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Sleep duration, sleep quality, and sexual orientation: findings from the 2013–2015 National Health Interview Survey[☆,☆☆]

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Abstract

Introduction: This study identifies associations between sleep outcomes and sexual orientation net of sociodemographic and health-related characteristics, and produces estimates generalizable to the US adult population.

Participants/methods: We used 2013–2015 National Health Interview Survey data (46,909 men; 56,080 women) to examine sleep duration and quality among straight, gay/lesbian, and bisexual US adults. Sleep duration was measured as meeting National Sleep Foundation age-specific recommendations for hours of sleep per day. Sleep quality was measured by 4 indicators: having trouble falling asleep, having trouble staying asleep, taking medication to help fall/stay asleep (all ≥4 times in the past week), and having woken up not feeling well rested (≥4 days in the past week).

Results: In the adjusted models, there were no differences by sexual orientation in the likelihood of meeting National Sleep Foundation recommendations for sleep duration. For sleep quality, gay men were more likely to have trouble falling asleep, to use medication to help fall/stay asleep, and to wake up not feeling well rested relative to both straight and bisexual men. Gay/lesbian women were more likely to have trouble staying asleep and to use medication to help fall/stay asleep relative to straight women. Finally, bisexual women were more likely to have trouble falling and staying asleep relative to straight women.

Conclusions: Sexual minority women and gay men report poorer sleep quality compared with their straight counterparts.

Keywords

Health disparities; Health surveys; LGBT health; Sexual identity; Sexual minorities; Sufficient sleep

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Disclosure

The authors have nothing to disclose.

Introduction

Research has established clear associations among sleep deprivation, poor sleep health, and a variety of undesirable physical and mental health outcomes.[1,2] In a recent comprehensive literature re-view on sleep and health[2], authors found that whereas the strength of association and magnitude may vary among studies, shortened sleep duration was consistently related to a host of adverse physical and mental health outcomes: poor general health/quality of life,[3] poor cardiovascular health[4] and metabolic health (ie, diabetes[5] and metabolic syndrome[6]), increased mortality risk,[7,8] depression and other mental health conditions/symptoms,[9] and decreased human performance and workplace/driving accidents.[10,11] As evidence of an association between short sleep duration and poor health out-comes has grown and sleep duration has declined,[12] addressing the problem of inadequate sleep has become a national health objective. The US Department of Health and Human Services' *Healthy People* initiative added "Sleep Health" as a topic to its 2020 objectives, with 2 of the topic's 4 objectives focused on sufficient duration of sleep.[13]

One avenue for better understanding the relationship between sleep and health is identifying specific sociodemographic characteristics associated with shorter durations or poorer quality of sleep. These have included sex,[14] race/ethnicity,[15,16] age,[14,17] marital status,[18] education,[18] having children in the household,[18,19] work/employment,[10] and urbanicity.[15,16] Largely missing from these investigations, however, is sexual orientation.

We found only 4 studies that examined sexual orientation and sleep.[20–23] The first study found that bisexual women had higher odds than heterosexual women of self-reporting inadequate sleep in ≥14 of the past 30 days. No such difference between lesbian and straight women, or among men by sexual orientation, was identified.[20] However, this study used a question that asked how many days (in the previous 30 days) the respondent felt that they had not gotten enough rest or sleep. Responses may reflect short sleep duration or excessive sleepiness, which may also result from poor quality sleep. This study also used survey data from only 10 US states. The second study[21] used activity diaries kept over a 16-day period by a convenience sample of 53 British adults aged 18–49 years and showed that those who identified as homosexual awakened from sleep earlier than those who identified as heterosexual, and that homosexual men went to sleep later than heterosexual men, resulting in shorter overall sleep duration. This study did have notable limitations: it used a small convenience sample, it did not include bisexual adults or those ≥50 years, and it did not account for any sociodemographic or health-related covariates.[21] The 2 most recent studies used US nationally representative survey data from the National Health Interview Survey (NHIS).[22,23] The first examined men and women separately and found no differences in sleep duration by sexual orientation—but did not examine sleep quality.[23] The second also found no differences in sleep duration by sexual orientation.[22] However, it found that homo-sexual and bisexual adults had poorer sleep quality than heterosexual adults, and women (regardless of sexual orientation) had poorer sleep quality than heterosexual men. As the first US national study to focus solely on sleep quality differences by sexual orientation, this study made an important contribution but was limited in that it used heterosexual men as the reference category in models that included both men and women. The significance of differences among women by sexual orientation was not presented, except for a note that

bisexual women had greater odds of reporting difficulty falling asleep compared with straight women.[22]

The objective of this study is to continue addressing this gap in the literature by examining differences in sleep duration and sleep quality among gay/lesbian, bisexual, and straight adults using data from a US national survey. Our study extends the results of Chen and Shiu's[22] research by using a larger sample that includes an additional year of data with more statistical power for analysis and conducting analyses for women separately to permit comparisons among women by sexual orientation. It also includes an additional outcome—use of medication to help fall/stay asleep—to further illuminate the association of sexual orientation and sleep problems. Consistent with previous studies on this topic, our study controls for a variety of sociodemographic and health-related characteristics that have been identified as being associated with sleep duration and quality. We hypothesize that gay men will be less likely to meet National Sleep Foundation (NSF) recommendations for sleep duration. This expectation is based on the 2 previous studies which used NHIS data in which the results for men trended in that direction but did not reach significance.[22,23] However, with the additional statistical power available in this study, we expect those differences to be significant. We also hypothesize that sexual minority men and women will both have a higher likelihood of reporting poor sleep quality compared with their straight counterparts, as previous studies have found sexual minority adults more likely to report risk factors for poor sleep quality.

Participants and methods

Data

Data from the NHIS were used for the analyses. We combined 3 years of data, from the 2013 to 2015 NHIS, covering 102,989 adults ≥18 years (46,909 men; 56,080 women). The NHIS is a multipurpose health survey that is nationally representative of the civilian, non-institutionalized US population. It operates continuously throughout the year, with data files released annually. The survey uses a multistage area probability sample design and is administered using computer assisted personal interviewing, with telephone interviewing permitted to complete missing portions.[24] Analytic variables were drawn from the NHIS Household Composition, Family Core, and Sample Adult Core components. In the Household Composition module, basic demographic/relationship information is collected on all house-hold residents. The Family Core module (administered separately to each family in the household) collects information on all family members and covers topics included as covariates in our analyses: sociodemographic characteristics, family food security, health status, and activity limitations. In addition, 1 "sample adult" from each family is randomly selected to complete the Sample Adult module, answering for themselves unless physically or mentally unable to do so (in which case a knowledgeable family member serves as a proxy respondent). The annual final response rates for the Sample Adult modules ranged from 61.2% in 2013 to 55.2% in 2015.[24] All survey questions related to sleep duration, sleep quality, and sexual orientation were included in the Sample Adult module.

Measures

Sleep duration—Adults were asked, “On average, how many hours of sleep do you get in a 24-hour period?” Responses were combined with adult’s age to create an indicator measure of whether NSF recommendations for sleep duration were met. These age-specific recommendations suggest 7–9 h/d for adults 18–25 years, 7–9 h/d for adults 26–64 years, and 7–8 h/d for adults ≥65 years.[17] Other recommendations/classifications were considered, such as getting “sufficient sleep” as defined in Healthy People 2020 Objective SH-4 as ≥8 h/24-h period for adults 18–21 and ≥7 h/24-h period for adults ≥22 years.[13] However, multivariable analyses yielded similar results to those using the measure based on NSF recommendations.

Sleep quality—For 3 of the 4 measures of sleep quality, adults were asked, “In the past week, how many times did you (*a*) have trouble falling asleep, (*b*) have trouble staying asleep, and (*c*) take medication to help you fall asleep or stay asleep?” For each of these questions, responses were combined to create an indicator for ≥4 times in the past week. The final measure of sleep quality was an indicator variable for whether an adult reported waking up not feeling well rested ≥4 days in the past week. This was created by subtracting from 7 the re-sponse to the survey question that asked, “In the past week, on how many days did you wake up feeling well rested?” Consistent with prior research, the threshold of ≥4 times/days in the past week was used as a conservative measure of poorer sleep quality.[19,22]

Sexual orientation—Adults were classified into sexual orientation categories using the survey question, “Which of the following best represents how you think of yourself?” Responses for men included gay; straight, that is, not gay; bisexual; something else; and I don’t know the answer. For women, responses included lesbian or gay; straight, that is, not lesbian or gay; bisexual; something else; and I don’t know the answer. As in previous studies of sexual orientation and health using the NHIS,[25–27] adults answering “something else” or “I don’t know the answer” or who refused to answer the question were omitted from the analyses. Cognitive testing and methodological evaluation of the NHIS sexual orientation question have been discussed at length elsewhere.[28,29]

Covariates—A number of sociodemographic and health-related characteristics were included as covariates in the multivariable analyses based on a review of the scientific literature. Sociodemographic characteristics included age (in years), race/ethnicity, education level, marital status, employment in the past 12 months, whether children (b18 years) lived in the adult’s residence, urbanicity (ie, lived in a metropolitan statistical area), and poverty status. Poverty status data were drawn from the NHIS multiply imputed income files.[30]

Health-related characteristics used as covariates (also based on previous literature) included having limitations in an activity of daily living (ADL) or instrumental activity of daily living (IADL);[31] having recently experienced pains/aches;[32] respondent-reported health status;[31] family food security;[33] obtaining sufficient aerobic activity;[34] experiencing serious psychological distress;[32] and having financial worries.[32]

The ADL/IADL limitation indicator denotes adults who required assistance with personal care needs (eg, eating, bathing), routine needs (eg, household chores, shopping), or both. The recent pain indicator denotes adults who experienced pain, aching, or stiffness in any joint in the past 30 days, or pain in the neck, lower back, or face that lasted 1 day or longer in the past 3 months. Health status was captured from a question asking whether an adult's "health in general is excellent, very good, good, fair, or poor." Classification of food security was recommended by the US Department of Agriculture Economic Re-search Service and based on a series of 10 survey questions.[24,35] Sufficient aerobic activity was measured based on leisure-time activity and defined by the *2008 Physical Activity Guidelines for Americans* as 150 min/wk of moderate aerobic activity, 75 min/wk of vigorous aerobic activity, or a combination of both.[36] The indicator for serious psychological distress was created by summing the responses to 6 separate questions that asked respondents how often during the pre-ceding 30 days they felt (1) so sad that nothing could cheer them up, nervous, (3) restless or fidgety, (4) hopeless, (5) that everything was an effort, or (6) worthless. Each question had 5 response categories: all of the time, most of the time, some of the time, a little of the time, or none of the time, which were associated with the values 4 through 0. Values of ≥13 on this scale were used to identify adults experiencing serious psychological distress.[37] The financial worry scale was created based on results of a factor analysis that reduced a set of 8 questions to 6. Those 6 questions asked adults "How worried are you right now about not (a) having enough money for retirement; (b) being able to pay medical costs of a serious illness/accident; (c) being able to maintain the standard of living you enjoy; (d) being able to pay medical costs for normal health care; (e) having enough money to pay your normal monthly bills; and (f) being able to pay your rent, mortgage, or housing costs?" Each question had 4 response categories: not worried at all, not too worried, moderately worried, and very worried. Responses from these 6 questions, which loaded on the same factor, were summed to create a scale ($\alpha = .67$), with higher scores indicating higher levels of financial worry.

Analysis—Similar to other studies,[20,21,25–27] all analyses were stratified by sex to examine the association between sexual orientation and sleep separately for men and women. First, descriptive estimates for all measures were generated. Next, 2-tailed significance tests were run to identify significant differences ($P < .05$) in the sex- and sexual orientation–stratified estimates of sleep duration and sleep quality. Finally, multivariable logistic regression models were fit to assess the association between sexual orientation and sleep duration and quality, adjusting for sociodemographic and health-related covariates. The models with sleep quality measures as outcomes also included meeting NSF recommendations for sleep duration as an additional covariate. We present the model-adjusted prevalence ratio (APR) estimates and corresponding 95% confidence intervals (CIs), which were obtained from those logistic regression models.[38] We present prevalence ratios because they are less likely than odds ratios to overestimate the effect of a predictor on a dependent variable when the outcome is common.[39] Analyses were carried out in SAS-callable SUDAAN[40] and weighted using final NHIS annual sample adult weights to achieve national representativeness, averaged for the inclusion of 3 years of survey data. The analyses used NHIS sample design information to account for additional covariance resulting from the survey's stratified cluster sample design.

Results

Estimates of sleep, sleep quality, sexual orientation, socio-demographic, and health-related characteristics are presented in Table 1. Between men and women, there was no difference in meeting the NSF recommendations for sleep; however, significant sex differences were found in all measures of sleep quality. Women had a higher prevalence, compared with men, of trouble falling asleep (17.8% vs 12.0%), trouble staying asleep (24.2% vs 17.7%), waking up not feeling well rested (40.4% vs 32.5%), and using medication ≥4 times in the past week (9.1% vs 5.8%). As for sexual orientation, 97.7% of men identified as straight, 1.8% as gay, and 0.4% as bisexual. For women, 97.6% identified as straight, 1.4% as gay/lesbian, and 1.0% as bisexual.

Turning to the analyses of sleep outcomes by sexual orientation, a pattern of significant differences was found between gay and straight men (Table 2). Gay men had a higher prevalence than straight men of having trouble falling asleep ≥4 times in the past week (17.5% vs 11.9%), waking up not feeling well rested ≥4 times in the past week (41.3% vs 32.3%), and using medication to help fall/stay asleep ≥4 times in the past week (14.7% vs 5.6%). Gay men (14.7%) also differed from bisexual men (7.8%) in that last measure, but bisexual men did not differ significantly from straight men in any of the measures. There were no significant differences among men in the likelihood of meeting NSF recommendations for hours of sleep per day or in having trouble staying asleep ≥4 times in the past week.

Among women, a similar pattern of significant differences was found between straight and sexual minority women. Compared with straight women, gay/lesbian women had a higher prevalence of trouble falling asleep (22.8% vs 17.5%), trouble staying asleep (30.3% vs 23.9%), waking up not feeling well rested (47.4% vs 40.1%), and using medication to help fall/stay asleep (14.7% vs 9.0%). Bisexual women, compared with straight women, had a higher prevalence of trouble falling asleep (33.8%), trouble staying asleep (35.3%), and waking up not feeling well rested (53.5%). The percent-age of bisexual women (33.8%) who had trouble falling asleep ≥4 times in the past week was also higher than that of gay/lesbian women. As among men, there were no significant differences by sexual orientation among women in the likelihood of meeting NSF recommendations for hours of sleep per day.

In Table 3, APRs and 95% CIs from sex-stratified logistic regression models are presented for each of the outcomes measured. As in the bivariate analysis, there were no significant associations between sexual orientation and meeting the NSF guidelines on recommended number of hours of sleep in the multivariable results.

The same pattern of differences seen for measures of sleep quality among men in the bivariate analysis was also found in the multivariable analysis—although 2 additional differences emerged as well. Compared with straight men, gay men had a higher likelihood of having trouble falling asleep ≥4 times in the past week (APR = 1.32; 95% CI = 1.09, 1.61) and waking up not feeling well rested ≥4 times in the past week (APR = 1.22; 95% CI = 1.10, 1.35). They were also more likely to use medication to help fall/stay asleep ≥4 times in the past week (APR = 2.62; 95% CI = 2.00, 3.45). Like straight men, bisexual men were

less likely, compared with gay men, to have trouble falling asleep ≥4 times in the past week (APR = 0.60; 95% CI = 0.37, 0.96), waking up not feeling rested ≥4 days in the past week (APR = 0.75;95% CI = 0.57, 0.99), and using medication to fall/stay asleep ≥4 times in the past week (APR = 0.45; 95% CI = 0.22, 0.91). Those first 2 differences were not significant in the bivariate analysis. There were no differences by sexual orientation among men for having trouble staying asleep ≥4 times in the past week.

Among women, half of the significant differences identified in the bivariate analysis persisted in the multivariable analysis, and no new significant differences emerged. Women identifying as gay/lesbian were more likely to have trouble staying asleep ≥4 times in the past week (APR = 1.17; 95% CI = 1.01, 1.36) and to be using medication to help fall/stay asleep ≥4 times in the past week (APR = 1.57; 95% CI = 1.24, 2.00) compared with women identifying as straight. Bisexual women were more likely to have trouble staying (APR = 1.29; 95% CI = 1.09, 21.54) and falling (APR = 1.43; 95% CI = 1.13, 1.79) asleep ≥4 times in the past week compared with straight women. The differences among women in waking up not feeling well rested as well as 2 of the differences in trouble falling asleep seen in the bi-variate analysis were no longer significant in the multivariable analysis.

Discussion

In this study, we examined differences in sleep duration and sleep quality among gay/lesbian, bisexual, and straight adults using data from the 2013–2015 NHIS. Multivariable analyses revealed no differences in sleep duration (measured by meeting NSF recommendations) by sexual orientation. The APR comparing gay and straight men was in the same direction and similar in magnitude to the results of Chen and Shiu's study[22] and the Jackson et al study, [23] and like their results, the estimate in this study just missed significance at the $P < .05$ level. Consistent with the Jackson et al study,[23] we found no differences in sleep duration between bisexual and straight men, or among women by sexual orientation. It is difficult to compare these results to those of Blosnich et al [20] because the measure used in that research is not comparable to any of the measures used in this analysis.

We also hypothesized that sexual minority men and women would both have a higher likelihood of reporting poor sleep quality compared with their straight counterparts. This hypothesis was also supported by the results. Among men, those identifying as gay had a higher likelihood of waking up not feeling rested, having trouble falling asleep, and using medication to help fall/stay asleep ≥4 times in the past week compared with those identifying as straight and bi-sexual. Chen and Shui[22] found similar associations between gay and straight men for the first 2 measures, although their results did not quite reach significance. This difference can again be explained by power differences. The other results have no parallel in the literature.

For women, we found that those identifying as bisexual had a higher likelihood of poor sleep quality (trouble falling and staying asleep ≥4 times in the past week) and those identifying as gay/lesbian had a higher likelihood of having trouble staying asleep and using medication to help fall/stay asleep ≥4 times in the past week com-pared with those identifying as straight. The difference between bi-sexual women and straight women in the likelihood of trouble

falling asleep was also noted by Chen and Shiu.[22] The rest of the results of our study pertaining to women were not addressed in the study by Chen and Shiu,[22] as their integrated gender/sexual orientation measure did not facilitate a comparison of the statistical significance of differences in sleep quality by sexual orientation among women.

Future studies can build on these results by exploring the under-lying reasons for and consequences of the differences we identified. The reciprocal associations between sleep, other health-related behaviors, and adverse health outcomes are well established.[1,2] One path for future research is examining whether differing sleep quality for these groups is associated with differing adverse health outcomes and health behaviors. For example, previous work has found gay men and women to be more likely to report severe psychological distress and moderate smoking,[41] and bisexual women more likely to report severe psychological distress and moderate or current smoking[41–43] compared with their straight counterparts, and both distress and smoking have been found to be associated with poor sleep quality.[1,2,9,44] Examining such relationships further could provide evidence on the role that poor sleep quality may play in exacerbating health disparities or that health disparities may play in exacerbating sleep quality differences. Longitudinal studies would be necessary to determine the direction, or bidirectional nature, of the associations. It may also be that the increased prevalence of serious psycho-logical distress, smoking, and poor sleep quality among sexual minorities is collectively a function of other factors such as minority stress.[42,45] Health studies with measures of stigma or stress would be necessary to explore this possibility.

Limitations

This study has a few limitations. Respondents may have difficulty recalling information about sleep duration and quality, which may introduce bias into these measures. In addition, because only survey data were used, there was no objective measurement of sleep duration and/or quality, such as could be obtained through actigraphy or polysomnography. Different individuals or groups may interpret the questions differently and have different understanding of what it means to wake up feeling well rested or have trouble falling asleep. There were also analytic limitations. We combined 3 years of NHIS data, but for some sexual minority groups, the sample sizes were still small, resulting in wide CIs in some instances, and one descriptive estimate did not meet the threshold for reliability. Multiple comparisons increased the possibility of committing type I error. Finally, the NHIS adjusts its sampling weights for non-response, yet the response rates for the Sample Adult module were between 61.2% and 55.2% and could be viewed as a limitation.

Conclusions

As sleep duration has declined across the population[12] and the evidence for the association of poor sleep quality with adverse health outcomes has continued to grow, improving sleep health has become a major national objective.[13] Our findings can inform these efforts by filling a gap in the sleep literature. This analysis has provided evidence that certain sexual minority groups (ie, gay men, gay/lesbian women, and bisexual women) report poorer sleep quality than their straight counterparts. Seeking to better understand these differences may help identify why certain sexual orientation groups are at risk for poorer sleep quality, and

perhaps provide an understanding of how to assist in improving overall health among sexual minority groups.

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Table 1

Descriptive estimates of sleep duration, sleep quality, sexual orientation, sociodemographic, and health-related characteristics among US men and women: NHIS, 2013–2015 (N = 102,989)

Characteristic	Men (n = 46,909), % (95% CI)		Women (n = 56,080), % (95% CI)	
Sleep duration and sleep quality				
Meets NSF recommendations[a]	63.9	(63.23, 64.49)	63.0	(62.39,63.69)
Trouble falling asleep[b]	12.0	(11.58, 12.44)	17.8	(17.30,18.27)
Trouble staying asleep [b]	17.7	(17.11, 18.20)	24.2	(23.60,24.70)
Used medication to help fall/stay asleep[b]	5.8	(5.55, 6.12)	9.1	(8.76,9.46)
Woke up not feeling well rested[c]	32.5	(31.75, 33.16)	40.4	(39.72,41.08)
Sexual orientation				
Straight	97.7	(97.52, 97.91)	97.6	(97.37,97.75)
Gay/lesbian[d]	1.8	(1.66, 2.03)	1.4	(1.29,1.57)
Bisexual	0.4	(0.37, 0.53)	1.0	(0.90,1.14)
Sociodemographic characteristics				
Age (y)				
18–24	13.1	(12.53, 13.76)	12.0	(11.52,12.56)
25–44	34.9	(34.23, 35.61)	33.6	(32.96,34.18)
45–64	34.7	(34.02, 35.38)	34.3	(33.69,34.89)
≥65	17.3	(16.73, 17.81)	20.1	(19.57,20.66)
Race/ethnicity				
Hispanic	15.9	(15.19, 16.54)	14.8	(14.23,15.32)
Non-Hispanic White	66.0	(65.11, 66.82)	65.2	(64.35,65.94)
Non-Hispanic Black	10.9	(10.40, 11.37)	12.3	(11.81,12.88)
Non-Hispanic other/multiple race(s)	7.3	(6.88, 7.75)	7.8	(7.30,8.23)
Education level				
Less than high school diploma	13.7	(13.18, 14.24)	12.9	(12.41,13.30)
High school diploma/GED	26.6	(25.99, 27.27)	24.7	(24.10,25.24)
Some college	29.5	(28.79, 30.11)	32.3	(31.66,32.84)
Bachelor’s degree or higher	30.2	(29.40, 31.06)	30.2	(29.52,30.97)

Characteristic	Men (n = 46,909), % (95% CI)		Women (n = 56,080), % (95% CI)	
Marital status	24.5	(23.81, 25.20)	20.2	(19.61, 20.77)
Never married	63.1	(62.39, 63.81)	57.6	(56.89,58.22)
Married/cohabitating	12.4	(12.02, 12.78)	22.3	(21.79,22.74)
Divorced, separated, or widowed	73.4	(72.71, 74.04)	61.8	(61.16,62.45)
Employed in past 12 mo	32.8	(32.08, 33.55)	37.4	(36.74,38.03)
Children living in residence	24.5	(23.81, 25.20)	20.2	(19.61,20.77)
Urbanicity				
Not in MSA	14.3	(13.11, 15.64)	15.0	(13.77,16.31)
Small MSA	30.7	(29.32,32.21)	30.9	(29.41,32.32)
Large MSA	54.9	(53.61, 56.23)	54.2	(52.83,55.47)
Poverty status				
Poor (b100% FPT)	11.7	(11.18, 12.22)	14.9	(14.37,15.46)
Near poor (100% ≤ FPTb< 200%)	17.6	(17.04, 18.15)	20.0	(19.45,20.50)
Not poor (≥200% FPT)	70.7	(69.90, 71.52)	65.1	(64.3,65.89)
Health-related characteristics				
ADL/IADL limitation(s)	3.9	(3.68, 4.16)	5.8	(5.48,6.03)
Experienced recent pain/aches	46.1	(45.33, 46.79)	51.4	(50.71,52.04)
Respondent-reported health status				
Poor/fair	12.5	(12.05, 12.92)	13.4	(13.03,13.84)
Good	25.9	(25.31, 26.43)	27.0	(26.52,27.56)
Very good/excellent	61.7	(60.97, 62.34)	59.5	(58.89,60.16)
Food security				
Very low food security	3.9	(3.65, 4.15)	4.4	(4.16,4.63)
Low food security	5.3	(5.07, 5.63)	6.4	(6.12,6.67)
Marginal/high food security	90.8	(90.38, 91.13)	89.2	(88.82,89.61)
Sufficient aerobic activity	53.0	(52.21, 53.75)	45.7	(45.04,46.45)
Serious psychological distress	2.9	(2.71, 3.16)	4.1	(3.84,4.33)
Financial worry (range: 0–18)[e]	6.4	(6.28, 6.45)	7.0	(6.94,7.11)

Percentage distributions may not add up to 100.0% because of rounding.

Abbreviations: FPT, federal poverty threshold; GED, General Educational Development high school equivalency diploma; MSA, metropolitan statistical area; n, unweighted sample size; NHIS, National Health Interview Survey.

[a] NSF recommendations include 7–9 hours sleep per day for adults 18–25 years, 7–9 hours of sleep per day for adults 26–64 years, and 7–8 hours of sleep per day for adults ≥65 years.

[b] At least 4 times in the past week.

[c] At least 4 days in the past week.

[d] Responses included "gay/lesbian" for women, and "gay" for men.

[e] Mean (95% CI) provided.

Table 2

Prevalence of sleep duration and sleep quality among US men and women, by sexual orientation and sex: NHIS, 2013–2015 (N = 102,989)

Outcome and sexual orientation group	Men, % (95% CI)		Women, % (95% CI)	
Meets NSF recommendations[a]				
Straight	64.0	(63.33, 64.61)	63.2	(62.49, 63.81)
Gay/lesbian[b]	60.8	(56.15, 65.24)	63.3	(58.69, 67.69)
Bisexual	63.5	(54.78, 71.44)	57.4	(51.35, 63.17)
Trouble falling asleep (≥4 times in the past week)				
Straight	11.9[c]	(11.44, 12.31)	17.5[c,e]	(17.04, 18.02)
Gay/lesbian[b]	17.5[d]	(14.31, 21.18)	22.8[d,e]	(19.11, 26.93)
Bisexual	13.0	(8.56, 19.34)	33.8[c,d]	(28.24, 39.74)
Trouble staying asleep (≥4 times in the past week)				
Straight	17.6	(17.10, 18.20)	23.9[c,e]	(23.35, 24.48)
Gay/lesbian[b]	16.7	(13.74, 20.20)	30.3[d]	(26.13, 34.78)
Bisexual	23.2	(16.26, 32.01)	35.3[d]	(30.01, 41.01)
Used medication to help fall/stay asleep (≥4 times in the past week)				
Straight	5.6[c]	(5.35, 5.92)	9.0[c]	(8.66, 9.36)
Gay/lesbian[b]	14.7[d,e]	(11.58, 18.40)	14.7[d]	(11.60, 18.40)
Bisexual	7.8[c,f]	(4.20, 14.16)	11.2	(8.36, 14.84)
Woke up not feeling well rested (≥4 d in the past week)				
Straight	32.3[c]	(31.57, 32.98)	40.1[c,e]	(39.45, 40.82)
Gay/lesbian[b]	41.3[d]	(37.15, 45.54)	47.4[d]	(42.71, 52.22)
Bisexual	35.1	(27.04, 44.01)	53.5[d]	(47.24, 59.59)

Abbreviation: NHIS, National Health Interview Survey.

[a]NSF recommendations include 7–9 hours sleep per day for adults 18–25 years, 7–9 hours of sleep per day for adults 26–64 years, and 7–8 hours of sleep per day for adults ≥65 years.

[b]Responses included “gay/lesbian” for women and “gay” for men.

[c] Significantly different at the $P < .05$ level (2-tailed) compared with "gay/lesbian" within the same sex.

[d] Significantly different at the $P < .05$ level (2-tailed) compared with "straight" within the same sex.

[e] Significantly different at the $P < .05$ level (2-tailed) compared with "bisexual" within the same sex.

[f] Does not meet National Center for Health Statistics guidelines for reliability, as the relative standard error is >30.0%. Relative standard error is calculated as (standard error/estimate)*100.

Table 3

Logistic regression of sleep duration and sleep quality on sexual orientation, sociodemographic characteristics, and health-related characteristics among US men and women: NHIS, 2013–2015 (N = 102,989)

Outcome and sexual orientation group	Men, APR (95% CI)		Women, APR (95% CI)	
Meets NSF recommendations[a]				
Straight	Ref.	Ref.	Ref.	Ref.
Gay/lesbian[b]	0.92	(0.85, 1.00)	1.03	(0.96, 1.10)
Bisexual	0.99	(0.86, 1.13)	0.91	(0.83, 1.01)
Bisexual vs gay/lesbian[c]	1.07	(0.92, 1.25)	0.89	(0.79, 1.00)
Trouble falling asleep (≥4 times in the past week)[d]				
Straight	Ref.	Ref.	Ref.	Ref.
Gay/lesbian[b]	1.32	(1.09, 1.61)	1.19	(0.99, 1.43)
Bisexual	0.79	(0.51, 1.23)	1.43	(1.13, 1.79)
Bisexual vs gay/lesbian[c]	0.60	(0.37, 0.96)	1.20	(0.90, 1.59)
Trouble staying asleep (≥4 times in the past week)[d]				
Straight	Ref.	Ref.	Ref.	Ref.
Gay/lesbian[b]	0.96	(0.80, 1.16)	1.17	(1.01, 1.36)
Bisexual	1.23	(0.87, 1.73)	1.29	(1.09, 1.54)
Bisexual vs gay/lesbian[c]	1.28	(0.87, 1.88)	1.11	(0.88, 1.39)
Used medication to help fall/stay asleep (≥4 times in the past week)[d]				
Straight	Ref.	Ref.	Ref.	Ref.
Gay/lesbian[b]	2.62	(2.00, 3.45)	1.57	(1.24, 2.00)
Bisexual	1.18	(0.61, 2.27)	1.30	(0.98, 1.74)
Bisexual vs gay/lesbian[c]	0.45	(0.22, 0.91)	0.83	(0.58, 1.19)
Woke up not feeling well rested (≥4 d in the past week)[e]				
Straight	Ref.	Ref.	Ref.	Ref.
Gay/lesbian[b]	1.22	(1.10, 1.35)	1.10	(0.99, 1.22)

Outcome and sexual orientation group	Men, APR (95% CI)		Women, APR (95% CI)	
Bisexual	0.91	(0.71, 1.18)	1.11	(0.97, 1.26)
Bisexual vs gay/lesbian[c]	0.75	(0.57, 0.99)	1.00	(0.85, 1.19)

Abbreviation: NHIS, National Health Interview Survey.

[a]Outcome of meeting NSF recommendations include 7–9 hours sleep per day for adults 18–25 years, 7–9 hours of sleep per day for adults 26–64 years, and 7–8 hours of sleep per day for adults ≥65 years. Covariates included in the model were age, race/ethnicity, education level, marital status, employed in the past 12 months, children living in the residence, urbanicity, poverty status, ADL/IADL limitation(s), experienced recent pain/aches, respondent-reported health status, food security, sufficient aerobic activity, serious psychological distress, and financial worries.

[b]Responses included “gay/lesbian” for women and “gay” for men.

[c]APRs and 95% CIs for comparisons between bisexual and gay/lesbian groups based on the same model used in another analysis where gay/lesbian was designated as the reference category.

[d]Covariates included in the model were age, race/ethnicity, education level, marital status, employed in the past 12 months, children living in the residence, urbanicity, poverty status, ADL/IADL limitation(s), experienced recent pain/aches, respondent-reported health status, food security, sufficient aerobic activity, serious psychological distress, financial worries, and meets NSF sleep guidelines.

[e]Covariates included in the model were age, race/ethnicity, education level, marital status, employed in the past 12 months, children living in the residence, urbanicity, poverty status, ADL/IADL limitation(s), experienced recent pain/aches, respondent-reported health status, food security, sufficient aerobic activity, serious psychological distress, financial worries, and meets NSF sleep guidelines.