectedness were interactively protective for population youth mental health deserves consideration by education, health, and social service systems. Adopting upstream programs and policies that aim to narrow these disparities can be a critical target toward healthy youth development and, as our analysis suggests, serve mutually beneficial goals. For example, adolescent mental health systems could facilitate and incentivize interventions to improve parent-child relationship quality or connect youth to supportive adults. Likewise, promotion of healthy sleep through universal school-based curricula or later school start times could yield improvements in population mental health and functioning.<sup>8,9</sup> Findings also underscore the added value of addressing family dynamics and behaviors within sleep promotion activities. Importantly, embedding efforts across the prevention spectrum into communities with greater levels of youth facing adversity or lacking social capital could advance progress on health equity goals.

Finally, any investigation of adolescent health by race/ethnicity would be incomplete without contemplating the impacts of racism at multiple levels. Inequitable policies intended to concentrate disadvantages for racial/ethnic minorities underlie nearly every social determinant of both sleep and mental health (e.g., neighborhood social cohesion<sup>11</sup>) and were likely imperfectly accounted for in our models. Variability in effect sizes by racial/ethnic category may be a function of groups' distinct vulnerability to racism-related exposures. Although operational measures of racial discrimination such as residential segregation were not captured in the MSS, their inclusion into this and other population-based surveys would improve the validity of future inquiries into adolescent health disparities.

## CONCLUSION

Ongoing declines in adolescent sleep and mental health present a challenge for those invested in young people, especially youth of color. Although there were significant differences in adolescent sleep, mental health, and parent-child connectedness by race/ethnicity, our analyses suggest that both adequate sleep and strong relationships between parents and youth may protect against mental health problems and that mental health benefits more fully manifest when both are present. The findings could inform actions to bolster healthful behaviors and relationships during this critical developmental window, potentially translating to health gains lasting into adulthood.

## ACKNOWLEDGMENTS

The authors thank Ann Kinney, PhD, Minnesota Department of Health, for supporting access to the data set and information about the survey's administration.

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