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Elevated Sleep Disturbance Among Blacks in an Urban Family Medicine Practice

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Abstract

Purpose—Blacks experience a number of health disparities. Sleep disturbances contribute to poor health. This preliminary study explores whether a disparity exists for sleep disturbance in Blacks compared to Whites and Others.

Methods—A cross-sectional study was conducted in a sample (N=92) of urban, primary care patients (52% Black, 46% White, and 2% Other) from a university-based, family medicine practice. Mean (sd) age was 51.9 (8.9) years. Participants completed the Pittsburgh Sleep Quality Index, the Center for Epidemiologic Studies Depression Scale -Revised, and a checklist of chronic health-conditions.

Results—The rate of clinically meaningful sleep disturbance was 71%. In bivariate logistic regressions, Black race was associated with sleep disturbance (OR: 3.00; 95% CI: 1.17–7.69). Controlling for income attenuated that association by about 11% (race OR = 2.71; 95% CI 1.04–7.06). Education explained about 35% (race OR = 2.39; 95% CI .89–6.42). Adjustment for depression, chronic illness, and education simultaneously resulted in an estimate for race of OR = 2.44; 95% CI = .85–7.01.

Conclusions—Being Black is associated with having a sleep disturbance that is only partially accounted for by depression, socioeconomic status and disease burden. Black primary care patients may benefit from additional screening and monitoring of sleep difficulties.

Keywords

Sleep; Insomnia; Blacks; Race; Health Disparity

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Introduction

Regardless of economic status Blacksi in the United States experience chronic stress and consequent poor health due to social disadvantages (1–5) and stressor-related allostatic load (6). One often unrecognized and seldom examined component of illness that contributes to health status is sleep disturbance. Poor sleep may represent a response to stress (7), a component contributing to allostatic load (8;9), and/or a mediator between psychological distress and neuroendocrine effects leading to negative health outcomes (10;11). Thus, sleep disturbance may constitute an important contributor to health disparities in Blacks.

Sleep disturbances are associated with considerable morbidity (12;13) as well as with increased mortality (14), and even susceptibility to developing common colds (15). The most common form of sleep disturbance, chronic insomnia, occurs in approximately 10% of the general population and is associated with substantial economic costs and health consequences (16), including higher health care expenses (17), with direct costs estimated at US $13 billion per annum in physician visits, prescriptions and procedures (18). Not surprisingly, sleep disturbances, particularly insomnia, are highly prevalent in primary care patients (19). Chronic insomnia is an independent risk factor for hypertension (20), which is a key driver of the disproportionate overall illness burden in socioeconomically disadvantaged Blacks.

In general, both subjective (21;22) and objective (22;23) sleep disturbance are more pronounced in individuals with lower socio-economic status. Likewise, greater subjective (24) and objective (25) sleep disturbances have been observed in Blacks compared to Whites with some exceptions (26). Findings have consistently shown that Blacks have higher rates of sleep apnea (27–29), shorter or longer habitual sleep durations (30), and more objective indicators of insomnia (25) than Whites. Subjectively, Blacks report insomnia or indicators of insomnia at similar or lower rates than Whites (31–34), perhaps due to under-endorsement of insomnia in some Black samples (35). Taken together, the available literature suggests a disparity with respect to sleep disturbances in Black populations.

In this paper, we focus specifically on whether Blacks have more sleep disturbance than Whites and Others in a clinical sample as measured with a validated sleep instrument. We targeted middle aged and older adults, given the cumulative nature of chronic illness and the increase in sleep disturbances across the life span. We recruited participants from an urban primary care setting, given the increased burden of chronic disease among socioeconomically disadvantaged urbanites (36). We hypothesized that Blacks would be more likely to report sleep disturbance.

Methods

Participants and Procedure

Patients aged 40 and older, recruited in person and through flyers posted in the waiting room at the Family Medicine Center of the University of Rochester Medical Center directing them to call a research coordinator to schedule a research appointment at the Family Medicine Center or the General Clinical Research Center (*N*=107). The flyer and the informed consent document indicated that the time commitment for the study would be approximately 3 hours and that participants would be compensated $50 for their participation. At the appointment,

[i]We use the term “Black” to refer to people who self identify as being of African descent. This very diverse group includes U.S. born African Americans whose lineages have endured slavery and its sequelae, people of Afro-Caribbean descent, recent immigrants from Africa, and others.

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following written informed consent, participants completed an interview assessing demographics and psychosocial circumstances, the Pittsburgh Sleep Quality Index (PSQI) (37), the Center for Epidemiologic Studies Depression Scale-Revised (CES-D-R) (38), and a checklist of chronic health-conditions (see instruments, below) as well as a blood draw (these latter data reported elsewhere (39)). Fifteen participants did not complete the PSQI; they did not differ on any demographic variables from the rest of the sample.

Respondents completing all study instruments (*N*= 92) were middle -aged on average (*M* = 51.9 years, *SD*= 8.91), and the majority were female (77.2%), had an income level of less than $20,000 per year (62%), were not currently married (73.9%), and had children (83.7%). A little more than one quarter of the sample did not complete high school (26.1%). Participants were primarily Black (52.2%) and White (46.6%) with one participant each endorsing only American Indian/Native and Other, respectively. The latter two participants (2.2%) were combined with Whites into one White/Other group for analyses. The racial diversity of the sample mirrored the diversity of the entire clinic population. Additional racial and other characteristics of the sample are further detailed in Table 1.

Instruments

PSQI—The PSQI is a 24 item scale that measures sleep disturbances along 7 dimensions. Scores from these 7 dimensions (ranging from 0–3) are individually reported as component scores and summed to derive a global sleep quality score (0–21), with a score of >5 having been demonstrated to be indicative of a sleep disturbance (37). A subsequent reliability and validation study comparing the PSQI to sleep diaries and to objective polysomnographic measures of sleep in patients with insomnia found that using a cutoff of >6 resulted in the best sensitivity and specificity with respect to insomnia (40), a convention that we adopt in this study. Cronbach's alpha internal consistency in the current sample was .78, which compares to the .83 reported in the original validation study. We report the global score and each of the component scores, as well as two single items from the scale, that are useful self-report measures of sleep continuity disturbance observed in insomnia samples. These were total sleep duration (dichotomized at 6.5 hours) and sleep efficiency, which is the ratio of time spent in bed to total sleep duration (dichotomized at 85%).

CES-D-R—The CES-D-R is a 20-item measure of depressive symptoms in the previous week (38). Responses involve a 4 point Likert scale ranging from 0 ("not at all") to 3 ("nearly every day"). Cronbach's alpha internal consistency in the current sample was .93. For descriptive purposes we report both the total CES-D-R scores and total score with the sleep items removed, though only the latter were used in analyses.

Other health factors—Patients completed a checklist of chronic conditions adapted from that used in the Midlife Development in the US survey (41). The self-report checklist asks: "has a doctor ever told you you've had any of the following problems? Place a number to the left of each problem below: 0 = never; 1 = previously had this; 2 = have this now or within the last year." The 25 common chronic medical conditions span respiratory, gastro-intestinal, neurological, endocrine, and cardiovascular problems and conditions include "asthma," "recurring backache," "diabetes," and "persitent trouble with your mouth or gums." All items rated a 2 were summed to form a morbidity index (42). Bodyweight was also available from primary care charts for approximately 90% of the sample.

Statistical Analysis

Following descriptive statistics, a series of bivariate logistic regressions were conducted with sleep disturbance (PSQI >6), sleep duration (<6.5 hours per night), and sleep efficiency (<85%) as the dependent variables. The main predictor of interest was race (Black vs.

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White/Other) with additional predictors being, gender, employment status (employed vs. unemployed) annual household income (<$20,000 per years vs. ≥$20,000 per year), education level (no high school diploma vs. high school diploma or vs. a college degree), depressive symptoms (by CES-D-R quartile with sleep items removed), and disease burden (Morbidity Index). We also considered age and body weight as potential covariates. We tested each covariate separately in models predicting PSQI >6 from race, and subsequently included all significant covariates in the final model. To examine if any of the other predictors explained observed associations between race and sleep disturbance, we computed the change in estimate resulting from including each variable in the model ([unadjusted OR for race – adjusted OR for race]/[unadjusted OR for race – 1]). Although neither the CES-D-R category absent sleep items nor the Morbidity Index differed by race or by income, we conservatively adjusted for depression and common medical conditions. Finally, to further assess whether specific chronic illnesses were associated with sleep disturbance, contingency analyses were conducted for the presence or absence of specific conditions derived from the self-reported checklist) -and PSQI scores above or below our cutoff. All analyses were conducted in SPSS 17.0 (SPSS, Inc.).

Results

Descriptive Findings

Descriptive statistics for the global PSQI, the 7 PSQI component scores, the sleep duration and efficiency items, depressive symptomatology score from the CESD-R (excluding the sleep items), age, body weight and morbidity are presented in Table 2. Using a cutoff of 6 to identify the presence of clinical sleep disturbance or insomnia, 70.7% (n = 65) of the sample scored above the cutoff. The high mean PSQI global score of 10.0 (4.9) is elevated compared to a healthy sample, and to a sample with suspected sleep apnea, and is comparable to values observed in an insomnia sample in the original PSQI validation studies (37).

Using the CES-D-R (including the sleep items) to classify individuals with a moderate to high likelihood of major depression, 46.7% (n = 43) met the standard CES-D-R cutoff of 16; 33.7% (n = 31) met the higher suggested cutoff of 21 for older adults (43). As might be expected, Pearson correlation coefficients showed that the CES-D-R (excluding the sleep items) was correlated with poorer global sleep quality (r= .53; p < .001), shorter sleep duration (r= .24; p < .05) and lower sleep efficiency (r= .23; p < .05). Patients with and without sleep disturbance did not significantly differ by age (PSQI global sleep quality score > 6: M = 51.14, SD= 7.71; PSQI score 6 or below: M= 53.59; SD = 11.28, p = .23) or body weight (PSQI global sleep quality score > 6: M= 201.23, SD= 42.78; PSQI score 6 or below: M= 196.22, SD = 46.17, p = .62). The differences in morbidity index scores for patients with and without sleep disturbance approached statistical significance (PSQI global sleep quality score > 6: M= 4.42, SD= 3.34; PSQI score 6 or below: M= 3.11, SD = 2.12, p = .06).

Sleep Disturbance and Race

Binary logistic regression models predicting sleep disturbance (PSQI global sleep quality score >6) are presented in Table 3. Black race was related to the presence of sleep disturbance (OR: 3.00; 95% confidence interval: 1.17–7.69) in the unadjusted model (Model 1). In subsequent models that adjusted for gender, employment status, income category (at or above, or below, $20,000 per year), education, CES-D-R quartile, or chronic disease morbidity, race remained associated with global sleep quality (Models 2–7). Only two predictors explained more than 10% of the association between race and sleep disturbance: income (attenuation in OR = [3.0 – 2.79]/[3.0 – 1] = .105) explained roughly 10.5% and education ([3.0 – 2.31]/[3.0 −1] = .345) 34.5% of the risk associated with Black race.

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Including all significant covariates in a model simultaneously (Full Model) yielded an association between race and sleep disturbance comparable in magnitude to the unadjusted association (OR: 2.44; 95% confidence interval: 0.85–7.01). This same pattern of findings was observed in models using sleep duration (sleep duration <6.5 hours per night) as the dependent variable, though race was not a significant predictor in models using sleep efficiency (<85%) as the dependent variable (data not shown).

Discussion

There was a high rate of sleep disturbance in this urban primary care sample (>70%). The mean global PSQI score in the sample was higher than is typically observed in samples of sleep apnea patients (37;44;45) and similar to the level of severity observed in patients suffering from primary insomnia (37), hemodialysis patients (46) and patients with lung cancer (47). Most notably, race was a significant independent correlate of sleep disturbance. This finding from a clinical sample is similar to that observed by Hall et al. in a recent multi-site, community study of mid-life women(22).

In the current study, being Black was related to roughly 3 times the odds of having a sleep disturbance compared to being White/Other. Race remained a significant correlate of sleep disturbance after controlling for income, employment and a number of other factors which explained around 10% or less of the association. Controlling for education, however, explained roughly 35% of the risk associated with race. Further longitudinal work might examine the biopsychosocial mechanisms accounting for these findings. The role of chronic stress and unmeasured lifestyle factors such as diet and exercise will be important to consider.

Limitations of this study include its cross-sectional nature, which prohibits any causal interpretations of these findings, a relatively small sample size, and the collection of data from only one primary care setting, which is not representative of the general population and may not represent other urban community samples. In addition, neither medication status nor body mass index were available in a manner that could be subjected to rigourous analysis, though both can contribute to sleep disturbance though groups did not differ with respect to the PSQI component that measures sleep medications and several correlates of obesity (weight that was available from chart review, presence of diabetes taken from the chronic condition checklist, and presence of snoring derived from PSQI item #5e). It is also possible that the generally low educational level of this cohort may have introduced random error in responses on self-report instruments. This would make it less, rather than more likely to detect associations. Finally, our overall sample was generally low on all socio-economic indicators and predominantly female, limiting the generalizability of the findings.

Notwithstanding these limitations, the strengths of the study include the use of a validated sleep instrument in an ethnically diverse sample to assess the contributions of race to sleep disturbance severity, while adjusting for levels of depression and disease burden. The findings support the notion that a disparity exists for Blacks with respect to sleep disturbance. Such results indicate a need for large scale prevalence studies to see if this estimate is broadly generalizable. It will also be important to test whether higher chronic stress is a key contributor to higher rates of poor sleep among Blacks. Further work is also needed on whether midlife and older Black patients in urban primary care settings may benefit from screening and/or increased monitoring for sleep problems.

This is important for several reasons. First, sleep disturbance is becoming increasingly recognized as a risk factor for significant morbidity and, to some extent, mortality. With respect to Blacks in particular, further work is needed to test the extent to which sleep

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disturbances independently contribute to the established higher prevalence rates of hypertension and cardiovascular disease in these populations. Second, most common sleep disturbances can be effectively treated, but remain vastly under-recognized and under-treated (13;48). Importantly, efficacious behavioral sleep medicine interventions that could be integrated into primary care settings exist for a variety of sleep disturbances (49). Finally, although the general population has poor access to such specialty services, access is likely evenworse in traditionally underserved populations. Cost effective means to deliver interventions for sleep disturbances in the primary care context merit consideration.

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Abbreviations

sd	standard deviation
PSQI	Pittsburgh Sleep Quality Index
CESD-R	Center for Epidemiological Studies Depression Scale-Revised
OR	Odds Ratio
CI	Confidence Interval

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Table 1

Sample Characteristics for Total Sample and for Black and White/Other Participants

	Total Sample	Black	White/Other
Race [*n* (%)]	92 (100.0)	48 (52.2)	44 (48.8)
White, non-Hispanic	40 (43.5)	0	40
Black, non Hispanic	44 (47.8)	44	0
Hispanic[a]	3 (3.3)	2	1
American Indian or Alaska Native[b]	4 (4.3)	2	2
Other	1 (1.1)	0	1
Age [mean (range)]	51.9 (40–80)	51.3 (40–80)	52.5 (40–79)
Gender [female *n* (%)]	71 (77.2)	39 (81.3)	32 (72.7)
Education [*n* (%)]			
No high school diploma	24 (26.1)	16 (33.3)	8 (18.2)
GED or graduated from high school	21 (22.8)	14 (29.2)	7 (14.6)
Some college	8 (8.7)	3 (6.3)	5 (10.4)
Associate's degree or 2 years of college	23 (25.0)	13 (27.1)	10 (20.8)
College graduate	10 (10.9)	1 (2.1)	9 (18.8)
Graduate degree	6 (6.5)	1 (2.1)	5 (10.4)
Employment status [*n* (%)]			
Employed (Total)	27 (29.3)	13 (27.1)	14 (31.8)
Full time employment	17 (18.5)	10 (20.8)	7 (15.9)
Part time employment	10 (10.9)	3 (6.3)	7 (15.9)
Unemployed (Total) [c]	65 (70.7)	35 (72.9)	30 (68.2)
Homemaker	2 (2.2)	1 (2.1)	1 (2.1)
Retired	8 (8.7)	3 (6.3)	5 (11.4)
On disability	37 (40.2)	19 (39.6)	18 (40.9)
Looking for paid work	17 (18.5)	13 (27.1)	4 (9.1)
Not looking for paid work	15 (16.3)	7 (14.6)	8 (18.2)
Household income level [*n* (%)]			
Less than $20,000 per year	57 (62.0)	34 (70.8)	23 (52.3)
Equal to or greater than $20,000	35 (38.0)	14 (29.2)	21 (47.7)

[a] Two Hispanic participants also endorsed Black and the other endorsed White.

[b] Two American Indian/Native Alaskan participants also endorsed Black, 1 also endorsed White and the other endorsed only American Indian/Native Alaskan.

[c] Some respondents endorsed more than one category of unemployment status.

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Table 2

Mean (sd) scores for sleep quality depression, and chronic illness morbidity for the urban primary care patients (*N*= 92).

Variable	Mean	sd
PSQI Global sleep quality	10.00	4.88
PSQI Components		
1. Subjective sleep quality	1.57	0.96
2. Sleep latency	1.70	1.08
3. Sleep duration	1.28	1.14
4. Sleep efficiency	1.26	1.23
5. Sleep disturbance	1.96	0.80
6. Use of sleep medication	1.17	1.34
7. Daytime dysfunction	1.22	0.84
PSQI Items		
Average sleep duration (hours)	5.83	1.77
Habitual sleep efficiency (%)	75.00	20.10
Depression		
CES-D-R	17.19	12.37
CES-D-R (minus sleep items)	14.10	11.90
Morbidity Index	4.1	3.1

PSQI = Pittsburgh Sleep Quality Index; CESD-R = Center for Epidemiological Studies Depression Scale-Revised.

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Table 3

Percentages of selected characteristics by sleep disturbance (PSQI > 6) and odds ratios and confidence intervals from hierarchical logistic regression models predicting sleep disturbance.

Characteristic	% with PSQI > 6	Model 1 OR (95% CI)	Model 2 OR adjusted (95% CI)	Model 3 OR adjusted (95% CI)	Model 4 OR adjusted (95% CI)	Model 5 OR adjusted (95% CI)	Model 6 OR adjusted (95% CI)	Model 7 OR adjusted (95% CI)	Full Model OR Adjusted (95% CI)
Race/ethnicity									
Black	81.3	3.00* (1.17–7.69)	2.97* (1.15–7.65)	2.92* (1.15–7.86)	2.71* (1.04–7.06)	2.39† (.89–6.42)	2.91* (1.07–7.94)	3.15* (1.20–8.26)	2.44† (.85–7.01)
White/Other	59.1								
Gender									
Male	66.7		(referent)						
Female	71.8		1.13 (.38–3.33)						
Employment status									
Employed (full or part time)	23.1			(referent)					
Unemployed/retired/on disability	76.9			2.20 (.82–5.92)					
Income per year									
Less than $20,000	77.2				1.93 (.75–4.97)				
Equal to or greater than $20,000	60.0								
Education level									
No high school diploma or GED	83.3					3.51* (.98–12.59)			2.86 (.73–11.19)
High school diploma/GED and some college	82.8					3.63* (1.12–11.73)			2.60 (.74–9.23)
Associate's degree or higher	53.8					(referent) [b]			(referent) [b]
CES-D-R[a] quartiles									
Lowest quartile	45.0						(referent) [c]		(referent) [c]
2nd quartile	65.2						2.12 (.60–7.56)		1.74 (.46–6.58)
3rd quartile	80.8						4.28* (1.10–16.60)		3.14 (.77–12.87)
Highest quartile	87.0						8.38* (1.78–39.60)		6.37* (1.30–31.25)
Morbidity index[d]	--							1.19† (.99–1.42)	1.10 (.89–1.36)

OR = odds ratio; CI = confidence interval; PSQI = Pittsburgh Sleep Quality Index; CESD-R = Center for Epidemiological Studies Depression Scale-Revised; *N*= 92; Model 1 provides the OR for the unadjusted model of the association between race/ethnicity and sleep disturbance; Models 2 – 7 provide the ORs for the adjusted models of the association between race/ethnicity and sleep disturbance (each model OR is adjusted for a single covariate); The Full Model provides the OR for the fully adjusted model of the association between race/ethnicity and sleep disturbance (i.e., after adjusting for all covariates).

[a] CES-D scores exclude sleep items

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[b] The OR for education level represents the odds compared to the highest education level (having an Associate's degree or higher)

[c] The OR for each CES-D quartile represents the odds compared to the lowest quartile

[d] The morbidity index is a continuous variable

[*] Wald statistic, $p \leq .05$;

[†] Wald statistic, $p < .1$