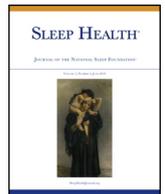




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Sexual orientation and sleep difficulties: a review of research

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ABSTRACT

Is sexual orientation associated with sleep difficulties? In this article, we review empirical evidence that addresses this question. Stress is associated with sleep difficulties such as insomnia and, because members of sexual minorities experience greater stress, on average, than do others, lesbian, gay, and bisexual (LGB) individuals can be expected to report more sleep difficulties than their heterosexual peers. We reviewed 17 studies published since 1990, with data gathered from more than 600,000 individuals; some included data on both quantity and quality of sleep. In nine of 12 relevant studies, at least some sexual minority individuals reported shorter sleep duration than did heterosexual individuals, on average. In nine of 10 relevant studies, sexual minority individuals reported lower quality sleep, on average. Few data were available about other aspects of sleep as a function of sexual orientation. No investigators found LGB people to have fewer sleep difficulties than did heterosexual individuals. We conclude that, although research in this area is new and still limited in some respects, sleep difficulties are more common among LGB than heterosexual people. Our conclusion suggests the possibility that sleep difficulties may underlie known health disparities among members of sexual minorities. Further research is needed to evaluate differences in sleep difficulties among members of sexual minorities, and to explore treatment options for LGB individuals suffering from sleep difficulties.

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Sleep is acknowledged to be fundamental to health, but until recently, little has been known about sleep among members of sexual minorities. In the general population, those with sleep difficulties experience more illnesses, accidents, and chronic health problems than do others.^{1,2} Because many sleep problems are more pronounced under stressful conditions, and because lesbian, gay and bisexual (LGB) people often experience greater stress than their heterosexual peers, one might expect LGB individuals to experience more sleep difficulties than do heterosexual individuals. In this article, we evaluate the evidence relevant to this hypothesis, and examine what is known about the correlates of sleep difficulties among LGB people.

Sleep is essential to the achievement of health; without adequate sleep, physical and mental health deteriorate.³ Sleep difficulties are associated with many physical health problems such as diabetes, hypertension, metabolic syndrome, and coronary heart disease.^{1,4,5} Sleep difficulties are also linked with mental health problems such as anxiety and depressive symptoms.^{6,7} Sleep difficulties have also been tied to suicidality^{8,9} and to all-cause mortality.^{4,10} Although the importance of sleep for health is acknowledged,³ and although

health disparities among sexual minority individuals have been documented,¹¹ little has been known until recently about sleep difficulties among sexual minority populations.

Among correlates of sleep difficulties in the general population, stress occupies an important place. It is well known that stressors of many kinds may affect sleep patterns.¹² For example, Ailshire and Burgard¹³ found that adults who reported frequent conflict with family members were more likely to report troubled sleep. Similarly, in a study of life stress and insomnia symptoms among college students, Bernert and her colleagues¹⁴ found that students who reported more stressful events with family members also described themselves as suffering more symptoms of insomnia. Both sleep duration and quality may decrease in the face of heightened stress. Stress may also affect the structure and efficiency of sleep.¹²

Due to stigma and discriminatory treatment, members of sexual minorities are often exposed to considerable stress.^{15–17} When compared to heterosexual people, lesbian and gay individuals experience added life stress, such as difficulties in family relationships.^{18,19} Sexual minority youth are also at greater risk than their heterosexual peers of child maltreatment,^{20,21} peer bullying,²² and other forms of violence.²³

Sexual minority adults are also subjected to greater minority stress.^{24,25} Lesbian, gay and bisexual individuals may encounter discrimination in employment and public accommodations as well as

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in educational, medical, and legal environments.^{11,26,27} They are also more likely than heterosexual adults to be victims of violence.²³ The greater burden of stress experienced by LGB individuals as a result of such discrimination may in turn affect their sleep.

Considering the important role of stress in sleep impairment, and given the substantial stress experienced by members of sexual minorities, it is reasonable to expect that lesbian, gay and bisexual individuals may have impaired sleep. In other words, due to heightened stress that they experience, sexual minority people could logically be expected to sleep less well than do their heterosexual peers. Recent evidence has made it possible for the first time to examine what research suggests about possible associations between sexual orientation and sleep difficulties. Such associations would help to identify a group of people at high risk of sleep difficulties.

In what follows, we first evaluate evidence with respect to sleep disparities as a function of sexual orientation. Next, we examine what is known about variables that have been found to be associated with sleep patterns among LGB people. Third, we discuss strengths and limitations of the research literature in this area. Finally, we offer conclusions and suggest directions for future study.

Methods

Search strategy

A systematic literature search was conducted in January 2019, using PubMed, PsycINFO, EBSCOHost, and Medline, for articles published from 1990 to the present. The combination of keywords used were (sleep/sleep disorders/sleep problems/nightmares/insomnia/sleep quality) AND (sexual orientation/lesbian/gay/bisexual/homosexual). All combinations of keywords were used in the literature search. We also searched reference lists of included studies for additional citations.

Paper selection

Paper selection for the review was completed by both authors. Articles were excluded if they were not in English, or if they did not report empirical data on at least 5 persons relevant to both sleep difficulties and sexual orientation for both sexual minority and heterosexual participants. Criteria for the sleep variable required that the study reported information about hours of sleep (sleep duration), sleep difficulties (quality of sleep), other aspects of sleep, or conversations with healthcare providers about sleep problems; those articles that did not report such information were excluded. The two authors agreed on the classification of inclusion/exclusion for 100% of the articles identified.

Sexual identity is a complex and fluid concept, but researchers often rely on one measure – a label of one's sexual orientation. For the purposes of this review, sexual identity refers to measures that asked participants to provide a label for their sexual identity (e.g., lesbian, gay, bisexual). Other researchers measured sexual identity through reports on sexual attraction (e.g., "Are you only attracted, mostly attracted, or equally attracted to members of same/opposite sex?"). In some studies, sexual identity was measured through reported sexual behavior (e.g., same-sex partners, opposite-sex partners). While best practices assert that sexual identity be determined through the use of multiple measures,²⁸ few datasets include such resources.²⁹ Therefore, criteria for the sexual orientation variable were based on the participants' reports about their own sexual identity, sexual attraction, and/or sexual behavior. Articles that were based on any other criteria for sexual orientation were excluded (e.g., household roster data). We identified 901 articles and screened their titles and abstracts (see Fig. 1). After duplicates and irrelevant articles were excluded, 17 studies met the criteria for inclusion and were included in this review.

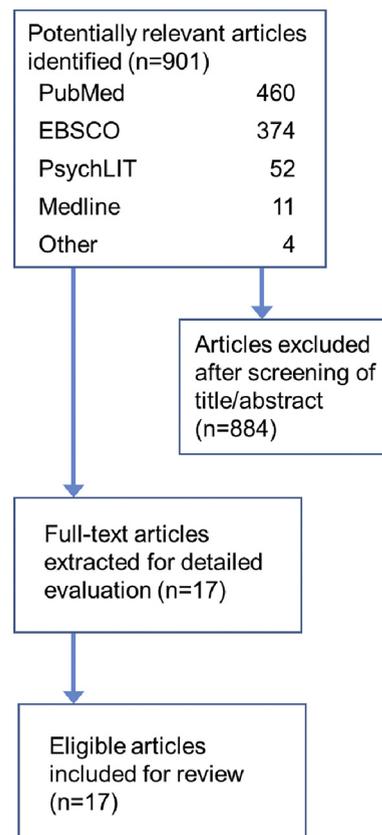


Fig. 1. Graphic depiction of inclusion and exclusion process for the review. Inclusion criteria consisted of articles written in English, with more than 5 participants, and measures reporting on sleep and sexual orientation. Over 900 articles were identified and screened. Duplicate and irrelevant articles were excluded based on reviewing of titles and abstract, resulting in 17 eligible articles for this review.

Overall, 634,872 participants were represented, and approximately half of the participants were female. Fourteen of the 17 studies were conducted in the United States, one in England, one in South Korea, and one in China. Dependent measures included sleep quality (10 articles), quantity (duration) of sleep (12 articles), sleep efficiency (1 article), and satisfaction with amount of sleep (1 article).

Review of research

Our review of the literature is divided into two sections. First, we consider the findings of 17 reviewed studies that examined between-group comparisons of sexual minority and other individuals, asking whether sexual minority people are more likely than heterosexual people to experience sleep difficulties. We describe existing research on between-group comparisons by sexual orientation for sleep duration (hours of sleep) and sleep quality. In the second section, we expand our critical review beyond the 17 studies to include additional literature on individual, interpersonal, and contextual differences in sleep. This expansion allowed us to consider differences *within* the sexual minority population, asking whether some LGB individuals are more likely than others to experience sleep difficulties. Here we widen our focus by examining correlates of sleep difficulties and identifying emerging areas of investigation.

Do sexual minority people experience more sleep problems than do others?

Five categories of possible sleep difficulties are considered here: duration, quality, timing, efficiency, and daytime alertness/sleepiness/

napping. Even though issues may vary from one category of sleep difficulties to another, each category is important in a person's overall sleep experience. For example, either very short or very long customary sleep durations may be associated with health problems.^{30,31} Quality and efficiency of sleep are associated with the extent to which individuals feel that their sleep is restorative.⁴ Unusual timing of sleep (e.g., sleeping during odd hours due to shift work) is associated with daytime sleepiness and heightened levels of accidents.⁴ A comprehensive understanding of sleep difficulties must include information in all five categories.

Sleep duration

The National Sleep Foundation (NSF) has produced guidelines on the recommended hours of sleep according to age. The NSF

guidelines recommend 8 to 10 hours per night for 14 to 17 year olds, 7 to 9 hours per night for 18 to 65 year olds, and 7 to 8 hours for those over 65 years of age.³² Researchers have used these guidelines as general reference points. Twelve papers reported information about average sleep duration among sexual minority versus heterosexual people; findings from these papers are summarized in Table 1. Five of these articles^{33–37} found that sexual minority individuals reported sleeping fewer hours per night, on average, than did heterosexual respondents. One reported that lesbian, gay and bisexual people were more likely than others to report very short sleep (less than or equal to 5 hours per day).³⁸ Another reported that, among Latino(a)/Hispanic people, sexual minority men and women were more likely to report short sleep durations (less than 7 hours per day) and

Table 1
Studies of sleep duration among sexual minority individuals

Author (date)	Data, sample, and sample size ^a	Assessment of sleep duration	Assessment of sexual orientation	Results summary
Chen & Shiu (2017)	NHIS 2013–2014 Adults; N = 68,960	< 6 h = short sleep 7–9 h = normal >9 h = long sleep	Identity	LG adults more likely than H adults to report short sleep; adjusted risk ratio of short sleep higher for LG adults (1.34) than H adults ^b
Cunningham et al (2018)	BRFSS 2016 (25 states) Adults; N = 201,027	Sufficient sleep = 7 or more h per night	Identity	L and B women less likely than H women to report sufficient sleep duration (55.3%, 56.1%, 65.9% respectively). No differences among GBH men
Dai & Hao (2017)	BRFSS 2014 (19 states) Adults; N = 169,392	< 5 h = very short < 6 h = short sleep 7–8 h = normal sleep 9+ h = long sleep	Identity	LGB adults more likely than H adults to report very short sleep and less likely to report normal sleep. Prevalence percentage of very short sleep for LGB adults (17.3%) and H adults (12.2%). Prevalence for normal sleep for LGB adults (51.2%) and H adults (57.1%)
Fricke & Sironi (2017)	Add Health Wave 4 Adults; N = 14,334	< 6 h = short sleep	Identity Attraction Behavior	Adjusted odds ratios of short sleep higher for 'mostly straight' women (1.27) and 'mostly gay' women (2.64) than 'straight' women; higher for women with mostly female partners (4.90) than only male partners; higher for women were attracted to same-sex (2.42) than opposite sex Adjusted odds ratios of short sleep higher for 'bisexual' men (2.56) than 'straight' men; higher for men attracted to both sexes (1.88) than only opposite sex ^b
Galinsky et al, (2018)	NHIS 2013–2015 Adults; N = 102,989	Did sleep duration meet NSF recommendation? ^d	Identity	No differences among LGBH adults
Jackson et al, (2016)	NHIS 2013–2014 Adults; N = 69,270	<7 h = short sleep 7 h = normal >7 h = long sleep	Identity	No differences among LGBH adults
Kann et al (2016)	YRBS 2015 Adolescents; N = 15,713	8 or more h = healthy	Identity Behavior	Prevalence for healthy sleep lower for LGB youth (23.4%) than H youth (28.3%). Prevalence for healthy sleep lower for youth with same-sex partners (20.5%) than youth with opposite-sex partners (24.8%)
Li et al (2017)	SCAHS 2015 Adolescents; N = 123,459	Sleep duration subscale of the PSQI	Attraction ^c	Sexual minority youth reported shorter sleep duration (mean = 6.8 h) compared to H youth (mean = 7.1 h); sexual minority youth less likely to report sleeping 7+ h per day than H youth
Patterson & Potter (2018)	NHANES 2013–2014 Adults; N = 3,862	Sleep duration in h	Identity	No differences among LGBH adults
Rahman & Silber (2000)	Convenience sample Adults; N = 53	16-day diary of bedtimes and waking times, yielded sleep duration in h	Identity	LG adults reported shorter sleep duration than H adults (7.12 h, 8.68 h, respectively)
Seo, Sung, & So (2015)	KYRBWS-VIII 2012 Adolescents; N = 11,289	Do you think you sleep enough?	Identity	B boys reported less sufficient sleep than H boys; no differences among girls
Trinh et al (2017)	NHIS 2013–2015 Adults; N = 91,913	<7 h = short sleep 7–8 h = normal >8 h = long sleep	Identity	For Whites, prevalence ratio of reporting long sleep higher for LB women (1.38) than H women For Latino(a)/Hispanics, prevalence ratio for short sleep was higher for LGB men (1.37) and women (1.32) than H; and prevalence to report long sleep durations higher for LB women (1.62) than H women For Blacks, no differences in sleep duration as a function of sexual orientation for men or women

Notes. Add Health, National Study of Adolescent Health; KYRBWS-VIII, Eighth Korea Youth Risk Behavior Web-based Survey; NHANES, National Health and Nutrition Examination System; NHIS, National Health Information Survey; SCAHS, School-Based Chinese Adolescents Health Survey; YRBS, Youth Risk Behavior Survey. LGBH, lesbian, gay, bisexual, heterosexual. PSQI, Pittsburgh Sleep Quality Index.

^a Please note sample overlap.

^b This study utilized multiple models and found that differences in sleep duration were partly explained by other factors.

^c Those reporting same-sex or both-sex attractions were considered sexual minority.

^d National Sleep Foundations (NSF) recommends 7–9 hours of sleep per night for those 18–64 years of age, and 7–8 hours of sleep per night for those 65 years of age or older.

that sexual minority women were also more likely to report long sleep (more than 8 hours per day).³⁹ Cunningham and colleagues found that sexual minority women were less likely than heterosexual women to report sufficient (i.e., 7+ hours per night) sleep, but this was not true for men.⁴⁰ In the study by Trinh and colleagues,³⁹ White women who identified as sexual minorities were more likely than those who identified as heterosexual to report habitual long sleep (more than 8 hours); there were no other differences among White individuals and there were no significant differences among those who identified as Black. Three studies^{41–43} reported no differences in sleep duration as a function of sexual orientation, and none reported sleep patterns among members of sexual minorities that were healthier than those of heterosexual individuals.

The 12 papers reporting on sleep duration were based on nine separate datasets. Six of the nine datasets (seven of 12 studies) were representative samples of defined age groups in the non-institutionalized United States population. The 2013–2014 or 2013–2015 National Health Interview Survey (NHIS) data served as the basis for four papers.^{33,39–41} The remaining representative samples served as the basis for one paper each: the 2015 Youth Risk Behavioral Surveillance System (YRBS) data,³⁵ the 2013–2014 National Health and Nutrition Examination Survey (NHANES) data,⁴³ the National Longitudinal Study of Adolescent Health (Add Health),³⁴ the 2014 Behavior Risk Factor Surveillance System (BRFSS) data,³⁸ and the 2016 BRFSS data.⁴⁰ In addition, a study by Li and colleagues³⁶ was based on a large, representative sample of Chinese adolescents. The earliest paper to explore disparities in sleep duration³⁷ was based on a convenience sample. It is notable that 7 of the 9 papers reporting on disparities in sleep duration were based on representative samples.

Several researchers have utilized recent NHIS data to examine sleep duration, and varying results have emerged. Galinsky and colleagues,⁴¹ using 2013–2015 NHIS data (i.e., a larger dataset) reported that there were no differences in the percentages of individuals as a function of sexual orientation reporting the amount of sleep recommended by the National Sleep Foundation. Jackson and colleagues,⁴² using 2013–2014 NHIS data, reported no differences in sleep duration (assessed as less than, equal to, or more than 7 hours per night, on average), as a function of sexual orientation. Using the 2013–2014 NHIS data, Chen and Shiu³³ found that lesbian and gay individuals were more likely than heterosexual individuals to report short (defined as “less than 6 hours per night”) sleep duration, but the authors further reported that this difference was partially accounted for by demographic variables together with health status of the groups. Chen and Shiu³³ also found that non-White sexual minorities were more likely to report short sleep duration than White sexual minorities. Trinh et al.³⁹ also examined the NHIS sample separately by racial and ethnic groups. They reported short sleep durations among sexual minorities that identified as Latino(a)//Hispanic, and long sleep durations among both White and Latino(a)//Hispanic (but not among Black) women compared to heterosexual women. Given that each group of investigators employed different coding procedures, and that variations in scaling of outcome variables and in analytic approaches (i.e., prevalence, risk, or odds ratios) may have affected the results, the best interpretation of this set of findings is not clear.

In addition to the studies mentioned above, one study focused on youth’s subjective satisfaction with amount of sleep.⁴⁴ In a study based in South Korea, 11,829 adolescents were asked whether or not they normally “get enough sleep”. Sexual orientation was coded on the basis of adolescents’ reports about the gender of partners in encounters that involved kissing, fondling, or other sexual behavior. Youth who reported only same sex partners were coded as “lesbian or gay” and those who reported both male and female partners

were coded as “bisexual”. Results showed that bisexual boys were more likely than heterosexual boys to say that they did not get enough sleep; reports of lesbian and bisexual girls about sleep did not differ reliably from those of heterosexual girls.⁴⁴ While a unique approach to examining sleep was employed here, interpretation of these results is complicated by the fact that no definitions of “enough sleep” were offered to or given by the adolescent respondents.

In summary, results of many but not all studies that focused on the amount of sleep individuals reported per night suggest the existence of disparities as a function of sexual orientation. Most investigators found that sexual minority individuals were more likely than others to report short sleep durations (e.g., less than 7 hours per night), but three studies reported no sleep deficiencies as a function of sexual orientation. Differences among the studies in coding, scaling, and related issues make comparisons across studies difficult to offer. Given the variability in reporting across studies (e.g., reporting of odds ratios, prevalence ratios, or other indexes), we did not attempt to provide estimates of effect size; we presented results of each study to illustrate sleep differences across sexual orientation (see [Tables 1 and 2](#)). Further research in this area, particularly with more standardized coding procedures and discussion of effect sizes, appears to be warranted.

Sleep quality

Measures of sleep quality assessed ability to initiate and sustain sleeping activities (e.g., trouble falling asleep, trouble staying asleep). Ten papers presented information about sleep quality among sexual minority versus heterosexual people; findings from these papers are summarized in [Table 2](#). All but one article reported that at least some sexual minority individuals reported poorer sleep quality, on average, than did heterosexual respondents. The remaining article⁴⁵ used 2010 BRFSS data, and reported that bisexual women (but not lesbian women, and not sexual minority men) reported poorer sleep quality than did heterosexual respondents (see also Blosnich et al.,⁴⁶ which is based on a subset of the 2010 BRFSS data, and which reported that, among military veterans, sexual minority women reported poorer sleep quality than did heterosexual women). None of the articles presented results indicating that sexual minorities reported better sleep quality than heterosexuals.

The 10 papers that reported on sleep quality were based on seven different datasets. Six of these were based on representative samples of non-institutionalized people in the United States. A seventh paper was based on a representative sample of Chinese adolescents.³⁶ Most of the investigators who reported disparities in sleep quality as a function of sexual orientation analyzed data from representative samples, and this increases confidence in their findings.

Sleep efficiency, daytime sleepiness, and sleep timing

Despite the importance of daytime sleepiness, sleep efficiency, and sleep timing for health and safety,⁴ few data have been reported on the association of sexual orientation and sleep difficulties in these areas. The sole article identified in this category was a study of Chinese adolescents, which reported lower sleep efficiency and greater daytime sleepiness among sexual minority youth.³⁶ To the best of our knowledge, no additional studies have been published in this area at this time.

Summary of between-groups data

The hypothesis that sleep difficulties are more common among lesbian, gay, and bisexual people than among heterosexual

Table 2
Studies of sleep quality among sexual minority individuals

Author (date)	Data, sample, and sample size ^a	Assessment of sleep quality	Assessment of sexual orientation	Results summary
Blosnich et al, (2014)	BRFSS 2010 Adults; N = 93,414	> 14 days poor sleep in last 30 days	Identity	Adjusted odds ratios for poorer sleep higher for B women (1.56) than H women; no differences among GBH men
Chen & Shiu (2017)	NHIS 2013–2014 Adults; N = 69,960	Problems falling, staying asleep, feeling unrested 4 or more times per week	Identity	LGB reported more of all sleep problems than H. Adjusted odds ratios of feeling unrested higher among LG adults (1.20) than H adults. Adjusted odds ratios of having trouble falling asleep higher for LG adults (1.24) and B adults (1.38) than H adults. Adjusted odds ratio of waking during the night higher for B adults (1.50) than H adults. ^b Adjusted prevalence ratio of reporting sleep problems higher for B adults (1.4) than H adults
Duncan et al (2018)	NYC HANES 2013–2014 Adults; N = 1220	Problems falling, staying asleep, sleeping too much for several days or more of last 2 weeks	Identity	Adjusted odds ratio for reporting sleep problems higher for LB women (1.74) than H women; no differences among GBH men
Fredriksen-Goldsen, et al (2017)	NHIS 2013–2014 Older Adults (50+ y) N = 33,346	Problems falling, staying asleep, feeling unrested, for 3 or more times per week	Identity	Adjusted odds ratio for reporting sleep problems higher for LB women (1.74) than H women; no differences among GBH men
Fricke & Sironi (2017)	Add Health, Wave 4 Adults; N = 14,334	Problems falling, staying asleep 3 or more times per week	Identity Behavior Attraction	For trouble falling asleep, adjusted odds ratio higher for B women (1.85) than H women; higher for women with same-sex attraction (1.31) than women with opposite-sex attraction, higher for women with mostly opposite-sex partners (1.40) than women with only opposite-sex partners, and higher for men with same-sex partners (2.28) than men with opposite-sex partners For trouble staying asleep, adjusted odds ratio higher for B women (1.48) than H women, higher for women with both sex attraction (1.27) than women with only opposite-sex attraction; higher for women with mostly opposite-sex partners (1.38) than women with only opposite sex partners ^b
Galinsky et al, (2018)	NHIS 2013–2015 Adults; N = 102,989	Problems falling, staying asleep, feeling unrested, taking medicine for sleep; at least 4 days per week	Identity	Adjusted prevalence ratios for trouble falling asleep higher for G men (1.32) than H men, B women (1.43) than H women Adjusted prevalence ratios for trouble staying asleep higher for L women (1.17) and B women (1.29) than H women Adjusted prevalence ratios of using sleep medications higher for G men (2.62) than H men, L women (1.57) than H women Adjusted prevalence ratios for feeling unrested higher for G men (1.22) than H men
Li et al (2017)	SCAHS 2015 Adolescents; N = 123,459	PSQI	Attraction ^c	Adjusted odds ratios for reporting poor sleep quality higher for LGB youth (1.35) than H youth (PSQI total scores and all subscales) ^d
Martin-Storey et al, (2018)	ATUS 2010, 2012, 2013 Adults; N = 17,378	How rested upon awakening in the morning	Behavior/Relationship Status ^e	Women in same-sex couples felt less rested than did women in opposite-sex couples, in some environments; no differences for men
Patterson & Potter (2018)	NHANES 2013–2014 Adults; N = 3,862	Ever report sleep problem to doctor? Doctor ever diagnosed sleep problem?	Identity	For sleep problems confirmed by doctor, adjusted odds ratios higher for B adults (1.99) than H adults. No differences for suspected sleep problems. Confirmed sleep problems mediated by depressive symptoms ^b
Patterson et al, (2018)	Add Health Wave 4 Adults; N = 15,632	Problems falling, staying asleep	Identity	LGB adults were more likely than H adults to report sleep problems. Sleep problems mediated by stress and relationship problems ^b

Notes. Add Health, National Study of Adolescent Health; ATUS, American Time Use Survey; BRFSS, Behavior Risk Factor Surveillance System; NHANES, National Health and Nutrition Examination System; NHIS, National Health Information Survey; SCAHS, School-Based Chinese Adolescents Health Survey; LGBTH, lesbian, gay, bisexual, transgender, heterosexual; PSQI, Pittsburgh Sleep Quality Index.

^a Please note sample overlap.

^b Denotes study utilized multiple models and found that differences in sleep partly explained by other factors for at least some sexual minorities.

^c Those reporting same-sex or both-sex partners considered sexual minority.

^d Denotes study utilized multiple models and found that differences remained significant even after controlling for other factors.

^e Specifically, individuals in same-sex versus opposite-sex couples.

individuals has been supported by most of the available evidence. The data are particularly clear with respect to sleep quality; in this case, nine of 10 studies reported findings that offered clear support for the hypothesis, and one provided limited support. Research on sleep duration also suggested that short sleep is more common among sexual minority individuals. In this area, six of 12 studies supported this hypothesis, three reported partial support, and none reported results in the opposite direction (i.e., sexual minorities more likely to get healthy hours of sleep). Li and colleagues³⁶ reported lower sleep efficiency among sexual minority youth in China, but there are as yet few other data on the association of sexual orientation and other aspects of sleep.

What are the correlates of healthy sleep among lesbian, gay and bisexual individuals?

Whereas the previous section examined the possibility that experiences with sleep among sexual minority individuals are different than those among heterosexual individuals, the following section explores evidence about correlates of sleep experience that may shed light on sleep difficulties among sexual minority individuals. We consider sociodemographic characteristics (e.g., age, gender), followed by qualities of a person's immediate social context (e.g., qualities of relationships with family members and peers), and finally qualities characteristic of the broader environment (e.g., characteristics of

neighborhoods). In examining this literature, we highlight correlates of sleep difficulties in the general population and among sexual minorities; we also identify important areas of future research.

Sociodemographic characteristics

Age and gender are clearly associated with sleep quality and duration in the general population.⁴⁷ In general, women and older adults are more likely to report sleep difficulties.^{19,47,49} The findings are not, however, entirely consistent (see, for example Grandner et al⁵⁰). There have been a few relevant studies among sexual minority populations. In the 2013–2014 NHANES data, older lesbian, gay and bisexual participants were more likely than their younger peers to report sleep difficulties that had been confirmed by a medical professional.⁴³ In five studies, sexual minority women also reported poorer quality sleep than did sexual minority men.^{19,33–35,43}

Reports of sleep difficulties also differ among members of different racial groups; members of racial minority groups generally report more sleep difficulties than do those who are in the majority group. In particular, African Americans report shorter sleep durations than do White Americans, and African Americans are more likely to report habitual short sleep,^{42,51} though some of these disparities may be attributable to living in low-income or inner-city areas.⁵¹ Two studies^{33,39} reported that some non-White sexual minority individuals were more likely than their White counterparts to report either short or long sleep. Whether racial differences in sleep are observed among members of sexual minorities needs more exploration.

Income and financial hardship

Financial hardship has been linked with poor sleep health in the general population.⁵² In general, people who report feeling strong financial pressures (e.g., difficulty in paying bills) are more likely to report sleep difficulties. Measures of socioeconomic status such as income and education have also been linked with poor sleep quality among gay and bisexual men living with HIV.⁶ In a sample of men who have sex with men (MSM) in Paris, financial hardship was a correlate of problems in sleep quality as well as of daytime sleepiness and short sleep duration.^{53,54} No other findings about associations of income or financial hardship among LGBT populations have been reported.

Health and health-related behaviors

The association of poor health, depressive symptoms, and sleep quality has been well established in the general population.⁴ Individuals who are in poor health are more likely to report sleep difficulties. Health and illness have not, however, been widely studied among sexual minority individuals. Li and colleagues³⁶ reported that depression was associated with poorer sleep quality for sexual minority participants. Among gay and bisexual men and MSM more generally, those who are living with HIV, and who report symptoms of anxiety or depression are more likely to report poor sleep quality.^{6,47} Given the widely acknowledged links between sleep and health, further delineation of these links would be helpful.³

Stress is well-established as a correlate of sleep problems in the general population,^{55,56} but has not been widely studied in sexual minority populations. Only two studies reported relevant data. In a national sample, Patterson et al¹⁹ reported that greater perceived stress was strongly associated with poorer sleep quality for sexual minority adults. In a sample of sexual minority men in Paris, Mountcastle and colleagues found that those who reported greater stress also reported shorter sleep durations and poorer sleep quality.⁵⁷ No other data are available on stress and sleep quality,

sleep duration, or other qualities of sleep among sexual minority populations.

Health behaviors such as substance use have also been associated with sleep difficulties.^{2,3} Tobacco and alcohol use are associated with sleep duration and with sleep quality in the general population, as well as in sexual minority populations¹¹; those who use substances are more likely to report inadequate and/or low quality sleep.³⁶

Social context

A person's social context is known to affect sleep in the general population, such that those who maintain positive relationships and receive considerable support from people around them are likely to report better sleep than others.¹³ Among sexual minority populations, however, the data on this topic are limited. Using data from Wave III of the Add Health Study, Needham & Austin¹⁸ reported that sexual minority young adults reported less support from parents than did their heterosexual peers. Qualitative studies suggest that family support for sexual minority youth can serve as a protective factor for mental health and also that family rejection increases the risk of these youth experiencing homelessness and housing instability.^{58,59} Based on data from Wave IV of the Add Health Study, Patterson and colleagues¹⁹ found that sexual minority individuals had less positive relationships with parents as adults than did their heterosexual peers. Moreover, stress associated with these relationship difficulties was associated with poor quality sleep, and it mediated the association of family relationship problems and sleep.¹⁹ Li and colleagues³⁶ reported that victimization via school bullying was associated with sleep difficulties among Chinese adolescents. No other studies have yet assessed links between the qualities of sexual minority individuals' social contexts and their sleep habits.

Broader environment

It is well established that neighborhood and housing factors can affect sleep.^{60–62} Homelessness is associated with insufficient sleep as well as with poorer health outcomes.⁶⁷ Given the vulnerability to temperature, crime, and harassment when living on the streets, it is not surprising that housing insecurity and homelessness affect sleep.⁶⁷

In the case of sexual minority youth, several qualitative studies have documented how family rejection that results in homelessness can jeopardize safe sleeping arrangements.^{63–65} Research has shown that LGBT youth make up between 30 and 40 percent of young clients who use housing-related (i.e., homeless) services in the US.^{64,66} Qualitative research has documented homeless sexual minority youths' sleep difficulties and their links to issues of safety, noise, and related concerns.^{59,68} When faced with homelessness or housing insecurity, some youth resort to survival sex in exchange for a place to sleep.⁵⁹ In a survey of LGBT street youth, Garofalo et al⁶⁸ found that many of these youth reported difficulties in finding safe places to sleep. Further study of these issues is warranted.

Perceived neighborhood safety also influences sleep. For instance, feeling safe from crime in daily life has been linked with healthy sleep in the general population.⁶¹ In a sample of MSM living in Paris, Duncan and colleagues⁶⁹ found that perceptions of neighborhood safety were correlated with both sleep duration and quality; men who described their neighborhoods as unsafe were more likely than others to report short sleep duration (< 7 hours per night) and poor sleep quality.⁶⁹ In another study, women with same-sex partners were found to sleep as well as did those with opposite-sex partners when they lived in supportive areas; but when they lived in non-supportive circumstances, women (but not men) with same-sex partners reported feeling less rested after sleep.⁷⁰

Summary

Based on data that are currently available, the most consistent correlates of sleep quality and duration are sociodemographic characteristics such as age, gender, and overall health. Other things being equal, in the sexual minority population as in the general population, those who are healthy, young, and male seem to sleep better than those who are female, old, or ill. There is some evidence to suggest that sexual minority individuals who are under stress because of poverty, neighborhood conditions, or relationship problems may also report poor sleep quality and/or duration, but much remains to be learned about the correlates of sleep difficulties among lesbian, gay and bisexual individuals, and about the ways in which these are similar to or different from those in the general population. Further work in this area could help to identify ways in which contextual variables affect sleep among sexual minority individuals.

Discussion

Having reviewed the research literature relevant to the hypothesis that there are disparities in sleep as a function of sexual orientation, and having examined research on correlates of sleep among lesbian, gay and bisexual individuals, we turn now to a discussion of the findings. First, we discuss the strengths and limitations of the literature in this area. We then present conclusions that can be justified by the research to date, and discuss their implications. Finally, we offer suggestions for future research.

Studies in this area have been characterized by some distinctive strengths. A number of studies have been based on data from large, diverse samples, and many of these samples have been representative of the populations from which they were drawn. The YRBS data on adolescents were representative of the youth population in many parts of the United States³⁵ and other datasets were nationally representative data from American adults.^{19,33,34,41–43,70} Both sleep duration and sleep quality measures were available, providing for the opportunity to examine different dimensions of sleep. Sleep-related variables were measured using well-validated assessment tools. The availability of sexual orientation and sleep-related variables in large, representative datasets solidifies confidence in the data.

As strong as the existing research has been in some ways, however, it is in its infancy, and it is characterized by some limitations. Most studies have focused on adults, with only two studies of adolescents^{35,36} and only one study specifically on older sexual minority adults,⁴⁸ so there is little information about possible developmental changes in the association of sexual orientation and sleep patterns. In addition, no observational or biomarker data on sleep among lesbian, gay and bisexual people have been reported; existing studies have been based mainly on self-reports. Questions about disparities as a function of sexual orientation have yet to be addressed in the areas of sleep timing and efficiency. The variability among coding and analytic approaches (ie, prevalence, risk, and odds ratios) has made direct comparisons across studies more difficult. In addition, we reviewed only studies that were published in English.

Qualitative data about sleep could throw light on variations in sleep patterns, but have not yet been reported. Furthermore, all the studies to date have been cross-sectional in design; there are as of yet no longitudinal data. Most research has been conducted in the U.S., so the extent to which findings generalize to other cultural settings is not yet clear. Some researchers have reported differences in sleep among LGB individuals,⁷¹ and more information in this area would be helpful. Many questions about causes and correlates of sleep patterns among sexual minority individuals are still in need of study.

With these strengths and limitations in mind, what can be concluded from the research to date? First, available data clearly document the existence of disparities in sleep quality among sexual minority adults in the United States. This conclusion is based on consistent findings from nine of 10 different studies, each one based on a national sample; findings from the other U.S. study⁴⁴ revealed partial support for the idea of sleep disparities as a function of sexual orientation. Notably, not one researcher reported any evidence of more favorable sleep quality among lesbian, gay, or bisexual adults. Thus, findings from multiple large-scale health surveys conducted in the United States over the last several years are clear in revealing disparities in self-reported sleep quality among adults as a function of sexual orientation.

Secondly, additional data suggest that, both inside and outside of the United States, disparities in sleep quality may not be limited to adults. Differences in sleep quality may also characterize lesbian, gay, and bisexual adolescents and older adults,^{35,48} and effects may be found outside the United States, as well as within it.³⁶ These conclusions, however, need further exploration.

Third, the findings with regard to differences in sleep duration are not as conclusive as those for sleep quality, but they also suggest disparities as a function of sexual orientation. Here, six studies, based on four different, large samples, revealed shorter sleep duration among sexual minority adults than among their heterosexual peers (see Table 1). Three additional studies provided partial support for this hypothesis.^{34,39} The remaining three studies in this area reported no differences. Not a single study concluded that sexual minorities have higher likelihood of healthy sleep duration. Lastly, two of the studies reporting shorter sleep among sexual minority individuals focused on adolescents^{35,36} or adults; no data were available on older adults. Again, more research is warranted to explore sleep at different points in the life course.

These findings on sleep quality and duration are important for a number of reasons. First, they suggest the existence of significant but previously unrecognized health disparities among sexual minority adults in the United States, and likely among sexual minority adolescents as well. Second, such sleep disparities may have substantial health implications. Both short sleep duration and poor sleep quality are associated with many mental and physical health problems,³ and also with risk of early mortality.⁴ Whether LGB people who suffer with sleep difficulties also have additional health problems, and if so, whether sleep is a causal link in this regard, remains to be determined.

One implication of the research reviewed above is that sexual minority individuals who suffer sleep difficulties may also be likely to experience additional health disparities. Indeed, sexual orientation disparities in many of areas of physical and mental health have been documented.¹¹ Whether there are causal links between sleep disturbances and other health disparities, and the direction of such causality (if causal links exist), are important questions for future research. Physical health problems could stem, at least in part, from problems in health-related behavior that result from sleep deficiencies. For this reason, possible linkages between sleep and health-related behavior (such as tobacco, drug, and alcohol use) are also in need of more focused study.

It is clear that, when possible, sleep problems of sexual minority individuals should be addressed. Given that effective and relatively brief treatments are available for insomnia and other sleep problems,^{72,73} these should be made readily available to sexual minority (and other) individuals who experience sleep problems. Further research and consideration on how best to make treatment available to sexual minority populations will be important in this area.

As significant as extant findings about sleep duration and quality are, it is clear that much remains unknown. Aspects of sleep such as

timing, efficiency, and daytime sleepiness may also show linkages with sexual orientation, but they have not yet received much attention. Because survey methods have been dominant in this area, there are as yet no studies of sexual orientation and sleep that are based on biometric or observational methods. Nevertheless, some important findings about the personal and social determinants of sleep have emerged. For example, in the sexual minority as well as in general populations, women and older adults seem to experience more sleep difficulties than men or than younger people. Similarly, in sexual minority as well as in general populations, those who live in unsafe neighborhoods seem to be more vulnerable than others to sleep difficulties. Little is yet known, however, about the role of other variables such as social isolation. It is clear that much remains to be learned.

In future work, researchers may benefit from devoting attention to the conceptualization of sexual orientation. Most studies to date have assessed sexual orientation using single-item measures of sexual identity. As Fricke and Sironi³⁴ have shown, however, assessments of sexual identity and those of sexual behavior may not necessarily yield similar results. Moreover, the fluidity of sexual behavior and identity over the life course has been widely discussed,⁷⁴ and should be considered in sleep research. In addition, with a few exceptions,^{38,75} research on gender identity and sleep is still very scarce. Future research that integrates assessments of sexual identity and gender identity together with those of sexual behavior and sexual attraction could create greater understanding of sleep among sexual minority individuals. Furthermore, research has yet to examine fully the similarities and differences in sleep among LGB individuals. Both qualitative work and large-scale quantitative studies provide good opportunities to examine health outcomes among individuals with intersecting identities. In addition, the existing literature does little to examine the context of sleep difficulties, which when explored, may open new understandings of sleep difficulties.

In summary, results from recent research suggest that sexual minority individuals sleep less and sleep less well than do heterosexual individuals. In national samples, these differences have been found among both men and women, and among both adolescents and adults. Little is yet known about social or other determinants of these sleep disparities, though some findings suggest the role of stress. It is well known that sleep difficulties are associated with many health problems in the general population, but such linkages have not yet been identified among sexual minority populations. The possibility that disrupted sleep could underlie known health disparities among sexual minority individuals is an important one that deserves study. Now that sleep disparities as a function of sexual orientation have been identified, their possible role in health should be examined.

Disclosure statement

The authors have nothing to disclose.

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