

BRIEF REPORT

Disparities in Sleep Problems by Sexual Orientation among New York City Adults: an Analysis of the New York City Health and Nutrition Examination Survey, 2013–2014

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Published online: 9 July 2018
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Abstract We examined disparities in sleep problems by sexual orientation among a population-based sample of adults, using data from the New York City (NYC) Health and Nutrition Examination Survey (NYC HANES), a population-based, cross-sectional survey conducted in 2013–2014 ($n = 1220$). Two log binomial regression models were created to assess the relative prevalence of sleep problems by sexual orientation. In model 1, heterosexual adults served as the reference category, controlling for gender, age, race/ethnicity, education, marital status, and family income. And in model 2, heterosexual men served as the reference category, controlling for age, race/ethnicity, education, marital status, and family income. We found that almost 42% of NYC adults reported sleep problems in the past 2 weeks. Bisexual adults had 1.4 times the relative risk of sleep problems compared to heterosexual adults ($p = 0.037$). Compared to heterosexual men, heterosexual and bisexual women had 1.3 and 1.6 times the risk of sleep problems, respectively ($p < 0.05$). Overall, adults

who self-identified as bisexual had a significantly greater risk of sleep problems than adults who self-identified as heterosexual.

Keywords Sleep problems · Lesbian, gay, bisexual (LGB) health · Health disparities · Health equity · New York City

Introduction

Sleep is a critical determinant of health [1]. Among the general population and among lesbian, gay, and bisexual (LGB) individuals, poor sleep health has been associated with adverse health outcomes, including an increased risk of HIV, mental health problems, drug use, hypertension, diabetes, obesity, and cancer [2–4].

Few studies have examined sleep among LGB adults. Of these, several have used convenience samples, including a study of 200 participants in the Staffordshire area of the UK, who recorded daily activities over 16 days [5]. The researchers found that homosexual participants had a shorter sleep duration than heterosexual participants [5]. Other studies have examined sleep among specific LGB populations [3, 6]. Among gay, bisexual, and other men who have sex with men (MSM) in London, about one third (34.6%) rated their sleep quality as poor, and about half (43.6%) reported sleeping less than 7 h on average nightly [3]. Among a sample of MSM in Paris, poor sleep was also common, including 44.7% who reported problems falling asleep [7].

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A small number of studies have used population-representative samples to examine sexual orientation disparities in sleep [8–10]. Some found disparities by sexual orientation, citing socio-economic status (SES) and physical and mental health as contributing factors [5, 8, 9], while others found no disparities [10], which warrants additional research. One challenge has been lack of consistency of sleep measures used across studies, with some studies analyzing sleep duration, and others analyzing different sleep quality measures. Rarely have studies examined the extent to which adults themselves reported sleep problems. Thus, the objective of the current study was to use a population-based sample to measure disparities in self-reported sleep problems by sexual orientation. We assessed sleep problems in New York City (NYC), an urban setting where LGB adults may migrate because of perceived greater acceptance. We hypothesized that LGB adults, in NYC, would be more likely than heterosexual adults to experience sleep problems.

Methods

Survey Design

The NYC Health and Nutrition Examination Survey (NYC HANES) was conducted from August 2013 through June 2014. The goal was to monitor the health of NYC adults ages 20 years and older, in order to guide health policy. The survey used a three-stage cluster sampling design to select a population-representative sample of non-institutionalized household residents. Standardized National Health and Nutrition Examination Survey (NHANES) protocols were used. Data collection consisted of a face-to-face computer-assisted interview (CAPI), audio computer-assisted self-interview (ACASI), physical exam, and biologic specimen collection. The overall response rate was 36% ($n = 1527$). Detailed methods of NYC HANES have been published [11].

Measures

Sleep problems Sleep problems were based on participant responses to the CAPI question: “Over the last two weeks, how often have you been bothered by the following problems: trouble falling or staying asleep, or sleeping too much?” [12]. The response “not at all” was

categorized as having no sleep problems, while the responses “several days,” “more than half of the days,” or “nearly every day” were categorized as having sleep problems.

Sexual Orientation Sexual orientation was self-reported via ACASI. Participants responded to the question: do you think of yourself as: (1) heterosexual, (2) homosexual, (3) bisexual, (4) something else, or (5) not sure. The latter two categories were grouped in our analysis.

Socio-Demographic Covariates Participants reported their age (categorized as 20–34, 35–64, 65+), gender (male, female), race and ethnicity (non-Latino white, non-Latino black, Latino, non-Latino Asian, non-Latino other), education (high school degree or less, more than high school), family income (<\$20,000, ≥\$20,000), and marital status (married or living with a partner, not married; the latter included never married, widowed, divorced, and separated).

Data Analysis

Our analytic sample included participants in NYC HANES who responded to the questions on both sleep problems and sexual orientation ($n = 1220$). Prevalence of sleep problems was calculated by sexual orientation for all NYC adults and then further stratified by gender.

We used log binomial regression to estimate the relative risk of sleep problems by category of sexual orientation. We created two models: (1) a model with heterosexual adults as the reference category, controlling for gender, age, race/ethnicity, education, marital status, and family income, and (2) a model with heterosexual men as the reference category for gender and sexual orientation groups, controlling for age, race/ethnicity, education, marital status, and family income. A sensitivity analysis was performed, excluding adults who reported their sexual orientation as “Not sure”/“Something else” ($n = 28$). Data were weighted to account for complex survey design, non-response, and post-stratification. Weights were further adjusted to account for non-response to sexual orientation and sleep questions. Statistical significance was $\alpha < 0.05$. SAS 9.4 (SAS Institute Inc., Cary, NC) and SUDAAN 11.0.1 (Research Triangle Institute, Research Triangle Park, NC) were used for all statistical analyses.

Results

Most survey respondents who answered the sexual orientation question reported being heterosexual (89%), and almost 42% of respondents reported having sleep problems in the past 2 weeks.

Heterosexual NYC adults reported the lowest prevalence of sleep problems (40.4%), followed by homosexual adults (49.2%); bisexual adults reported the highest prevalence of sleep problems (62.7%). Overall, women had a higher prevalence of sleep problems than men (45.8 vs. 37.2%). When we stratified by both gender and sexual orientation, bisexual adults had the highest prevalence of sleep problems among both men (67.3%) and women (60.5%). For men, homosexuals had the next highest prevalence (58.5%), and heterosexuals had the lowest (35.1%), whereas among women, heterosexuals had the next highest (45.1%) and homosexuals the lowest (34.8%).

In multivariate log binomial regression analysis of sleep problems, the risk of having sleep problems for bisexual adults was 1.4 times greater than for heterosexual adults ($p = 0.037$; Table 1, model 1). However, when heterosexual men were used as the common reference group, we found that heterosexual and bisexual women had 1.3 and 1.6 times the risk of sleep problems as heterosexual men, respectively ($p < 0.05$; Table 1, model 2). The sensitivity analysis excluding adults who reported their sexual orientation as “Not sure”/“Something else” showed similar patterns of disparities (not shown).

Discussion

Our analysis showed sexual orientation disparities in self-reported sleep problems among a population-based sample of adults in NYC. Adults who identified as bisexual had significantly greater risk of reporting sleep problems than adults who identified as heterosexual, and women who identified themselves as bisexual had significantly greater risk than men who identified as heterosexual. Our study adds to the literature and is consistent with previous studies, showing sexual orientation disparities in sleep health [5, 8, 9]. Disparities in sleep problems in this NYC-based study, though, were smaller than in some previous research [9].

There are several potential explanations for our findings, including biological, psychological, cultural, and social reasons for why there might be differences in sleep

based on sexual orientation. One potential direct cause for sleep disparities by sexual orientation is “minority stress.” As articulated by Meyer [13], this stress model proposes that stigma, prejudice, and discrimination are chronic psychosocial stressors that lead to negative health outcomes, such as sleep problems. Consequently, we note that stress and the resulting disparities are not caused by particular behaviors or by something inherent within LGB communities, but are linked to the stigma placed on these communities. We also postulate that the magnitude of sleep problem disparities by sexual orientation varies geographically, in relation to regional variation in the stigma against LGB individuals. This variation may contribute to the disparate findings in the literature. If we presume that NYC is more accepting than other geographic locations, then it makes sense that we found significant but comparatively small differences between populations. Indirect causes for sleep disparities may be worse physical or mental health.

Study Strengths and Limitations

A major strength of this study was the use of a population-representative survey. A limitation was the use of self-reported measures including for sleep and sexual orientation, which may introduce recall bias and social desirability bias; e.g., misclassification may have occurred if participants felt uncomfortable revealing their sexual orientation. Additional misclassification may have resulted from the response categories “homosexual” and “bisexual,” as the terms are alienating to many LGB adults and do not adequately identify sexual orientation. Furthermore, gender classification as only male or female may have misclassified and not adequately accounted for transgender and gender-nonconforming adults. We also note that we used a single item to measure sleep problems, which may be associated with over-reporting of sleep problems, and this study may be subject to residual confounding (e.g., we were unable to account for nighttime work shift and co-sleeping). Finally, these NYC-based results might not be generalizable to adults in non-urban locations.

Future Research

Future research should focus on a range of sleep measures and should consider including objective measures of sleep, such as actigraphs. We note, however, that incorporating survey measures of sleep is more feasible

Table 1 Multivariate log binomial regression analysis of sleep problems

	Number	% of NYC population, ages 20+ (95% CI)	% with sleep problems (95% CI)	Unadjusted prevalence ratio (95% CI)	<i>p</i> value	Adjusted prevalence ratio (95% CI)	<i>p</i> value
Total	1220	100	41.8 (38.6–44.9)	NA	NA	NA	NA
Model 1 [~]							
Sexual orientation							
Heterosexual	1085	89.2 (86.7–91.3)	40.4 (37.1–43.8)	Ref	Ref	Ref	Ref
Homosexual	54	4.1 (2.9–5.6)	49.2 (33.1–65.3)*	1.2 (0.9–1.7)	0.243	1.1 (0.8–1.6)	0.393
Bisexual	53	3.9 (2.9–5.3)	62.7 (49.5–75.9)*	1.6 (1.2–2.0)	0.006	1.4 (1.1–1.9)	0.037
Something else/not sure	28	2.8 (1.8–4.4)	44.9 (23.4–66.3)*	1.1 (0.7–1.9)	0.704	1.1 (0.6–1.8)	0.795
Age							
20–34	489	32.8 (29.4–36.4)	44.9 (40.1–49.7)	1.4 (1.1–1.8)	0.014	1.5 (1.1–2.0)	0.002
35–64	603	50.8 (47.4–54.1)	42.7 (38.3–47.0)	1.3 (1.0–1.7)	0.034	1.5 (1.1–1.9)	0.002
65+	128	16.4 (13.4–20.0)	32.9 (24.4–41.4)	Ref	Ref	Ref	Ref
Race							
Non-Latino white	420	35.0 (29.9–40.6)	44.9 (39.6–50.2)	Ref	Ref	Ref	Ref
Non-Latino black	292	21.3 (16.7–26.7)	32.4 (26.6–38.2)	0.7 (0.6–0.9)	0.005	0.7 (0.6–0.9)	0.003
Latino	303	27.1 (23.2–31.4)	49.1 (42.5–55.7)	1.1 (0.9–1.3)	0.352	1.1 (0.9–1.3)	0.623
Non-Latino Asian	138	14.0 (10.8–18.0)	33.9 (25.9–41.9)	0.8 (0.6–1.0)	0.038	0.7 (0.5–0.9)	0.007
Non-Latino other	67	2.6 (2.0–3.5)	43.4 (30.8–56.0)*	1.0 (0.7–1.3)	0.843	0.9 (0.7–1.3)	0.695
Gender							
Men	526	46.6 (43.7–49.6)	37.2 (32.6–41.9)	Ref	Ref	Ref	Ref
Women	694	53.4 (50.4–56.3)	45.8 (41.5–50.1)	1.2 (1.1–1.4)	0.008	1.2 (1.0–1.4)	0.012
Education							
High school degree or less	385	37.7 (33.4–42.3)	38.7 (33.3–44.2)	Ref	Ref	Ref	Ref
More than high school degree	835	62.3 (57.7–66.6)	43.6 (39.9–47.3)	1.1 (1.0–1.3)	0.143	1.3 (1.1–1.6)	0.004
Marital							
Not married	655	50.1 (46.4–53.8)	44.3 (39.9–48.6)	1.1 (1.0–1.3)	0.119	1.1 (0.9–1.3)	0.450
Married or living with partner	565	49.9 (46.2–53.6)	39.3 (34.8–43.8)	Ref	Ref	Ref	Ref
Family income							
≥ \$20,000	862	73.2 (68.8–77.2)	39.1 (35.4–42.8)	Ref	Ref	Ref	Ref
< \$20,000	296	26.8 (22.8–31.2)	47.4 (41.0–53.8)	1.2 (1.0–1.4)	0.040	1.3 (1.1–1.6)	0.008
Model 2 [^]							
Sexual orientation and gender							
Heterosexual men	464	41.9 (38.9–45.0)	35.1 (30.3–40.0)	Ref	Ref	Ref	Ref
Heterosexual women	621	47.3 (44.4–50.2)	45.1 (40.6–49.6)	1.3 (1.1–1.5)	0.003	1.3 (1.1–1.5)	0.004
Homosexual men	35	2.5 (1.7–3.6)	58.5 (38.5–78.5)*	1.7 (1.2–2.4)	0.024	1.5 (1.0–2.2)	0.071
Homosexual women	19	1.6 (0.8–3.0)*	34.8 (10.7–58.9)*	1.0 (0.6–1.7)	0.970	0.9 (0.6–1.6)	0.845
Bisexual men	16	1.3 (0.7–2.2)	67.3 (43.3–91.3)*	1.9 (1.3–2.9)	0.029	1.7 (1.1–2.7)	0.078
Bisexual women	37	2.6 (1.8–3.8)	60.5 (44.5–76.5)*	1.7 (1.2–2.4)	0.009	1.6 (1.1–2.4)	0.030
Something else/not sure men	11	1.0 (0.5–2.2)*	33.2 (9.7–69.7)	0.9 (0.3–2.7)	0.911	1.0 (0.4–2.4)	0.980
Something else/not sure women	17	1.8 (1.0–3.1)	51.4 (23.7–79.1)*	1.5 (0.8–2.7)	0.273	1.4 (0.8–2.6)	0.340

[~] Adjusting for age group, race, gender, education, marital status, and family income

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*Estimate should be interpreted with caution. Estimate's relative standard error (a measure of estimate precision) is greater than 30%, or the 95% confidence interval half-width is greater than 10 or the sample size is too small, making the estimate potentially

in population-based research. In addition, researchers should examine sleep health by sexual behaviors, not only sexual orientation, as the two are not perfectly correlated, in part because of internalized homophobia [14]. Future examination of sleep disparities should also explicitly include transgender and gender-nonconforming individuals. While more research is needed to understand mechanisms for sexual orientation disparities in sleep, emerging research has shown that social stressors, such as financial hardship [15] and unsafe neighborhoods [7], can influence sleep among gay, bisexual, and other MSM populations. Finally, because poor sleep health has been shown among LGB people of color, future research should examine sleep among homosexual and bisexual men and women of color.

Using a wider equity lens, we urge researchers to improve data collection on sexual orientation and gender identity, to better understand sleep needs experienced by LGB and transgender people. With representative surveys, it can be challenging to get sample sizes large enough to do meaningful analyses. Surveys of the LGB community, including both quantitative and qualitative approaches, may provide greater insights into some of the issues raised in this analysis. Research must also take an intersectional approach and consider how oppression related to race/ethnicity, gender identity, gender expression, and other social identities negatively affects the health of LGB and transgender communities. In planning interventions to ameliorate negative health effects, researchers must consider broader institutional and structural reform to remediate health inequities. In clinical practice, sleep problems among LGB individuals can be managed in primary care, and we urge primary care providers to screen their LGB patients for sleep problems. For LGB patients who report sleep problems, proven sleep interventions to reduce sleep problems can and should be offered. While there are a range of sleep interventions from lifestyle to pharmacological, we are not aware of any specific sleep interventions that take into consideration sexual orientation.

Acknowledgments We thank the people of New York City who participated in the study and the staff who worked tirelessly on the project. In addition, the authors thank all those involved in the field data collection. We thank Hayden Mountcastle for formatting this manuscript.

Contributors D.T. Duncan designed the study, interpreted the results, and drafted the article. R. Kanchi assisted with the study design, conducted all data analyses, interpreted the results, and drafted the article. L. Tantay and M. Hernandez critically revised

the manuscript regarding health equity. C. Letamendi also contributed a health equity perspective, and organized collaboration between NYC DOHMH authors. C. Chernov checked the data and edited the manuscript. L. Thorpe is co-Principal Investigator of NYC HANES, and critically revised the manuscript regarding important intellectual content. All authors have given final approval of the version to be published and are publicly responsible for its contents. All authors read and approved the final manuscript.

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