New Mexico Epidemiology

March 29, 2020 Volume 2021, Number 1

Mental Health Indicators and Inadequate Sleep Among New Mexico Youth, 2019

Dylan Pell, MPH, LMSW, Mental Health Epidemiologist
Dan Green, MPH, Survey Epidemiologist
Epidemiology and Response Division
New Mexico Department of Health

The American Academy of Sleep Medicine recommends that youth aged 13-18 sleep 8-10 hours per 24 hours.[1] Inadequate sleep is associated with a variety of mental health symptoms including depression, anxiety, and suicidal ideation.[2–4] Inadequate sleep in youth is a nationwide concern, as 77.9% of U.S. high school students slept fewer than eight hours per night in 2019.[5]

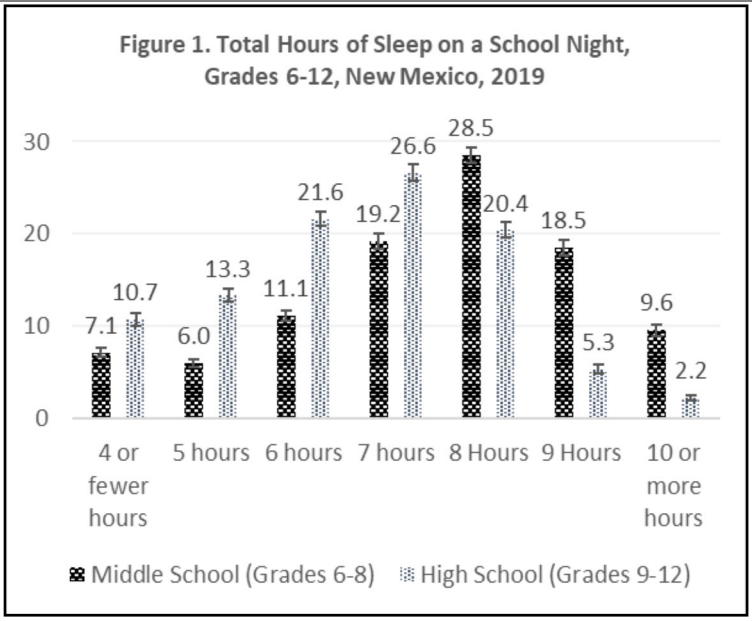
Known causes of inadequate sleep in youth include changes in circadian rhythm patterns as part of adolescent development, youth engaging in excessive screen time such as video games or social media late into the evening, and physical or mental health conditions like asthma, migraines, anxiety, or stress.[4,6] There is also evidence that early school start times are strongly associated with insufficient sleep in youth.[7,8]

Methods

The Youth Risk and Resiliency Survey (YRRS) assesses a variety of health risk behaviors and protective factors among New Mexico public middle school and high school students. The YRRS is part of the national CDC Youth Risk Behavior Surveillance System (YRBSS).[9] The YRRS is administered in the fall semester of odd-numbered years, and data are collected through paper and pencil surveys in school classrooms. The YRRS sample is stratified by school district, and within each school district, schools are selected with probability of selection proportional to school population size (SPP). Selected respondents include all students from systematically selected classrooms within each selected school. The 2019 high school YRRS had 19,227 respondents, with a response rate of 71%. The 2019 middle school YRRS had 19,677 respondents, with a response rate of 74%. In 2019, both the middle school and high school YRRS included one question about hours of sleep per night ("On an average school night, how many hours of sleep do you get?"). The high school survey instrument included six indicators of mental health and suicidal behaviors in the past 12 months: 1) Seriously considered suicide, 2) Planned a suicide attempt, 3) Attempted suicide, 4) Attempted suicide resulting in injury, 5) Felt sad or hopeless, and 6) Engaged in non-suicidal self-injury (intentionally hurting self without intention to die). The middle school survey instrument included three indicators of suicidal behaviors and mental health: 1) Ever seriously considered suicide, 2) Ever planned suicide, and 3) Ever attempted suicide. Descriptive statistics are presented on nightly total sleep (in hours) among students. The associations between total hours of sleep and mental health indicators were measured by calculating unadjusted and adjusted odds ratios with 95% confidence intervals with logistic regression, using the statistical software, Stata. The referent total sleep time chosen for comparisons was nine hours of sleep per night, based on clinical recommendations of 8-10 hours of sleep for youth 13-18 years old.[1] Among high school students, adjusted odds ratios controlled for possible confounding demographic and risk factors including sex, age, race/ethnicity, sexual orientation, gender identity, rural/urban county classification, parent education, drug use, tobacco use, and current alcohol use. These risk factors were selected based on literature supporting a link between the risk factor and both sleep and mental health. Because middle school students did not answer questions about gender identity, sexual orientation, or parent education, adjusted odds ratios among these students controlled only for sex, age, race/ethnicity, drug use, tobacco use, and current alcohol use.

Results

Most high school students (72.1%) slept fewer than eight hours an average school night. 43.4% of middle school students slept fewer than eight hours per night (Figure 1). 23.9% of high school students slept fewer than six hours per night, and 13.1% of middle school students slept fewer than six hours per night.



There was a strong and consistent association between hours of sleep and all mental health indicators. Compared to the referent category of nine hours of sleep per night, there were statistically significant unadjusted odds ratios for all mental health indicators at four or fewer and five hours of sleep per night among both middle school and high school students (Table 1). At six and seven hours of sleep per night, all mental health indicators had statistically significant odds ratios, with the exception among high school students of Indicator 4 (Attempted suicide resulting in an injury, at six and seven hours of sleep) and Indicator 3 (Attempted suicide, at seven hours of sleep). Among high school students who slept 10 or more hours per night, there was a statistically significant odds ratio of greater than one (1) for all indicators except Indicator 5 (Felt sad or hopeless). The largest unadjusted odds ratios for each indicator were for middle school and high school students who slept four or fewer hours per night.

After adjustment, the relationship between hours of sleep and all mental health indicators remained strong and consistent. Compared to the referent category, odds ratios were statistically significant for all 6 mental health indicators at four or fewer hours of sleep per night among both middle school and high school students. Odds ratios were statistically significant for all mental health indicators among both middle school and high school students who slept five or six hours per night, except for Indicator 4 (at six hours per night) among high school students. There was a similar relationship, though with smaller odds ratios, for all indicators at seven hours of sleep per night, except for Indicator 3 (Ever attempted suicide) among middle school students, and Indicator 3 (Attempted suicide) and Indicator 4 (Injured in a suicide attempt) among high school students. For high school students who slept 10 or more hours per night, there were significant odds ratios greater than one (1) for Indicator 1 (Considered suicide) and Indicator 2 (Planned suicide) among high school students. The largest adjusted odds ratios were for high school students who slept four or fewer hours per night, for Planned suicide (OR = 4.9) and Considered suicide (OR = 4.5) (Figure 3).

The largest unadjusted and adjusted odds ratios for all mental health indicators in both high school and middle school were seen for those students who slept four or fewer hours per night, followed by those who slept five or fewer hours and six or fewer hours of sleep per night. Seven hours of sleep was associated with significant risk for the majority of mental health indicators for all students. Among both middle school and high school students, Indicator 2 (Ever planned suicide/Planned suicide) and Indicator 1 (Ever considered suicide/Considered suicide) had the largest adjusted and unadjusted odds ratios (Table 1 and 2).

Discussion

Data from a representative sample of New Mexico high school and middle school students demonstrate that youth who slept fewer than eight hours per night were at a higher risk of feeling sad or hopeless, engaging in non-suicidal self-injury, considering suicide, and planning suicide. Twenty-four percent of high school students slept fewer than five hours per night, which was associated with the highest risk for all mental health indicators except Injured in a suicide attempt (Indicator 4). After controlling for demographic and known risk factors, results remained significant. This raises substantial public health concerns, given that nearly three quarters of New Mexico high school students and more than 40% of middle school students slept fewer than eight hours per night. These results are consistent with other studies demonstrating that negative mental health effects are associated with inadequate sleep among youth.[3,4]

Because the final response category for the YRRS sleep question is “10 or more hours,” it is expected that the students who selected this response included both students who were within the recommended sleep limits (10 hours), as well as students who exceeded recommended amounts of sleep (more than 10 hours). Excessive sleep can be a symptom of depression or other mental health problems, but the current question does not allow a clear distinction between those sleep 10 hours per night and those who sleep more than 10 hours.[10] A revision to the sleep question could provide better information as to the risks of ex-

cessive sleep for youth.

Because the YRRS is a point-in-time survey it is not possible to make causal inferences from these results. In one meta-analysis, researchers found that sleep disturbances were pervasive with most mental health conditions and that sleep disturbances are a contributory causal factor to mental health conditions including schizophrenia, depression, and post-traumatic stress disorder. These researchers also found evidence that sleep disturbances like insomnia are treatable and that mental health problems tend to lessen with treatment.[11] Addressing inadequate sleep may be a promising strategy to improve overall mental health.

Table 1. Unadjusted Odds Ratios (95% confidence intervals) for Mental Health Indicators by Total Hours of Sleep, Grades 6-12, New Mexico, 2019

	Sleep Duration in Hours						
Grades 6-8	≤ 4	5	6	7	8	9	≥ 10
1. Ever considered suicide	**5.4 (4.5-6.5)**	**3.7 (3.1-4.4)**	**2.7 (2.3-3.1)**	**1.9 (1.7-2.3)**	1.1 (1.0-1.3)	Referent	1.1 (.9-1.2)
2. Ever planned suicide	**6.3 (5.1-7.7)**	**4.1 (3.3-5.0)**	**2.9 (2.3-3.6)**	**2.0 (1.7-2.4)**	**1.3 (1.1-1.5)**	Referent	1.1 (.9-1.3)
3. Ever attempted suicide	**5.3 (4.1-6.7)**	**3.0 (2.3-4.0)**	**2.3 (1.9-2.9)**	**1.5 (1.2-1.9)**	1.1 (.8-1.3)	Referent	1.2 (.9-1.6)
Grades 9 - 12							
1. Considered suicide	**4.7 (3.5-6.2)**	**3.4 (2.6-4.6)**	**2.1 (1.6-2.7)**	**1.5 (1.6-2.7)**	1.1 (.8-1.4)	Referent	**1.9 (1.2-2.8)**
2. Planned suicide	**4.5 (2.3-6.3)**	**3.2 (2.4-4.5)**	**2.2 (1.6-3.0)**	**1.6 (1.2-2.2)**	1.2 (.9-1.7)	Referent	**1.8 (1.1-2.9)**
3. Attempted suicide	**4.3 (2.9-6.5)**	**2.7 (1.8-4.0)**	**1.5 (1.0-2.3)**	1.0 (.7-1.5)	.9 (.6-1.3)	Referent	**2.7 (1.7-4.5)**
4. Injured in suicide attempt	**5.0 (2.5-10.0)**	**2.6 (1.3-5.2)**	1.1 (.6-2.3)	1.0 (.5-2.0)	.9 (.4-1.8)	Referent	**3.8 (1.6-8.6)**
5. Felt sad or hopeless	**3.0 (2.4-3.6)**	**3.0 (2.4-3.6)**	**1.9 (1.6-2.3)**	**1.3 (1.1-1.6)**	.9 (.7-1.1)	Referent	1.2 (.9-1.6)
6. Non-suicidal self-injury	**3.8 (2.9-5.0)**	**2.9 (2.2-3.8)**	**2.1 (1.7-2.8)**	**1.4 (1.1-1.8)**	1.1 (.9-1.5)	Referent	**1.7 (1.1-2.5)**

Bolded values are significant at p < 0.05

Recommendations

Several interventions or policy decisions may improve sleep outcomes for adolescents. For example, there is strong evidence that setting later school start times improves adolescent sleep outcomes.[7,8] One study also indicated that teens with a parentally-set bedtime of 10 pm or earlier report better sleep.[4] The American Pediatric Association recommends screen-based devices not be allowed in adolescent bedrooms and that they be turned off 30 minutes prior to bedtime.[12] Lastly, treatments for insomnia may be recommended by a doctor or therapist depending on the clinical need.[13] Public education about the important relationship between sleep and mental health is recommended for families, professionals who work directly with youth, and school policy makers.

References

1. Paruthi S, Brooks LJ, D'Ambrosio C, et al. Consensus Statement of the American Academy of Sleep Medicine on the Recommended Amount of Sleep for Healthy Children: Methodology and Discussion. *J Clin Sleep Med*. 2016;12(11):1549-1561.
2. Liu X. *Sleep and Adolescent Suicidal Behavior PEDIATRICS*. Vol 27.; 2004. https://academic.oup.com/sleep/article/27/7/1351/2696828
3. Fitzgerald CT, Messias E, Buysse DJ. Teen sleep and suicidality: Results from the youth risk behavior surveys of 2007 and 2009. *J Clin Sleep Med*. 2011;7(4):351-356.
4. Owens J, Au R, Carskadon M, et al. Insufficient sleep in adolescents and young adults: An update on causes and consequences. *Pediatrics*. 2014;134(3):e921-e932.
5. Division of Adolescent and School Health C for DC and P. Youth Online: High School YRBS - 2019 Results. Published 2020. Accessed January 12, 2021. https://nccd.cdc.gov/Youthonline/
6. Kelly Y, Zilanawala A, Booker C, Sacker A. Social Media Use and Adolescent Mental Health: Findings From the UK Millennium Cohort Study. *EClinicalMedicine*. 2018;6:59-68.
7. Watson NF, Martin JL, Wise MS, et al. Delaying middle school and high school start times promotes student health and performance: An American academy of sleep medicine position statement. *J Clin Sleep Med*. 2017;13(4):623-625.
8. Wheaton AG, Chapman DP, Croft JB. School Start Times, Sleep, Behavioral, Health, and Academic Outcomes: A Review of the Literature. *J Sch Health*. 2016;86(5):363-381.
9. New Mexico Department of Health. Youth Risk and Resiliency Survey. Published 2020. Accessed January 12, 2021. https://www.nmhealth.org/about/erd/ibeb/yrrs/.
10. American Psychiatric Association. Diagnostic and statistical manual of mental disorders (5th ed.). In: *Diagnostic and Statistical Manual of Mental Disorders*. American Psychiatric Association; 2013.
11. Freeman D, Sheaves B, Waite F, Harvey AG, Harrison PJ. Sleep disturbance and psychiatric disorders. *The Lancet Psychiatry*. 2020;7(7):628-637.
12. Hale L, Kirschen GW, LeBourgeois MK, et al. Youth Screen Media Habits and Sleep: Sleep-Friendly Screen Behavior Recommendations for Clinicians, Educators, and Parents. *Child Adolesc Psychiatr Clin N Am*. 2018;27(2):229-245.
13. de Zambotti M, Goldstone A, Colrain IM, Baker FC. Insomnia disorder in adolescence: Diagnosis, impact, and treatment. *Sleep Med Rev*. 2018;39:12-24.

The New Mexico Epidemiology Report

Heidi Krapfl, M.S.
Deputy State Epidemiologist & Editor

The New Mexico Epidemiology Report
(ISSN No. 87504642) is published monthly
by the
Epidemiology and Response Division
New Mexico Department of Health
1190 St. Francis Dr.
P.O. Box 26110, Santa Fe, NM 87502

24-Hour Emergency Number:
(505) 827-0006
www.health.state.nm.us

Table 2. Adjusted Odds Ratios (95% confidence intervals) for Mental Health Indicators and Total Hours of Sleep, Grades 6-12, New Mexico, 2019*

	Sleep Duration in Hours						
Grades 6-8*	≤ 4	5	6	7	8	9	≥ 10
1. Ever considered suicide	**3.8 (3.1-4.7)**	**2.8 (2.3-3.4)**	**2.0 (1.7-2.4)**	**1.6 (1.3-1.8)**	1.0 (.8-1.2)	Referent	1.0 (.8-1.2)
2. Ever planned suicide	**4.2 (3.3-5.4)**	**2.8 (2.2-3.6)**	**2.1 (1.7-2.6)**	**1.6 (1.3-1.9)**	1.1 (.9-1.3)	Referent	1.1 (.9-1.3)
3. Ever attempted suicide	**2.9 (2.2-3.9)**	**1.8 (1.4-2.5)**	**1.5 (1.1-1.9)**	1.1 (.8-1.4)	.9 (.7-1.2)	Referent	1.2 (.9-1.6)
Grades 9-12**							
1. Considered suicide	**4.5 (3.1-6.6)**	**3.1 (2.1-4.5)**	**2.2 (1.5-3.0)**	**1.7 (1.2-2.5)**	1.4 (.9-2.0)	Referent	**2.5 (1.4-4.6)**
2. Planned suicide	**4.9 (3.3-7.3)**	**3.4 (2.3-5.1)**	**2.6 (1.7-3.7)**	**2.0 (1.4-3.0)**	**1.7 (1.1-2.6)**	Referent	**2.5 (1.2-5.0)**
3. Attempted suicide	**3.5 (2.1-5.8)**	**2.1 (1.3-3.5)**	**1.5 (.9-2.4)**	1.2 (.7-1.9)	1.3 (.7-2.2)	Referent	2.1 (.9-4.6)
4. Injured in suicide attempt	**3.0 (1.2-7.3)**	1.8 (.7-4.5)	1.0 (.4-2.2)	1.1 (.5-2.7)	1.4 (.6-3.4)	Referent	1.8 (.5-6.1)
5. Felt sad or hopeless	**2.7 (2.1-3.6)**	**2.6 (2.0-3.4)**	**1.7 (1.3-2.2)**	**1.4 (1.1-1.8)**	.9 (.7-1.2)	Referent	1.0 (.6-1.6)
6. Non-suicidal self-injury	**3.5 (2.4-5.1)**	**2.9 (2.0-4.1)**	**2.2 (1.5-3.2)**	**1.6 (1.1-2.3)**	1.5 (1.0-2.1)	Referent	1.7 (.9-3.3)

*Odds ratios are adjusted for age, sex, race/ethnicity, rural/urban county classification, drug use, tobacco use, and alcohol use. Referent is 9-hours total sleep time. **Bolded values are significant at p < 0.05**

Odds ratios are adjusted for age, sex, race/ethnicity, gender identity, sexual orientation, drug use, alcohol use, tobacco use, rural/urban county classification, and parents' education level. Referent is 9-hours total sleep time. **Bolded values are significant at p < 0.05