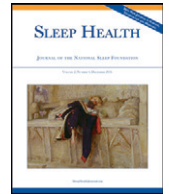




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Poor sleep health and its association with mental health, substance use, and condomless anal intercourse among gay, bisexual, and other men who have sex with men



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ABSTRACT

Objectives: The purpose of this study was to evaluate the prevalence of poor sleep health (ie, poor sleep quality and short sleep duration) in a sample of men who have sex with men (MSM). In addition, this study examined whether poor sleep health was associated with depressive symptoms, substance use, and sexual risk behaviors in this sample.

Design: Cross-sectional survey.

Participants: Broadcast advertisements were placed on a popular smartphone application for MSM in January 2016 to recruit users in the London metropolitan area ($n = 202$) to complete a Web-based survey, which included validated measures of sleep quality and duration.

Measurements: Poor sleep quality was defined based on self-report as very or fairly bad. Short sleep duration was defined as less than 7 hours each night. Regression models were used to assess associations between sleep variables and self-reported depressive symptoms, substance use, and sexual risk behaviors.

Results: About one-third (34.6%) of the respondents reported poor sleep quality and almost half (43.6%) reported sleeping less than 7 hours every night. Several poor sleep health variables were independently associated with depressive symptoms, substance use (eg, use of alcohol or marijuana), and condomless anal intercourse. For example, typical nightly sleep duration of less than 7 hours was associated with condomless receptive anal intercourse with a higher number of sexual partners (incidence rate ratio, 2.65; 95% confidence interval: 1.63–4.30; $P < .001$).

Conclusion: Sleep health promotion interventions should be developed for MSM, which may promote positive mental health as well as reduce substance use and sexual risk behaviors in this population.

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Introduction

Sleep, like nutrition and physical activity, is a critical determinant of health and well-being.¹ Poor sleep health has been implicated in poorer health outcomes across populations. Moreover, research on sleep patterns in the general population suggests that poor sleep quality and short sleep duration are highly prevalent, where only about 1 in 5 Britons (22%) sleep for the recommended 7 to 8 hours each night.²

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Despite the large and accumulating evidence on the prevalence and effects of poor sleep health, no prior studies have examined sleep health specifically among gay, bisexual, and other men who have sex with men (MSM), who experience multiple health disparities. To illustrate, MSM comprise the largest proportion of people living with HIV in the United Kingdom.³ In addition, MSM often experience syndemics of significant mental health and substance abuse disorders.⁴

Recent evidence strongly suggests that difficulties falling asleep and sleeping through the night are not only typical symptoms of depression, but also may be independent risk factors for depression and low quality of life long-term.^{5,6} With regard to substance use, research in otherwise healthy adolescents and adults indicates that poor sleep can influence substance use (eg, use of marijuana, alcohol, cigarettes).^{7,8} As for sexual behaviors, studies in the general population have yielded conflicting results on the association with sleep health, with some evidence from the United States suggesting that there is a positive relationship between sleep and sexual behaviors in urban adolescents but not in rural adolescents.^{8,9}

Poor sleep health could be implicated in poor mental health because of increased stress due to suboptimal sleep. Laboratory-based studies have shown that sleep deprivation and poor sleep health can impair decision-making skills.¹⁰ Therefore, poor sleep health can be associated with increases in alcohol and substance use. Poor sleep health may also lead one to rely on alcohol and other depressants to fall asleep or stay asleep. Conversely, the use of stimulants (eg, cocaine, ecstasy/3,4-methylenedioxymethamphetamine [MDMA]) is associated with poor sleep architecture, suggesting a bidirectional relationship between substance use behaviors and sleep health.¹¹ In the context of MSM and HIV transmission, poor sleep health may impair one's willingness and/or ability to negotiate condom use with a potential partner. However, no published research has examined whether sleep health is associated with mental health, substance use, or sexual risk behaviors among MSM and very few studies have been conducted investigating associations between sleep health and sexual risk behaviors overall.

The effects of poor sleep may be particularly salient for MSM who often use geosocial-networking smartphone applications to meet potential sexual partners for at least 2 reasons. First, previous work has shown that many MSM use these applications across the span of the day, including late night (9:30 PM to 2:30 AM) and early morning (2:30 AM to 6:30 AM).¹² These are oftentimes when bars, clubs, and other social venues might be closed. Second, the use of smartphones during these hours has been linked to poor sleep,¹³ suggesting that MSM who use geosocial-networking smartphone applications may have particularly poor sleep health. As such, the purpose of this study is to evaluate the prevalence of poor sleep health in a sample of MSM residing in London, England, recruited from a popular geosocial-networking smartphone application for MSM. In addition, this study examined whether poor sleep quality and short sleep duration were correlates of mental health, substance use, and sexual risk behaviors in the app-using sample. We note that these applications use global positioning system technology to form connections between users based on their current location.^{14,15} These geospatial technologies have generated quicker and easier ways for MSM to meet potential partners¹⁶ and, consequently, may facilitate users' ability to have multiple concurrent partners, thereby increasing their risk for acquiring and transmitting HIV¹⁷ and other sexually transmitted infections.¹⁶

Methods

Sample recruitment

Broadcast advertisements were placed on a popular geosocial-networking smartphone application for gay, bisexual, and other

MSM in January 2016. Advertisements were limited to the London metropolitan area. In line with previous research,¹² users were shown an advertisement with text encouraging them to click through the advertisement to complete an anonymous Web-based survey. Users were shown this advertisement the first time they logged into the application during four 24-hour periods, which were intentionally not consecutive days. Precautions (eg, use of the "Prevent Ballot Box Stuffing" feature on Qualtrics) were taken to avoid and eliminate duplicate responses as done in previous research¹⁸ because participants could have theoretically viewed the advertisement 4 times during the recruitment period, but no duplicate responses were apparent. Participants were told that completing the survey would enter them for a chance to win £50.

At the end of the recruitment period (ie, four 24-hour periods), 1410 users had clicked through the advertisement and reached the landing page of the survey, and 202 users provided informed consent and completed the survey, representing an overall response rate of 14.3%. The survey included 47 items and took an average (SD) of 9.68 (5.65) minutes for users to complete. All protocols were approved by the New York University Committee on Activities Involving Human Subjects before data collection. All respondents reported being at least 18 years old at the time of survey administration, an inclusion criterion.

Measures

Sleep quality

To assess sleep quality, participants were asked, "During the past month, how would you rate your sleep quality overall?"¹⁹ Response options were "very good," "fairly good," "fairly bad," and "very bad." These 4 options were collapsed into 2 categories—good sleep quality (including responses of very good and fairly good) and poor sleep quality (including responses of very bad and fairly bad) to improve statistical power given the low number of responses in the "very good" and "very bad" categories. Our collapsing approach for the 4-level sleep quality variable has been used in prior epidemiologic research.²⁰

Sleep duration

Self-reported typical sleep duration was measured with an item asking, "During the past month, how many hours of actual sleep did you get each night?"¹⁹ Responses were open-ended but limited to a single integer. Although previous studies have often categorized sleep duration as short (≤ 6 hours), average (7–8 hours), and long (≥ 9 hours),²¹ these 3 categories were collapsed into 2 categories—short (≤ 6 hours) and average (≥ 7 hours)—to improve the statistical power given the low number of responses in the "long" category. Our approach to categorizing sleep duration is consistent with previous epidemiologic studies.²⁰

Mental health

The self-reported presence of depressive symptoms was assessed using the Patient Health Questionnaire-2, a reliable and validated screening tool for depressive symptoms.²² A dichotomous variable was created using score on the measure indicating the absence (score: < 3) or presence (score: ≥ 3) of self-reported depressive symptoms.

Substance use

Participants were asked to check off substances they had used with the last 3 months from a list, including alcohol (≥ 5 drinks in a row), marijuana, acid/lysergic acid diethylamide (LSD), cocaine/crack cocaine, ecstasy/MDMA, ketamine, γ -hydroxybutyric acid/ γ -butyrolactone (GHB/GBL), methamphetamine, and nitrite inhalers (poppers). Dichotomous variables were created for alcohol use (use vs nonuse) and for recent drug use for 4 other substances (use vs

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