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Sexual Orientation Disparities in Early Adolescent Sleep: Findings from the Adolescent Brain Cognitive Development Study

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Abstract

Purpose: The purpose of this study was to examine associations between sexual minority status (e.g., gay or bisexual) and sleep problems in a demographically diverse, national sample of U.S. early adolescents.

Methods: We analyzed cross-sectional data from the Adolescent Brain Cognitive Development Study (Year 2, 2018–2020) to estimate associations between sexual orientation and sleep problems or disturbance, adjusting for confounders and testing potential mediators (depressive problems, stress problems, family conflict, and parental monitoring).

Results: In a sample of 8563 adolescents 10- to 14-years-old, 4.4% identified as sexual minority individuals. Sexual minority status was associated with self-reported trouble falling or staying asleep (risk ratio [RR] = 2.24, 95% confidence interval [CI] = 1.88–2.68) and caregiver-reported sleep disturbance (RR = 1.50, 95% CI = 1.29–1.75). The association between sexual minority status and trouble falling or staying asleep was partially mediated by greater depressive problems, more family conflict, and less parental monitoring, whereas the association between sexual minority status and caregiver-reported sleep disturbance was partially mediated by greater depressive problems, higher stress, and greater family conflict.

Conclusions: Our results indicate that sexual minority status may be linked to sleep disturbance in early adolescence. Depressive problems, stress, family conflict, and less parental monitoring partially mediate disparities in sleep health for sexual minority youth. Future research could test interventions to promote family and caregiver acceptance and mental health support for sexual minority youth to improve their sleep and other health outcomes.

Keywords: LGBT, sexual and gender minority, sexual orientation, sleep problems, sleep quality

Introduction

INSUFFICIENT SLEEP DURING ADOLESCENCE has been associated with increased risk of chronic diseases (e.g., obesity), psychiatric disorders (e.g., suicidal ideation, depression), and risk behaviors (e.g., drinking and driving, smoking, de-

linquency).¹ There is growing evidence that sexual minority (e.g., lesbian, gay, and bisexual) adults may experience more sleep issues than the general population²; however, little is known about sexual orientation disparities in sleep in adolescence. This is an important gap considering the role of sleep in healthy development during adolescence.³ Given that

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sleep is a modifiable behavior with important implications for physical and mental health, addressing sleep health disparities among sexual minority youth may be an important avenue toward promoting the health, safety, and well-being of sexual minority individuals.^{4,5}

Earlier research investigating sexual minority sleep health in adolescence has produced mixed results.^{5,6} Data from a national sample of U.S. adolescents followed into young adulthood (NEXT Generation Health Study, $N=1946$; 6.3% sexual minority participants) found no sexual orientation disparities except for snoring, breathing cessation, and daytime sleepiness among sexual minority females.⁶ In contrast, a cross-sectional analysis of data from the 2015 Youth Risk Behavior Survey (nationally representative sample of U.S. students in grades 9–12, $N=14,703$, 8.0% sexual minority participants) found that sexual minority adolescents had a higher prevalence of very short sleep duration (<5 hours) than their heterosexual peers.⁵

There are two main theoretical models that suggest stress, mental health, and family factors may mediate an association between sexual minority status and sleep problems. The biopsychosocial model^{7,8} suggests that to understand a health condition (e.g., sleep), psychological (e.g., mental health) and social (e.g., family) factors should be considered. The vulnerability-stress theory⁹ posits that stressors experienced by sexual minority people can trigger both mental and physical health problems. Due to stigma, discrimination, and general life stressors, sexual minority people may experience greater stress than heterosexual individuals.^{10–12} Stress can in turn lead to mental health problems including depressive problems and poor sleep, in line with the vulnerability-stress theory.⁹ Depression can also lead to sleep difficulties.¹³

Another potential mediator explaining poor sleep among sexual minority individuals is family relationships. Sexual minority individuals have reported less supportive relationships with parents¹⁴ and more distant relationships¹⁰ with parents compared with their heterosexual peers. Strained family relationships could lead to sleep problems.¹⁵ Concurrently, earlier studies have demonstrated less parental monitoring among sexual minority girls compared with heterosexual girls.^{16,17} Less parental monitoring and involvement could in turn lead to less monitoring of an adolescent's bedtime and sleep quality.¹⁸ In a nationally representative sample of U.S. adults, stress and family relationships were identified as two key mediators of sexual orientation and sleep problems¹⁰; however, this has yet to be examined in sexual minority adolescents. In a sample of Chinese college students, depression and interpersonal (including family) relationships were found to mediate the association between sexual orientation and sleep quality.¹³

To address the gaps in the literature, particularly among early adolescents, this study aimed to assess sexual orientation disparities in adolescent sleep using a demographically diverse national sample of U.S. early adolescents 10–14 years old and to explore potential mediators for the relationship. We hypothesized that sexual minority status would be associated with greater sleep problems in early adolescence.

Methods

We conducted a cross-sectional analysis of data from Year 2 of the Adolescent Brain Cognitive Development (ABCD) Study (4.0 release). The ABCD study is a longitudinal study

(baseline 2016–2018) of health, brain, and cognitive development in 11,875 children from 21 recruitment sites across the United States. The ABCD study participants, recruitment, protocol, and measures have previously been described in detail.¹⁹ Participants were predominantly 11–12 years old (range = 10–14 years) during the 2-year follow-up, which was conducted between 2018 and 2020, and 8563 met the criteria for inclusion in the study (no missing data for sexual orientation, sleep, or confounder variables). Institutional review board (IRB) approval was received from the University of California, San Diego, and the respective IRBs of each study site. Written assent was obtained from participants, and written informed consent was obtained from their caregivers.

Independent variable

Sexual orientation. Participants reported their own sexual orientation (“Are you gay or bisexual?”; yes, maybe, no, don’t understand the question, decline to answer) at Year 2.²⁰

Dependent variables

Kiddie Schedule for Affective Disorders and Schizophrenia DSM-5 sleep outcomes. As part of the ABCD study, adolescents were asked questions about problems falling or staying asleep in the past 2 weeks in Year 2, which were adapted from the Kiddie Schedule for Affective Disorders and Schizophrenia DSM-5 survey, a psychiatric diagnostic assessment tool for school-aged children.²¹ Participants responded to a 5-point Likert type scale with answers ranging from 0 (not at all) to 4 (nearly every day). Those having a problem at least several days in the past 2 weeks were grouped and those having a problem rarely or never were grouped to create a binary variable.

Sleep Disturbance Scale for Children. A 26-item measure was administered to the caregivers of adolescents in Year 2 to assess whether adolescents had any sleep disorders, as well as measure their overall sleep disturbance. Caregivers responded to questions using a 5-point Likert scale ranging from 1 (never) to 5 (daily) on the adolescent's various sleep behaviors. Based on the recommendations of the developers of the survey,²² a cutoff of 39 was used to indicate that a child had overall sleep disturbance. The individual item from the Sleep Disturbance Scale for Children, “How many hours of sleep does your child get on most nights?” was used as the measure for typical total sleep duration. Possible responses were as follows: (1) 9–11 hours, (2) 8–9 hours, (3) 7–8 hours, (4) 5–7 hours, and (5) <5 hours. These categories were collapsed into two categories (9–11 hours [1] vs. <9 hours [2–5]) for the analysis given the National Sleep Foundation recommendation of 9–11 hours of sleep for children ages 9–13 years.²³

Confounders

Based on parents' self-report, potential sociodemographic confounders for the association between sexual orientation and sleep outcomes were selected based on previous literature.^{5,6} Age (years), sex (female, male), race/ethnicity (White, Latino/Hispanic, Black, Asian, Native American, other), household income (U.S. dollars, greater than or less than \$75,000—the median U.S. household income), highest parent education (high school or less vs. college or more), and study site were adjusted for in all analyses.

Potential mediators

Based on the biopsychosocial model^{7,8} and vulnerability-stress theory,⁹ factors including depression, stress, and family relationships have been previously shown to mediate the association between sexual minority status and sleep problems in adult populations^{10,13} and were tested as potential mediators using the following measures.

Child Behavior Checklist. A screening tool consisting of 112 items asked a parent/caretaker about multiple psychiatric symptoms and behavior problems in their children at Year 2.²⁴ We used the Depressive Problems subscale from the DSM-Oriented Scales and the Stress Problems subscale from the 2007 Scale Scores as mediators. The Child Behavior Checklist has high test-retest reliability (intraclass correlation coefficient [ICC]=0.95), acceptable internal consistency²⁵ with alphas ranging from 0.63 to 0.79, and strong validity (ability of all items to discriminate significantly $p < 0.01$).²⁴ Confirmatory factor analysis results for the DSM-Oriented Scales indicated good fit (comparative fit index [CFI] of 0.96 and root mean square error of approximation [RMSEA] of 0.045).^{26,27}

Family conflict score. Adolescents were asked nine questions about conflict between family members including the parents and children in Year 2, which were averaged. Questions were based on the Conflict subscale of the Family Environment Scale.^{28–30} A higher family conflict score indicates that there are more severe family conflicts in a child's family.³¹ The family conflict score has acceptable²⁵ internal consistency ($\alpha = 0.66$) and good test-retest reliability (ICC=0.49).²⁹ CFI of 0.99, RMSEA of 0.05, and standardized root mean square residual (SRMR) of 0.01 indicated good model fit.^{26,29}

Parental monitoring scale. A validated measure was based on a child report^{28,29,32} to assess caregivers' active efforts to keep track of their child's whereabouts at home and outside of the home in Year 2. The response options used a Likert scale ranging from never (1) to almost always (5). The scale is calculated as the average of the five questions, with higher scores indicating overall high parental monitoring behaviors. The parental monitoring scale has acceptable to marginal²⁵ internal consistency ($\alpha = 0.53$) and good test-retest reliability (ICC=0.48).²⁹ CFI of 0.94 (acceptable), RMSEA of 0.13 (marginal), and SRMR of 0.04 (good) indicated good to marginal model fit.^{26,29}

Statistical analyses

Data analysis was performed in 2022 using Stata 15.1 (StataCorp, College Station, TX). Propensity weights were applied to yield representative estimates based on the American Community Survey from the U.S. Census. Modified Poisson regression analyses using robust standard errors³³ were conducted to calculate risk ratios estimating associations between sexual minority status (independent variable) and sleep problems or disturbance (dependent variables). We selected a modified Poisson regression approach using robust standard errors for the main analysis, which has been shown to be a reliable approach to estimate relative risk compared with logistic regression, particularly when outcomes are common (>10%).³³ We report unadjusted mod-

els (Model 1) and models adjusting for confounders (itemized in "Confounders" section, Model 2). In Model 3, we report models adjusting for confounders and including potential mediators (itemized in "Potential mediators" section).

In nonlinear models, it is challenging to assess the change of the coefficient of an independent variable due to the addition of variables into a statistical model because of a rescaling of the model that occurs whenever a variable that has an independent effect on the dependent variable is included in the model.

To account for this, we use the Karlson–Holm–Breen (KHB) method to examine the extent that depressive

TABLE 1. SOCIODEMOGRAPHIC AND SLEEP CHARACTERISTICS OF ADOLESCENT BRAIN COGNITIVE DEVELOPMENT STUDY PARTICIPANTS INCLUDED IN THE ANALYSIS (N=8563)

Sociodemographic characteristics	Mean (SD)/%
Age (years)	12.02 (0.66)
Sex (%)	
Female	48.8%
Male	51.2%
Race/ethnicity (%)	
White	52.4%
Latino/Hispanic	20.1%
Black	17.3%
Asian	5.5%
Native American	3.2%
Other	1.5%
Household income (%)	
Less than \$75,000	47.6%
\$75,000 and greater	52.4%
Parents' highest education (%)	
High school education or less	16.2%
College education or more	83.8%
Sexual minority status (%), Year 2	
No	87.4%
Yes	4.4%
Maybe	3.8%
I don't understand the question	3.1%
Decline to answer	1.3%
Sleep outcomes (%), Year 2	
Trouble falling/staying asleep in past 2 weeks ^a	
No	84.5%
Yes	15.5%
Overall sleep disturbance ^b	
No	72.0%
Yes	28.0%
<9 hours of sleep ^c	
No	44.1%
Yes	55.9%
Potential mediators	
Parental monitoring scale	4.46 (0.5)
Family conflict subscale	1.95 (1.85)
Depressive problems	53.9 (6.1)
Stress problems	53.1 (5.8)

ABCD propensity weights were applied based on the American Community Survey from the U.S. Census.

^aAdolescent-reported sleep problems at least several times in the past 2 weeks.

^bCaregiver-reported score of >39 on the Sleep Disturbance Scale.

^cCaregiver-reported item from the Sleep Disturbance Scale.

ABCD, Adolescent Brain Cognitive Development; SD, standard deviation.

problems, stress problems, parental monitoring, and family conflict attenuate the association between the independent variable (sexual orientation) and the dependent variables measuring sleep problems.³⁴ The KHB method calculates the percent change in the coefficient of an independent variable after including one or more mediator variables while accounting for the rescaling that occurs when additional variables are included in a nonlinear model and enables a decomposition of the indirect effects of each mediator variable. Several studies have shown the KHB approach performs as good or better than alternative approaches to assessing indirect effects^{35–37} and is not sensitive to Type I errors that result from large sample sizes or the number of mediation tests conducted.³⁴ We additionally tested for effect modification of sex on sexual orientation for sleep outcomes.

Results

In a sample of 8563 adolescents (mean age=12.0 years, 48.8% female, 52.4% White), 4.4% identified as sexual minority individuals (Table 1). Nearly one-sixth (15.5%) of the ado-

lescents reported trouble falling or staying asleep in the past 2 weeks, and 28.0% reported overall sleep disturbance.

Table 2 provides associations between sexual orientation and sleep outcomes. Being a sexual minority (responding “yes” to the sexual minority question) was associated with a 2.24 higher risk of self-reported trouble falling or staying asleep (95% confidence interval [CI]=1.88–2.68), and a 1.50 higher risk of caregiver-reported overall sleep disturbance (95% CI=1.29–1.75) in adjusted models (Model 2). Responding “maybe,” “I don’t understand the question,” or declining to answer the sexual minority question were associated with trouble falling or staying asleep. Responding “maybe” or declining to answer the sexual minority question was associated with caregiver-reported overall sleep disturbance. Sexual minority status was not associated with having <9 hours of sleep in adjusted models (Model 2). We did not find evidence of effect modification of sex on sexual orientation for trouble falling or staying asleep or caregiver-reported sleep disturbance (*p* for interaction >0.05).

Table 3 presents the results of the KHB analysis. The reference category are those participants who responded “no”

TABLE 2. ASSOCIATIONS BETWEEN SEXUAL MINORITY STATUS AND SLEEP OUTCOMES IN THE ADOLESCENT BRAIN COGNITIVE DEVELOPMENT STUDY (N=8563)

	<i>Trouble falling or staying asleep in past 2 weeks, adolescent report</i>		<i>Overall sleep disturbance, caregiver report</i>		<i><9 hours of sleep, caregiver report</i>	
	RR	p	RR	p	RR	p
<i>Model 1. Total sample, unadjusted</i>						
Sexual minority status						
No	Reference	—	Reference	—	Reference	—
Yes	2.60 (2.20–3.07)	<0.001	1.46 (1.26–1.67)	<0.001	1.09 (0.99–1.19)	0.052
Maybe	2.28 (1.88–2.76)	<0.001	1.32 (1.12–1.54)	0.001	1.09 (1.00–1.20)	0.049
I don’t understand the question	1.38 (1.04–1.81)	0.022	1.02 (0.83–1.25)	0.813	0.96 (0.86–1.08)	0.590
Decline to answer	2.37 (1.73–3.25)	<0.001	1.48 (1.16–1.90)	0.001	0.96 (0.80–1.16)	0.745
<i>Model 2. Total sample, adjusted^a</i>						
	ARR	p	ARR	p	ARR	p
Sexual minority status						
No	Reference	—	Reference	—	Reference	—
Yes	2.24 (1.88–2.68)	<0.001	1.50 (1.29–1.75)	<0.001	1.09 (0.99–1.20)	0.074
Maybe	1.95 (1.58–2.40)	<0.001	1.29 (1.08–1.53)	0.004	1.09 (0.98–1.21)	0.081
I don’t understand the question	1.44 (1.07–1.95)	0.015	1.04 (0.84–1.28)	0.710	1.04 (0.91–1.16)	0.568
Decline to answer	2.17 (1.55–3.03)	<0.001	1.44 (1.09–1.90)	0.010	0.95 (0.78–1.16)	0.646
<i>Model 3. Total sample, adjusted with mediators^b</i>						
	ARR	p	ARR	p	ARR	p
Sexual minority status						
No	Reference	—	Reference	—	Reference	—
Yes	1.58 (1.27–1.96)	<0.001	1.08 (0.89–1.32)	0.401	1.00 (0.89–1.12)	0.985
Maybe	1.31 (1.01–1.71)	0.039	0.99 (0.80–1.24)	0.986	1.01 (0.88–1.14)	0.877
I don’t understand the question	1.38 (1.00–1.91)	0.046	0.93 (0.73–1.18)	0.591	1.01 (0.88–1.15)	0.832
Decline to answer	1.73 (1.13–2.64)	0.011	1.25 (0.90–1.74)	0.174	1.00 (0.81–1.23)	0.984
Potential mediators						
Depressive problems	1.03 (1.02–1.05)	<0.001	1.04 (1.03–1.05)	<0.001	1.01 (1.00–1.01)	<0.001
Stress problems	0.99 (0.98–1.01)	0.989	1.01 (1.01–1.02)	<0.001	0.99 (0.99–1.00)	0.675
Family conflict subscale	1.13 (1.10–1.16)	<0.001	1.02 (1.00–1.04)	0.030	1.02 (1.00–1.03)	0.001
Parental monitoring scale	0.76 (0.68–0.86)	<0.001	0.95 (0.87–1.03)	0.252	0.91 (0.87–0.95)	<0.001

Bold indicates *p* < 0.05. Models represent the abbreviated output from Poisson regression models transformed to RRs. Propensity weights from the Adolescent Brain Cognitive Development Study were applied based on the American Community Survey from the U.S. Census.

^aModel 2 adjusted for age, sex, race/ethnicity, household income, parent education, and study site.

^bModel 3 adjusted for age, sex, race/ethnicity, household income, parent education, and study site. Potential mediators including parental monitoring, family conflict, depressive symptoms, and stress problems are included in the model.

ARR, adjusted risk ratio; RR, risk ratio.

TABLE 3. KARLSON–HOLM–BREEN ANALYSIS TO EXPLORE POTENTIAL MEDIATORS OF SEXUAL ORIENTATION AND SLEEP OUTCOMES

	<i>Sexual minority status</i>							
	<i>Yes vs. no</i>		<i>Maybe vs. no</i>		<i>I don't understand the question vs. no</i>		<i>Decline to answer vs. no</i>	
<i>Variable</i>	<i>% Reduction</i>	<i>z-Score</i>	<i>% Reduction</i>	<i>z-Score</i>	<i>% Reduction</i>	<i>z-Score</i>	<i>% Reduction</i>	<i>z-Score</i>
Trouble falling or staying asleep in past 2 weeks, adolescent report								
Depressive problems	12.77	3.82 ^a	11.95	2.88 ^a	7.67	1.38	10.79	2.05 ^a
Stress problems	—	—	—	—	—	—	—	—
Family conflict subscale	10.84	4.22 ^a	13.98	3.93 ^a	−2.71	−0.56	5.33	1.01
Parental monitoring scale	4.20	2.73 ^a	4.45	2.32 ^a	4.36	1.44	2.30	1.11
Overall sleep disturbance, caregiver report								
Depressive problems	49.79	5.32 ^a	97.19	3.46 ^a	—	—	26.03	2.01 ^a
Stress problems	24.35	3.69 ^a	29.6	1.66 ^a	—	—	11.85	1.21
Family conflict subscale	6.00	2.04 ^a	15.78	2.00 ^a	—	—	3.05	1.21
Parental monitoring scale	—	—	—	—	—	—	—	—

No formal mediation test was performed in cases where there was no direct association between the independent variable (*X*) and the dependent variable (*Y*) or the mediator variable (*Z*) and the dependent variable (*Y*). Mediation models are adjusted for age, sex, race/ethnicity, household income, parent education, and study site.

^a*p* < 0.05.

to the sexual minority question. Across models, we focus on cases where there is a significant direct association between the independent variable (*X*) and mediator variable (*Z*) on the dependent variables (*Y*).³⁸ The results show that the association between sexual minority status and trouble falling or staying asleep is reduced by 12.77% (*z*-score = 3.82) by depressive problems, 10.84% (*z*-score = 4.22) by family conflict, and 4.20% (*z*-score = 2.73) by parental monitoring, with similar results for participants who responded “maybe” to the sexual minority question. The association between sexual minority status and caregiver-reported overall sleep disturbance is reduced by 49.79% (*z*-score = 5.32) by depressive problems, 24.35% (*z*-score = 3.69) by stress problems, and 6.00% (*z*-score = 2.04) by family conflict. The association between “maybe” sexual minority status and caregiver-reported overall sleep disturbance is reduced by 97.19% (*z*-score = 3.46) by depressive problems, 29.60% (*z*-score = 1.66) by stress problems, and 15.78% (*z*-score = 2.00) by family conflict.

Discussion

In this demographically diverse sample of U.S. adolescents aged 10–14 years, we found that sexual minority adolescents were at higher risk of overall sleep disturbance, including a higher risk of trouble falling or staying asleep, compared with their heterosexual peers. Although many prior studies have demonstrated an association between sexual minority status and higher risk of sleep disturbance among adults,^{2,39,40} this is one of the first studies (to our knowledge) to report disparities in sleep problems among U.S. adolescents. Given the adverse health risks associated

with poor sleep, our findings suggest that there is a need to promote interventions that address sleep health disparities among sexual minority youth.

Earlier studies in both adults and adolescents have identified an association between sexual minority status and shortened sleep duration^{5,41,42}; however, this study did not find this association. It is possible that this null finding may be a result of caregiver-reported sleep duration, which may not accurately reflect the child’s sleep duration. Our findings are consistent with the results from one study conducted using the 2013–2014 National Health Interview Survey (adult sample, *N* = 68,960), which found that sexual orientation was only associated with higher risks of sleep disturbance and not associated with increased risk of short sleep duration.³⁹ Thus, more research with different samples as well as with future waves of the ABCD cohort is likely needed to gain a more nuanced understanding of sleep health disparities among sexual minority individuals across all ages.

Earlier studies have reported sleep health disparity differences by sex/gender and sexual orientation subgroups (e.g., lesbian, gay, bisexual) among sexual minority adolescents and adults.^{2,5,6,40–42} We did not find differences in the association between sexual minority status and sleep outcomes by sex. The only prior study (to our knowledge) to examine differences by sex with regard to sleep disturbance among sexual minority youth in the United States did not find any significant difference in trouble falling/staying asleep between males and females.⁶

Early adolescent participants who responded “maybe,” “I don’t understand the question,” or who declined to answer the sexual minority question reported greater trouble falling or staying asleep than heterosexual participants. Prior

research has reported the average age for sexual orientation identification among adolescents to be 17.8 years⁴³; thus, it is likely that many adolescents in the current sample may not be out yet. Some of the participants who responded “maybe,” “I don’t understand the question,” or who declined to answer could identify as a sexual minority later in life.

A growing number of studies provide support for the assertion that mental health (e.g., depression) and stress may contribute to the sleep health disparities observed in sexual minority populations.^{44–46} We found that depressive problems were associated with all of the adverse sleep outcomes we examined while stress problems were associated with caregiver-reported adolescent sleep disturbance. Furthermore, depressive problems partially mediated the association between sexual minority status and caregiver-reported sleep disturbance as well as trouble falling or staying asleep.

Stress problems partially mediated the association between sexual minority status and caregiver-reported overall sleep disturbance. One potential source of stress that has been linked to sleep problems among sexual minority people is family rejection and low family support,⁴⁷ which was supported by our finding that family conflict and less parental monitoring partially mediated the association between sexual minority status and trouble falling or staying asleep. Thus, interventions designed to target specific facets of adolescent life such as mental health or family support may help reduce sleep problems among sexual minority youth as well as the associated health risks.

Limitations

There are several limitations of our study that should be noted. First, the mediation analyses on cross-sectional data cannot inform longitudinal causal relationships.⁴⁸ Future research could examine longitudinal relationships among exposures, mediators, and outcomes. Future research could also test family conflict and parental monitoring as moderators. Our data relied on self-report or caregiver report, which could be subject to recall and reporting bias. Caregivers may vary in their ability to detect sleep disturbances in their adolescent children, and some sleep disturbances may be more likely to be seen by caregivers than others.⁴⁹ The sleep duration question from the Sleep Disturbance Scale did not include a response option for >11 hours of sleep; therefore, we were unable to examine associations with sleep duration longer than 11 hours. The Parental Monitoring Scale could be interpreted as marginal or not satisfactory for model fit and internal consistency, although there are a range of interpretations for internal consistencies.²⁵

In addition, our analyses did not differentiate by sexual orientation subgroup and thus were not able to capture differences in sleep quality between bisexual and gay/lesbian individuals. The phrasing of the sexual orientation question posed to participants implies that those who are neither gay nor bisexual do not identify as a sexual minority while in fact individuals may be queer, asexual, or pansexual. Some participants did not understand the question or declined to answer, which could reflect the younger mean age of our adolescent sample (12 years) and may have also limited our ability to capture all individuals who could later identify as a sexual minority. Finally, our study did not incorporate analyses of gender minor-

ity individuals, a group that also has been shown to have high rates of sleep problems in both adolescence and adulthood.^{42,50}

Conclusion

In sum, our results indicate that sexual minority status may be linked to sleep problems in early adolescence. Depressive problems, stress, less parental monitoring, and more family conflict partially mediate disparities in sleep health for sexual minority youth. Interventions to promote family and caregiver acceptance and mental health support for sexual minority youth can potentially improve their sleep and other health outcomes. Future longitudinal research should identify additional underlying causes for disparities in sleep health for sexual minority youth and test interventions designed to target these underlying causes. More studies are needed to identify differences among sexual and gender minority subgroups with regard to sleep health disparities.

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Authors' Contributions

J.M.N.: Conceptualization; writing—original draft and reviewing; formal analysis; supervision. C.M.L.: writing—original draft, review, and editing. J.H.Y.: Data analysis; writing—original draft, review, and editing. O.K., K.T.G., A.T., D.B.J.: writing—review, and editing. A.A.A.-s.: Data analysis; writing—review and editing. F.C.B.: Conceptualization; methodology; writing—review and editing.

Disclaimer

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Author Disclosure Statement

The authors have no conflict to declare.

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