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Differences in short and long sleep durations between blacks and whites attributed to emotional distress: analysis of the National Health Interview Survey in the United States☆

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ABSTRACT

Objectives: The current study examined the role of emotional distress in explaining racial/ethnic differences in unhealthy sleep duration.
Design: Data from the 2004-2013 National Health Interview Survey were analyzed using SPSS 20.
Setting: Data were collected through personal household interviews in the United States.
Participants: Of the total 261,686 participants (age ≥ 18 years), 17.0% were black, 83.0% were white, and the mean age was 48 years (SE = 0.04).
Measurements: To ascertain total sleep duration, participants were asked, "How many hours of sleep do you get on average in a 24-hour period?" Sleep duration was coded as short sleep (<7 hours), average sleep (7-8 hours), or long sleep (>8 hours). Emotional distress—feeling sad, nervous, restless, hopeless, worthless, and burdened over a 30-day period—was measured using Kessler-6, a 6-item screening scale.
Results: Of the participants reporting significant emotional distress (4.0% black, 3.5% white), χ^2 analyses revealed that a higher percentage of blacks, compared with whites, reported unhealthy sleep durations. Relative to Whites, Blacks had increased prevalence of short sleep (prevalence ratio = 1.32, $P < .001$) or long sleep (odds ratio =1.189, $P < .001$). The interaction between race/ethnicity and emotional distress was significantly associated with short (prevalence ratio = 0.99, $P < .001$) and long sleep (odds ratio = 0.98, $P < .001$) durations.
Conclusions: Individuals of the black race/ethnicity or those reporting greater levels of emotional distress are more likely to report short or long sleep duration. Emotional distress might partially explain racial/ethnic differences in unhealthy sleep duration between blacks and whites.

Introduction

The increasing prevalence of unhealthy sleep duration, defined as short (<7 h/d) or long (>8 h/d) sleep durations, is a serious public health challenge in the United States.[1–4] Evidence shows that unhealthy sleep duration is more prevalent among blacks compared with whites[5] and has been linked to increased cardiovascular and cerebrovascular risk, metabolic disorders, and diminished mental health functioning.[6,7] Whereas the negative health consequences of unhealthy sleep are well-documented, there are limited data on

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potential determinants of unhealthy sleep duration, especially among blacks in the United States, who have a higher prevalence of short and long sleep duration compared with whites.[1] Differences in sleep duration between blacks and whites have been attributed to (*a*) biological factors,[8,9] (*b*) behavioral factors,[10] (*c*) environmental factors,[11,12] (*d*) psychosocial factors,[13–15] and (*e*) medical conditions.[16,17] Of the 5 domains, psychosocial factors are generally considered the most proximal, easiest to modify, and therefore a potential target to improve overall sleep quantity and quality among blacks.

Prior studies have provided initial evidence that certain psychosocial factors, such as lower income, unemployment, and limited access to social resources (all psychosocial factors) among blacks may explain the development and maintenance of unhealthy sleep.[15,18] However, there is little population-based evidence regarding the impact of emotional distress (ED) on sleep duration and whether it might explain racial/ethnic disparity in unhealthy sleep durations. *Emotional distress* is defined as a state of emotional suffering characterized by symptoms of depression (eg, lost interest, sadness, and hopelessness) and anxiety (eg, restlessness and feeling tense)[19], which can affect overall health and well-being.[18] In fact, the often unrecognized and underanalyzed interaction between ED and sociodemographic factors, such as low socioeconomic status, may be masking the independent effect of ED on sleep. In light of the foregoing evidence, the aim of the current article was to explore whether ED might explain racial/ethnic disparity in unhealthy sleep durations.

Participants and methods

Participants

The study used data from the 2004-2013 National Health Interview Survey (NHIS). A total sample of 261,686 participants (blacks and whites) provided data for all analyses. Of the total sample, 17.0% were black and 83.0% were white. The mean age was 48 years (SE = 0.04). Participants were administered questionnaires to obtain demographic, socioeconomic, and medical data. NHIS sampling weights were applied in all analyses to ensure that the sample reflected the US population across the specific ages and to control for oversampling. For the current article, analyses included adults aged ≥18 years with complete data on all target variables.

Measures

To ascertain total sleep duration, participants were asked, "How many hours of sleep do you get on average in a 24-hour period?" Sleep duration was coded as short sleep (<7 hours), average sleep (7-8 hours), or long sleep (>8 hours).[15] Emotional distress—feeling sad, nervous, restless, hopeless, worthless, and burdened over a 30-day period—was measured using Kessler-6, a 6-item screening scale. Scores ranged from 0 to 24, and higher scores indicate greater levels of anxiety and depressive symptoms.[20] In our regression analyses, we coded Kessler-6 continuously because the mean ED score was 2.54 (SE = 0.01) and the majority of the sample had a score less than 13 and was not emotionally distressed. Treating Kessler-6 as a continuous variable accounts for more variance and increases the likelihood of detecting small effects on sleep duration.

Covariates

Possible confounding variables were identified and were included as covariates. Patient characteristics such as age, sex, body mass index (BMI), marital status, alcohol use, tobacco use, and family income were based on patient self-report. Age and BMI were used as continuous covariates, whereas all other variables were coded dichotomously: marital status (married/unmarried), alcohol use (currently using/not currently using), tobacco use (currently using/not currently using), family income (less than $35,000 per year/ more than $35,000 per year), employment (employed/unemployed), education (less than high school/greater than high school), and poverty status (below poverty line/above poverty line). Comorbidities (hypertension, coronary heart disease [CHD], heart condition, diabetes, and cancer) were assessed by participant self-report of ever being diagnosed by a physician with the condition.

Data analysis

Chi-square analysis was performed to assess association between demographic and target variables—ED and short, average, and long sleep durations (Table 1). We performed Poisson regression analysis to determine whether ED was independently associated with short or long sleep durations in blacks and whites, adjusting for sociodemographic factors (marital status, family income, employment, education, and poverty status), health risk behaviors (smoking and alcohol drinking), and chronic diseases (hypertension, heart disease, heart conditions, diabetes, and cancer). Other covariates also included age, BMI, and sex. All models were standardized and harmonized for the complex sample design of NHIS and adjusted for differences in NHIS sample design between 2004-2005 and 2006-2013. Rao-Scott corrections for χ^2 tests were also performed.

Primary analyses used Poisson regressions to calculate prevalence rates of short and long sleep relative to normal sleep. Four models were evaluated in the primary analyses. Model 1 was unadjusted, model 2 was age/sex adjusted, model 3 was adjusted for other patient characteristics (such as BMI, marital status, and SES), and model 4 was adjusted for medical comorbidities.

The interaction between ED and race was coded so that the interaction effect reflects the increase in the likelihood of short and long sleep for a 1-unit increase on the Kessler-6 for a black participant compared with their white counterparts.

Missing data for covariates were addressed by multiple imputations of 5 data sets using full conditional specification. All analyses were conducted using SPSS version 22 and R version 3.3.0. The analysis packages "survey" and "mitools" were used to deal with the complex sample design of NHIS and to create pooled estimates of results from the primary analyses.[21–23]

Results

Descriptive statistics

Of the total sample, 17.0% were black and 83.0% were white. The total sample mean score for ED was 2.5 (SE = 0.01). Of the total sample, 2.7% were very short sleepers, 26.82% were short sleepers, 61.59% were average sleepers, and 8.9% were long sleepers. Blacks (4.0%) had a higher prevalence of ED compared with whites (3.5%). Other variables analyzed included age (mean of 48, SE = 0.04), being married (45.1%), and obesity (BMI >30 kg/m^2) (27.1%). Black race/ethnicity and ED were significant predictors of short and long sleep durations. Descriptive analysis revealed that 36.6% of blacks reported short sleep duration, 9.7% reported long sleep duration, and 53.7% reported average sleep duration. Of the subsample of individuals with clinical distress, 53.0% reported short sleep duration, 14.9% reported long sleep duration, and 32.1% reported average sleep duration (Table 1).

Inferential statistics

Based on the covariate adjusted Poisson regression analysis, blacks have a 32% increased prevalence of reporting short sleep