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Racial Differences in Self-Reports of Short Sleep Duration in an Urban-Dwelling Environment

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Objectives. To explore whether there are differences in sleep duration between blacks and whites residing in similar urban neighborhoods and examine whether the relationship between sleep durations and sociodemographic and/or health indices are consistent for blacks and whites.

Methods. A total of 1,207 participants from the Healthy Aging in Neighborhoods of Disparities across the Life Span study (age: mean = 47, standard deviation = 8.74). Sleep duration was assessed by a self-report of hours of nightly sleep in the past month. Sociodemographic measures included age, sex, education, poverty status, and perceived neighborhood disorder. Health status was assessed using measures of vigilance, depression, perceived stress, coronary artery disease, diabetes, blood pressure, and inflammation.

Results. There were no significant racial group differences in sleep duration. Whites, however, were more likely than blacks to report sleep durations of <6/6–7 hr compared with >7 hr with increasing stress and education levels. Blacks were more likely than whites to report short sleep durations (i.e., 6–7 hr vs. >7 hr of sleep) with increasing inflammation levels.

Discussion. Although racial disparities in sleep duration are minimized when the environment is equivalent between blacks and whites, the underlying demographic and health explanations for short sleep durations may vary between whites and blacks.

Key Words: Aging—Race—Sleep duration.

SHORT sleep duration (6 hr or less per night) is associated with multiple adverse health outcomes including risk for coronary artery disease (Cappuccio, Cooper, D'Elia, Strazzullo, & Miller, 2011; King et al., 2008), stroke (Cappuccio et al. 2008; King et al., 2008), hypertension (Dean et al., 2012; Gottlieb et al, 2006), diabetes (Gottlieb et al., 2005; Van Cauter, Spiegel, Tasali, & Leproult, 2008), obesity (Cappuccio et al., 2008; Patel & Hu, 2008), immune system changes (Motivala, 2011; Prinz, 2004), inflammation (Motivala, 2011; Prinz, 2004), depression (Perlman, Johnson, & Mellman, 2006; Yoshitaka et al., 2006), anxiety (Taylor, Lichstein, Durrence, Reidel, & Bush, 2005; van Mill, Hoogendijk, Vogelzangs, van Dyck, & Penninx, 2010), and mortality (Cappuccio, D'Elia, Strazzullo, & Miller, 2010; Kripke, Garfinkel, Wingard, Klauber, & Marler, 2002; Tamakoshi & Ohno, 2004). Short sleep duration is also associated with deficits in memory (Bastien et al., 2003; Schmutte, Harris, Levin, Zweig, Katz, & Lipton, 2007), processing speed (Bastien et al., 2003), attention (Blackwell et al., 2011; Ohayon & Vecchierini, 2005), and language (Fenn, Nusbaum, & Margoliash, 2003). Previous literature has suggested that individuals residing in urban and/or heavily populated environments may be at increased risk for short sleep, perhaps due in part to stressful neighborhood conditions including crime, noise, limited access to resources, and discrimination (Hale & Do, 2007). However, there is limited research exploring the sleep duration differences in sociodemographic and health indices for individuals living in an urban environment.

Much of the previous research has suggested that blacks tend to report both shorter (≤6 hr) and longer (≥9 hr) sleep durations than whites (Durrence & Lichstein, 2006; Hale & Do, 2007; Krueger & Friedman, 2009; National Sleep Foundation, 2010; Nunes et al., 2008). Physiological measures of sleep, such as polysomnography (PSG) and actigraphy, have further supported that blacks were more likely than whites to have shorter sleep durations (Lauderdale et al., 2006), lower sleep efficiency (Mezick et al., 2008), and to have spent less time in deep wave sleep (Mezick et al., 2008). Given sleep loss is associated with adverse health conditions (i.e., hypertension, diabetes, and cardiovascular disease) that are commonly observed in blacks (Flegal, Carroll, Ogden, & Curtin, 2010; Ford, Giles, & Dietz, 2002; Lloyd-Jones et al., 2009; Nunes et al., 2008), researchers have attempted to account for potential socioeconomic status (SES), mental health (i.e., depression)

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lifestyle factors (i.e., alcohol/cigarette consumption, physical activity) that may explain racial sleep disparities and consequently racial health disparities (Nunes et al., 2008). Research, however, has reported mixed findings, either suggesting that racial differences in sleep are no longer significant after accounting for measures of SES (i.e., income; Fiorentino, Marler, Stepnowsky, Johnson, & Ancoli-Israel, 2006) or racial differences in sleep remain significant even after accounting for SES, mental health, and/or lifestyle factors (i.e., cigarette or alcohol consumption, Lauderdale et al., 2006, Mezick et al., 2008; Nunes et al., 2008).

Much of the previous research has included nationally representative samples, in which blacks and whites are less likely to be recruited from similar environments. Blacks are more likely to reside in urban and highly populated environments, which may explain the sleep disturbances often observed in this population (Hale & Do, 2007). However, investigators have not taken an approach of exploring whether racial sleep disparities are observed in a strictly urban environment, which may better account for features of the environment (i.e., noise, crime, and discrimination) rather than attempting to statistically control for an individual's education, income, mental health, and/or lifestyle. If stressful urban neighborhood conditions are linked to poor sleep duration in blacks, then it is likely that these same stressful conditions are linked to poor sleep duration in whites residing in these same neighborhoods. Thus, this approach may illustrate the importance of addressing poor sleep not just in blacks but also in whites residing in similar environments. Furthermore, significant findings suggesting that social context, rather than racial ethnicity per se, is associated with poor sleep may better aid in developing interventions designed in modifying the environment to improve sleep across a large community. Limited research, however, has explored whether blacks and whites living in an urban environment differ in their sleep durations and whether similar contextual and health factors are associated with worse sleep for urban-dwelling blacks and whites.

Accordingly, the current study explores two specific aims. The first aim examines whether there are racial differences in sleep duration in the Healthy Aging in Neighborhoods of Disparities across the Life Span (HANDLS) study. The second aim investigates whether the sociodemographic and/health indices related with sleep duration are consistent between whites and blacks.

Method

The current study included participants from the HANDLS study, a prospective longitudinal epidemiologic study of health disparities in a sample of urban-dwelling adults living in Baltimore, Maryland (Evans et al., 2010). A primary objective of HANDLS is to explore the relationship between SES and health in working-age, urban-dwelling blacks and whites (Evans et al., 2010). Between 2004 and 2009, HANDLS recruited 3,720 participants (55% females), ranging in age from 30 to 64 years, for baseline testing. Field interviewers performed face-to-face/doorstep interviews to recruit eligible participants from 13 neighborhoods in Baltimore city. Eligible participants were asked to complete surveys and make appointments for further physical and cognitive examinations on a mobile medical research vehicle located close or within the participants' neighborhood. A more detailed description of HANDLS project study design, recruitment procedures, measures, and baseline sample demographics has been previously published (Evans et al., 2010). Data for the current study included 1,207 participants (whites: $n = 608$; blacks: $n = 599$) who completed a majority of the sociodemographic and health indices at Wave 1 data collection (2004–2009) and the sleep duration measure, which was included at Wave 3 data collection (2009 to present). The average time between Wave 1 and Wave 3 was 4.5 years. The MedStar institutional review boards approved this study, and all participants provided written informed consent.

Sociodemographic and Health Indices

Sociodemographic measures included age, sex, race, and education. Poverty status was categorized as 0 (*family income < 125% the poverty threshold*) or 1 (*family income ≥ 125% the poverty threshold*) as defined by the Federal poverty threshold (Evans et al., 2010). A family income less than 125% the poverty threshold suggests that on average participants' income was less than 1.25 times the U.S. national poverty threshold. Perceptions of neighborhood disorder (Simcha-Fagan & Schwartz, 1986) was measured by a self-report ($\alpha = 0.92$) of commonly observed neighborhood characteristics (i.e., graffiti, litter, abandoned cars, drug dealers, unemployed loitering adults, gang activity, misbehaving children, prostitution, abandoned buildings, broken windows, crime, and unkempt houses). For each neighborhood characteristics, participants' responses ranged from 1 (*very rare*) to 5 (*very common*). For individuals who provided a response to at least 10 of the neighborhood characteristics, a sum score across the neighborhood disorder characteristics was estimated and included in the analyses. Trust of people in the neighborhood was also assessed by a self-report of feeling that people in the neighborhood can be trusted based upon a scale of 1 (*strongly agree*) to 5 (*strongly disagree*). Discrimination was assessed using the Everyday Discrimination Scale, a nine-item measure ($\alpha = 0.84$) assessing the frequency of day-to-day experiences (i.e., being treated with less courtesy, being treated with less respect, receiving poorer service, people acting as if you are uneducated, people afraid of you, people think you are dishonest, as well as being insulted, threatened, and/or harassed). For each item, responses ranged from 1 (*almost every day*) to 6 (*never*). A sum of the nine items was included in the current study's analyses (Williams, Yu, Jackson, & Anderson, 1997).

To assess mental health, the analyses included measures of vigilance, depressive symptoms, and perceived stress. Vigilance was measured by a six-item subscale ($\alpha = 0.58$) of the Multiscale Measure of Reactive Responding (Taylor & Seeman, 1999). The vigilance measure asked participants to report on a scale of 0 (*strongly agree*) to 4 (*strongly disagree*) to items such as "I feel safe most places without having to be on the lookout for danger"; "I'm not someone who worries about who's coming up behind me"; "I am pretty relaxed in most situations." A total score ranging from 1 (*low vigilance*) to 30 (*high vigilance*) was included in the current study's analyses. The Center for Epidemiological Studies Depression (CESD; Radloff, 1977) scale was used to measure depressive symptoms; total scores ranging from 1 (*no depressive symptoms*) to 60 (*high depressive symptoms*) were included in the current study's analyses. The participants' sense of their "basal state of stress" was assessed with the Perceived Stress Scale-4 (Cohen, Kamarck, & Mermelstein, 1983), which asked participants to respond to four items regarding stressful feelings and thoughts within the past month. The total score, which ranged from 1 (*no stress*) to 20 (*very stressed*), was included in the current study's analyses.

Several indices were conducted to assess physical health. Coronary artery disease (CAD) was measured by self-report. Diabetes status was assessed by a self-report history of diabetes, fasting glucose greater than 125 mg/dL, and/or use of hypoglycemic agents. High-sensitivity C-reactive protein was used as a measure of inflammation and was obtained from participant serum samples using standard laboratory methods (Quest Diagnostics, Chantilly, VA). As an objective assessment of a basic cardiovascular health, resting blood pressure (BP) readings were obtained while the participant was sitting with legs uncrossed using the brachial artery auscultation method and a stethoscope. For each individual, average systolic BP (SBP) and diastolic BP (DBP) across the two readings were calculated. Weight and height were measured, and body mass index (BMI) was calculated and included in the current study's analyses.

Sleep Duration

Sleep duration was measured by a single item that asked participants to rate on a Likert scale how many hours of sleep they obtained at night in the past month (0, *>7 hr*, to 3, *<5 hr*). Because only one participant reported less than 5 hr of sleep, the last two categories of the sleep duration item were collapsed. Thus, the range of the revised sleep duration variable used in the analyses was 0 (*>7 hr*) to 2 (*<6 hr*).

Statistical Analyses

Descriptive statistics for all the variables included in subsequent analyses were initially conducted for entire sample, and then separately for each racial group. To explore potential racial group differences across the measures, *t*-tests were conducted for the continuous measures, and chi-square tests were conducted for the dichotomous measures. To test our specific aims, a three-step multinomial logistic regression was conducted. The first model tested whether race was a significant predictor of sleep duration. The second model tested whether race remained a significant predictor after adjusting for demographic and health characteristics. All covariates were simultaneously entered into the model. The third model additionally included interactions between race and the demographic or health variables. Specifically, this model tested aim of our second study whether the relationships between sleep duration and the demographic or health characteristics varied by race. All continuous variables were grand mean centered by the sample's average score, and these centered variables were included in the multinomial models. Analyses were performed using the Statistical Package for Social Sciences, Version 17.

Results

Table 1 illustrates sample characteristics for the total sample and by whites and blacks. The total sample included 1,207 (whites = 608, blacks = 599) participants. Approximately 23% of the total sample reported sleep durations of 6 hr or less.

Compared with blacks, whites were older—age: $t(1,205) = 2.21$, $p = .027$, $d = .13$—and had greater years of education—$t(1,045) = 3.13$, $p = .002$, $d = .19$). Additionally, on average, whites reported more neighborhood disorder—$t(1,161) = 4.58$, $p < .001$, $d = .27$—than blacks, particularly for the following: graffiti, $\chi^2(4) = 47.30$, $p < .001$, $V = .20$; litter, $\chi^2(4) = 37.70$, $p = .000$, $V = .18$; drug dealers, $\chi^2(4) = 34.41$, $p < .001$, $V = .17$; gang activity, $\chi^2(4) = 23.96$, $p < .001$, $V = .14$; misbehaving children, $\chi^2(4) = 23.54$, $p < .001$, $V = .14$; prostitution, $\chi^2(4) = 57.23$, $p < .001$, $V = .22$; crime, $\chi^2(4) = 22.55$, $p < .001$, $V = .14$; and unkempt houses, $\chi^2(4) = 25.40$, $p < .001$, $V = .15$). Whites, on average, also reported greater vigilance, $t(929) = 5.55$, $p < .001$, $d = .36$; stress, $t(898) = 2.91$, $p = .004$, d = .19; and history of diabetes, $\chi^2(1) = 6.20$, $p = .013$, $V = .07$, than blacks.

Compared with whites, blacks were more likely to be below poverty status, $\chi^2(1) = 41.27$, $p < .001$, $\phi = 0.19$). Further, blacks reported more abandoned cars, $\chi^2(4) = 21.64$, $p < .001$, $V = .14$); abandoned buildings, $\chi^2(4) = 16.80$, $p = .002$, $V = .12$; more discrimination, $t(1,159) = 3.07$, $p = .002$, $d = .18$; and distrust of people in the neighborhood, $\chi^2(4) = 15.93$, $p = .003$, $V = .12$, than whites. As well, blacks had greater SBP, $t(1,095) = -2.16$, $p = .031$, $d = .13$.

No racial group differences were observed for sex, $\chi^2(1) = 0.05$, $p = .830$; depressive symptoms, CESD, $t(1,097) = 1.12$, $p = .263$; history of CAD, $\chi^2(1) = 0.15$,

Table 1. Sample Characteristics of Total Sample and within Racial Groups

		Racial groups		
	Total, $n = 1207$	Whites, $n = 608$	Blacks, $n = 599$	p Value
Age	47.34 ± 8.74	47.89 ± 8.78	46.78 ± 8.67	.027
Female	715 (59.2)	362 (59.5)	353 (58.9)	.830
Poverty status, below	461 (38.2)	178 (29.3)	283 (47.2)	.000
Education	12.77 ± 3.18	13.07 ± 3.61	12.48 ± 2.67	.002
Neighborhood disorder	31.49 ± 13.15	33.28 ± 12.84	29.78 ± 13.22	.000
Graffiti, common	339 (29.1)	199 (34.9)	140 (23.5)	.000
Litter, common	653 (56.0)	353 (61.9)	300 (50.4)	.000
Abandoned cars, common	192 (16.5)	84 (14.8)	108 (18.1)	.000
Drug dealers, common	591 (50.7)	308 (54.0)	283 (47.4)	.000
Loitering adults, common	474 (40.8)	241 (42.3)	233 (39.2)	.073
Gang activity, common	223 (19.4)	112 (19.9)	111 (18.9)	.000
Misbehaving children, common	427 (36.6)	224 (39.3)	203 (34.0)	.000
Prostitution, common	352 (30.4)	223 (39.2)	129 (21.9)	.000
Abandoned buildings, common	345 (29.6)	156 (27.4)	189 (31.7)	.002
Broken windows, common	222 (18.4)	108 (18.9)	114 (19.1)	.084
Crime, common	256 (22.1)	138 (24.2)	118 (20.0)	.000
Unkempt houses, common	368 (31.6)	196 (34.4)	172 (28.9)	.000
Trust people, disagree	361 (31.1)	173 (30.4)	188 (31.8)	.003
Discrimination	42.66 ± 8.23	43.42 ± 7.74	41.94 ± 8.62	.002
Sleep duration				.330
>7 hr	392 (38.3)	202 (40.2)	190 (36.5)	
6–7 hr	395 (38.6)	183 (36.4)	212 (40.8)	
<6 hr	236 (23.1)	118 (23.5)	118 (22.7)	
Vigilance	12.93 ± 6.65	14.09 ± 6.64	11.71 ± 6.45	.000
CESD	14.32 ± 11.20	14.68 ± 11.53	13.92 ± 10.84	.263
Stress	9.65 ± 4.80	10.09 ± 4.56	9.17 ± 5.00	.004
CAD, yes	34 (3.3)	19 (3.5)	15 (3.0)	.695
Diabetes, yes	167 (14.8)	101 (17.3)	66 (12.1)	.013
BMI	30.12 ± 7.77	30.31 ± 7.62	29.91 ± 7.92	.393
hsCRP	4.49 ± 8.91	4.33 ± 6.73	4.66 ± 10.77	.542
BP (diastolic)	72.43 ± 10.60	72.36 ± 10.29	72.50 ± 10.94	.830
BP (systolic)	119.33 ± 16.94	118.27 ± 17.12	120.48 ± 16.69	.031

Notes. Means and (standard deviations) illustrated for continuous variables. Number of (percentage) illustrated for dichotomous variables. BMI = body mass index; BP = blood pressure; CAD = coronary artery disease; CESD = Center for Epidemiological Studies-Depression scale; hsCRP = high-sensitivity C-reactive protein.

p = .695; BMI, $t(1,127) = 0.85$, p = .393; inflammation, $t(1,100) = -0.61$, p = .542); and DBP, $t(1,091) = -0.21$, p = .830.

Race and Sleep Duration

Race was not a significant predictor of sleep duration in the unadjusted and adjusted multinomial logistic models (see Table 2). However, some demographic and health indices were significant predictors of sleep duration. For example, lower levels of education, greater depressive symptoms, greater DBP levels, lower SBP levels, and increased BMI were associated with an increased likelihood of reporting sleep durations ≤7 hr compared with greater than 7 hr.

Although race was not a significant predictor of sleep duration, we did observe in our third multinomial regression model that the relationship between short sleep durations and demographic or health factors did vary by race (Table 2). Specifically, whites were more likely than blacks to report sleep durations ≤7 hr compared with greater than 7 hr with increasing stress and education levels. In contrast, blacks were more likely than whites to report short sleep durations (i.e. 6–7 hr of sleep vs. >7 hr of sleep) with increasing inflammation levels.

Discussion

Twenty-three percent of the participants in the current study reported sleeping 6 hr or less. Currently, the American Academy of Sleep Medicine recommends daily sleep durations of 7.5–8.5 hr for the average adult to function optimally (Collop, Salas, Delayo, & Gamaldo, 2008). Thus, almost of a quarter of our sample is reporting an inadequate amount of sleep, which is consistent with previous national

Table 2. Multinomial Odds Ratios (95% Confidence Interval) of <6 hr of Sleep and 6–7 hr of Sleep Relative to >7 hr of Sleep on Race, Sociodemographic and Health Variables

	M1	M2	M3
<6 Sleep hours vs. >7 sleep hours			
Sociodemographics			
Race, black	1.06 (0.77–1.47)	1.21 (0.78–1.87)	5.80 (0.38–88.76)
Age		1.00 (0.98–1.03)	1.01 (0.97–1.05)
Sex, male		0.90 (0.57–1.40)	0.69 (0.37–1.29)
Poverty status, below		1.16 (0.74–1.82)	1.03 (0.52–2.02)
Education		0.91 (0.84–0.98)*	1.04 (0.92–1.18)
Neighborhood disorder		1.01 (0.99–1.02)	0.99 (0.97–1.02)
Discrimination		1.01 (0.98–1.04)	0.99 (0.96–1.03)
Mental health			
Vigilance		0.98 (0.94–1.01)	0.99 (0.95–1.04)
CESD		1.04 (1.02–1.07)***	1.05 (1.02–1.09)**
Stress		0.99 (0.94–1.04)	1.05 (0.98–1.12)
Physical health			
CAD, yes		2.33 (0.70–7.83)	5.41 (0.87–33.80)
Diabetes, yes		1.53 (0.82–2.86]	1.96 (0.78–4.89)
BMI		1.03 (1.00–1.06)	1.02 (0.98–1.07)
hsCRP		1.00 (0.98–1.03)	0.99 (0.97–1.02)
BP diastolic		1.03 (1.00–1.06)*	1.05 (1.01–1.09)*
BP systolic		0.99 (0.97–1.00)	0.98 (0.95–1.00)
Interactions			
Race × Age			0.99 (0.94–1.05)
Race × Sex			0.59 (0.23–1.52)
Race × Poverty status			0.72 (0.28–1.86)
Race × Education			0.81 (0.69–0.96)*
Race × Neighborhood disorder			1.03 (0.99–1.07)
Race × Discrimination			1.04 (0.99–1.11)
Race × Vigilance			0.96 (0.89–1.04)
Race × CESD			1.00 (0.95–1.05)
Race × Stress			0.88 (0.79–0.98)*
Race × CAD			4.68 (0.39–56.32)
Race × Diabetes			1.78 (0.49–6.50)
Race × BMI			1.00 (0.94–1.07)
Race × CRP			1.04 (0.98–1.11)
Race × BP Diastolic			0.97 (0.91–1.03)
Race × BP Systolic			1.02 (0.98–1.06)
6–7 Sleep hours vs. >7 sleep hours			
Sociodemographics			
Race, black	1.23 (0.93–1.63)	1.07 (0.74–1.55)	1.47 (0.10–21.32)
Age		1.01 (0.98–1.03)	1.02 (0.99–1.05)
Sex, male		0.87 (0.60–1.28)	0.77 (0.45–1.31)
Poverty status, below		0.82 (0.55–1.23)	0.80 (0.43–1.46)
Education		0.97 (0.91–1.03)	1.07 (0.95–1.19)
Neighborhood disorder		1.00 (0.99–1.02)	1.00 (0.97–1.02)
Discrimination		0.99 (0.97–1.01)	1.00 (0.97–1.03)
Mental health			
Vigilance		1.01 (0.98–1.04)	1.01 (0.97–1.05)
CESD		1.00 (0.98–1.03)	1.01 (0.98–1.04)
Stress		1.00 (0.96–1.04)	1.06 (1.00–1.13)*
Physical health			
CAD, yes		1.54 (0.47–5.07)	1.99 (0.31–12.73)
Diabetes, yes		1.32 (0.75–2.31)	1.25 (0.51–3.07)
BMI		1.03 (1.00–1.06)*	1.04 (0.99–1.08)
hsCRP		0.99 (0.96–1.01)	0.92 (0.86–0.97)**
BP diastolic		1.02 (1.00–1.05)	1.02 (0.99–1.06)
BP systolic		0.98 (0.96–1.00)**	0.98 (0.96–1.00)
Interactions			
Race × Age			0.98 (0.93–1.02)
Race × Sex			0.76 (0.35–1.66)

(*Table 2 continues*)

Table 2. (*continued*)

	M1	M2	M3
Race × Poverty status			0.87 (0.37–2.02)
Race × Education			0.89 (0.78–1.02)
Race × Neighborhood disorder			1.02 (0.98–1.05)
Race × Discrimination			0.99 (0.94–1.04)
Race × Vigilance			1.00 (0.94–1.06)
Race × CESD			1.00 (0.96–1.05)
Race × Stress			0.88 (0.80–0.96)**
Race × CAD			1.92 (0.16–22.50)
Race × Diabetes			1.01 (0.31–3.31)
Race × BMI			1.00 (0.94–1.06)
Race × CRP			1.12 (1.04–1.21)**
Race × BP diastolic			1.00 (0.95–1.05)
Race × BP systolic			1.00 (0.97–1.03)

Notes. M1: Racial group variable; R^2 = .00 (Cox and Snell), .00 (Nagelkerke). Model χ^2 (2) = 2.22, p = .330. M2: Model 1 after adjusting for sociodemographic and health measures; R^2 = .11 (Cox and Snell), .12 (Nagelkerke). Model χ^2 (32) = 73.95, p < 0.000. M3: Model 2 testing additional for interactions between race and sociodemographic and health measures; R^2 = .16 (Cox and Snell), .19 (Nagelkerke). Model χ^2 (62) = 119.26, p < .000. BMI = body mass index; BP = blood pressure; CAD = coronary artery disease; CESD = Center for Epidemiological Studies Depression scale; hsCRP = high-sensitivity C-reactive protein.

*p < .05. **p < .01. ***p < .001.

surveys (Hale & Do, 2007; National Sleep Foundation, 2010).

Although previous studies have observed blacks reporting more inadequate sleep than whites (Durrence & Lichstein, 2006), the current study observed no significant racial differences in sleep duration for adults residing in similar environments. An explanation may be that the studies reporting racial differences have commonly recruited whites and blacks from environments that differ in metropolitan residence, population density, and average SES. This is not surprising considering a majority of blacks reside in urban, metropolitan areas (U.S. Department of Commerce, 1993). However, the HANDLS project is designed to disentangle SES and race as they relate to health and aging issues, which makes the current study unique.

Given that HANDLS recruited from an urban environment, our results may suggest that racial disparities in sleep durations are minimized when social and physical environments are similar between blacks and whites. Indeed, previous research has observed that the racial disparities often observed in national studies for hypertension, diabetes, obesity, and smoking are minimized or eliminated when the social environments of blacks and whites are equal (LaVeist, Pollack, Thorpe, Fesahazion, & Gaskin, 2011). Thus, the health of both blacks and whites may be at risk when residing in urban environments with poor physical environmental characteristics (i.e., dilapidated buildings, unsafe water and sanitation, environment noise, and limited parks) and/or poor social environmental characteristics (i.e., social strain, limited social support, segregation, and inequality; Galea & Vlahov, 2005). In fact, previous research has suggested that these poor conditions are associated with numerous health conditions including, but not limited to, asthma, psychological distress, hearing impairment, hypertension, heart disease, and mortality (Galea & Vlahov, 2005). Furthermore, perceptions of these poor neighborhood conditions is associated with psychological distress (Hill, Burdette, & Hale, 2009; Kruger, Reischl, & Gee, 2007) and depressive symptoms (Kruger et al., 2007), which, in turn, can influence poor physical health outcomes.

Although there were no significant racial group differences in sleep duration, we did observe that the demographic and health factors associated with sleep durations were inconsistent between whites and blacks residing in similar environments. Compared with blacks, whites were more likely to report short sleep durations within increasing stress and education levels. In contrast, blacks were more likely than whites to report short sleep durations with worse inflammation. These incongruent findings between blacks and whites may be explained by some of the sociodemographic racial differences that we also observed. For example, whites had greater perceptions of neighborhood graffiti, litter, drug dealers, gang activity, misbehaving children, prostitution, crime, and unkempt houses than blacks. Furthermore, whites reported greater stress and vigilance than blacks. Perhaps, then, inadequate sleep in whites may be explained by increased stress due to heightened perceptions of neighborhood disorder. In contrast, a greater percentage of blacks lived below poverty status and had less education; this may suggest that the health conditions observed with inadequate sleep in blacks may be linked to a limited access to resources, particularly health resources. Overall, these findings may suggest that although inadequate amounts of sleep are reported by both whites and blacks residing in an urban environment, the explanations/mechanisms of inadequate sleep may vary between blacks and whites.

Although our study observed several interesting findings, there are a few limitations that should be noted. Sleep duration was assessed by self-report, which may not be

an accurate representation of how much participants typically sleep. It is unclear whether participants are recollecting their sleep duration occurring during the weekend or week, which appears to vary in that sleep durations reported during the weekend tend to be longer than sleep durations reported during the week (Patel & Hu, 2008). Finally, our study did not account daytime napping that provides a better estimate of participants' sleep duration experience over 24 hr and can further support that participants' with short sleep durations at night are indeed experiencing disturbed sleep based upon increase daytime napping during the day. Future studies should consider assessing sleep duration with sleep diaries, a 1–2 week paper and pencil or digital logs of wake and sleep times, which can better account for average sleep durations. However, objective sleep measures such as PSG, the gold standard for sleep measurement, capture more reliable estimates of sleep duration and quality. Given racial differences have been observed in sleep architecture (Stepnowsky, Moore, & Dimsdale, 2003), future research should also explore whether these racial differences in sleep architecture are also minimized when restricting the population to an urban setting. Although the current study focuses on shorter sleep durations, previous research has suggested that longer sleep durations are also associated with poor health (Alvarez & Ayas, 2004) and increased risk of mortality (Kripke et al., 2002). Furthermore, blacks have also shown to exhibited longer sleep durations than whites (Durrence & Lichstein, 2006). Unfortunately, the range of responses for the self-reported sleep duration measure did not allow for us to examine a possible nonlinear sleep duration relationship with either the sociodemographic or health indices. Hale and Do (2007), however, observed in a national study that individuals residing in an urban-dwelling environment were at greater risk for reporting short sleep durations (≤6 hr) rather than long sleep durations (≥9 hr). Thus, it is possible that long sleep durations may not necessarily be associated with poor health in urban-dwelling populations. Given the demographics of Baltimore City (i.e., the city total population, the heterogeneity of the city population, social cohesion within the city, economic resources within the city) may differ from other cities, our findings may not be generalizable to populations in other urban areas.

Despite these limitations, our study expands upon the existing literature by suggesting that racial sleep disparities are minimized when social and physical neighborhood characteristics are equivalent between racial groups. The current study suggests that racial differences in sleep duration are most likely not due to biological racial characteristics but rather are influenced by contextual factors, such as limited resources and/or perceptions of neighborhood disorder. The increased perceptions of neighborhood disorder and/or limited resources may therefore lead to negative psychological and physical health conditions. Elucidating the mechanisms that explain how neighborhood characteristics influence sleep duration has the potential to broaden our understanding of health disparities and suggest new avenues for intervention programs.

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