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## Socioeconomic Status Discrimination is Associated with Poor Sleep in African-Americans, but not Whites

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### Abstract

**Rationale**—Research on self-reported experiences of discrimination and health has grown in recent decades, but has largely focused on racial discrimination or overall mistreatment. Less is known about reports of discrimination on the basis of socioeconomic status (SES), despite the fact that SES is one of the most powerful social determinants of health.

**Objective**—We sought to examine the cross-sectional association between self-reported SES discrimination and subjective sleep quality, an emerging risk factor for disease. We further examined whether associations differed by race or SES.

**Methods**—We used logistic and linear regression to analyze data from a population-based cohort of 425 African-American and White middle-aged adults (67.5% female) in the Southeastern United States. SES discrimination was assessed with a modified Experiences of Discrimination Scale and poor subjective sleep quality was assessed with the Pittsburgh Sleep Quality Index.

**Results**—In logistic regression models adjusted for age, gender, and education, reports of SES discrimination were associated with poor sleep quality among African-Americans ( $OR=2.39$ , 95%  $CI=1.35, 4.24$ ), but not Whites ( $OR=1.03$ , 95%  $CI=0.57, 1.87$ ), and the race  $\times$  SES discrimination interaction was significant at  $p=0.04$ . After additional adjustments for reports of racial and gender discrimination, other psychosocial stressors, body mass index and depressive symptoms, SES discrimination remained a significant predictor of poor sleep among African-

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Americans, but not Whites. In contrast to findings by race, SES discrimination and sleep associations did not significantly differ by SES.

**Conclusion**—Findings suggest that reports of SES discrimination may be an important risk factor for subjective sleep quality among African-Americans and support the need to consider the health impact of SES-related stressors in the context of race.

### Keywords

African-Americans; social discrimination; sleep

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In the United States (U.S.) there are substantial disparities in health (Feagin & Bennefield, 2014) that disproportionately impact African-Americans and persons of lower socioeconomic status (SES) (Adler & Newman, 2002). These disparities have led many to conclude that these groups may have different life experiences in comparison to others. Research suggests that discrimination, or “the practice of unfairly treating a person or group of people differently from other people or groups of people (Merriam-Webster, 2015),” may be a part of these differential life experiences (Sennett & Cobb, 1972). Self-reported experiences of discrimination are conceptualized as a form of psychosocial stress (Slopen & Williams, 2014) and have been associated with important and costly pre-clinical and clinical endpoints such as breast cancer (Taylor et al., 2007), depression (Schulz et al., 2006), cardiovascular disease (Lewis, Williams, Tamene, & Clark, 2014), asthma (Coogan et al., 2014), and obesity (Hunte & Williams, 2009; Lewis, Kravitz, Janssen, & Powell, 2011).

The majority of research on discrimination and health has focused on racial discrimination or overall mistreatment (Lewis, Cogburn, & Williams, 2015), but other forms of discrimination, specifically discrimination on the basis of SES, may also be important to consider given the well-documented association between SES and health (Adler & Stewart, 2010). SES has been a consistently powerful determinant of health in U.S. society historically and may gain greater significance in future decades as income inequality increases (Congressional Budget Office, 2011).

However, SES is related to race (Braveman, 2005). In 2010, Whites earned twice as much in income and had accumulated six times as much wealth, on average, than their African-American counterparts (McKernan, Ratcliffe, Steuerle, & Zhang, 2013). Further, research suggests that SES factors may operate differentially in African-Americans compared to Whites, particularly in relation to health (Williams & Mohammed, 2009). In a study examining the association between race, education, and weight change in 2,019 African-American and White women from the Study of Women’s Health Across the Nation (SWAN), educational attainment was associated with lower body mass index (BMI) as education level increased among White women, whereas in African-American women, the “protective” effect of educational attainment on BMI was not observed (Lewis et al., 2005). A more recent longitudinal study examining educational attainment and change in inflammation levels among 2,670 African-American and White young adults, aged 18–30 years, found that each additional year of education reported in Whites was associated with a 7-mg/dl lower increase in fibrinogen levels over the 15-year follow-up. However,

educational attainment was not associated with a lower rate of increase in fibrinogen levels over time in African-Americans (Fuller-Rowell, Curtis, Doan, & Coe, 2015).

Results from these studies in addition to others (Braveman et al., 2014; LaVeist, 2005) suggest that the impact of SES processes on health may differ by race. However, most of this research has focused on actual SES indicators. Few studies have examined the effect of SES-related stressors, particularly SES discrimination, on health in the context of race. Research suggests that African-Americans may be more vulnerable to the health effects of SES-related stressors as compared to Whites, because they have access to fewer economic, cultural, and social resources to cope with stress from negative SES-related events (Hardaway & McLoyd, 2009; Keene, Lynch, & Baker, 2014).

Thus, the current study was designed to examine the independent effects of SES discrimination on sleep quality in a cohort of African-American and White middle-aged adults. To date, we are aware of only one other study that has examined the association between SES discrimination and any indicator of health. In a nationally representative sample of 1,659 individuals in the United States, Ren, et al (Ren, Amick, & Williams, 1999) found independent associations between SES discrimination, racial discrimination and each of their three outcomes: depressive symptoms, general health status, and mental health status. However, their cohort was predominantly White (86.3%), and they did not control for important confounders (Hall et al., 2008; Slopen & Williams, 2014), including financial stress, overall stress, and gender discrimination.

Sleep quality, our outcome of interest, is an emerging risk factor for chronic disease, that has been associated with an increased risk of obesity (Buxton & Marcelli, 2010; Jean-Louis et al., 2014), stroke (Qureshi, Giles, Croft, & Bliwise, 1997), diabetes (Ayas et al., 2003), cancer (Marshall, Wong, Cullen, Knuiman, & Grunstein, 2014), cardiovascular disease (Jackson, Redline, & Emmons, 2015), and mortality (Gallicchio & Kalesan, 2009). According to the Centers for Disease Control and Prevention (CDC), the lack of quality sleep has become a “public health epidemic (Centers for Disease Control and Prevention).” Across studies, African-Americans and lower SES individuals have poorer quality sleep than Whites and higher SES individuals, respectively (Chen et al., 2015; Patel, Grandner, Xie, Branas, & Gooneratne, 2010; Petrov & Lichstein, 2015; Piccolo, Yang, Bliwise, Yaggi, & Araujo, 2013). Additionally, studies suggest that psychosocial stressors –including both racial and overall discrimination-- may be a risk factor for adverse sleep outcomes (Lewis et al., 2013; Slopen & Williams, 2014; Thomas, Bardwell, Ancoli-Israel, & Dimsdale, 2006; Tomfohr, Pung, Edwards, & Dimsdale, 2012; Vaughn, Salas-Wright, White, & Kremer, 2015). However, it is currently unknown whether discrimination based on SES is independently associated with sleep quality.

Based on previous research, we hypothesized that self-reported experiences of SES discrimination would be independently associated with worse subjective sleep quality. The need to examine discrimination within the “larger social context of the multiple stressful exposures within which it is embedded” (Williams & Mohammed, 2009) has been recommended in recent work (Lewis et al., 2015); thus, we examined whether this association was independent of other stressors (i.e. perceived stress), stressors related to

socioeconomic status (i.e. financial stress) as well as other forms of discriminatory stress (i.e. both racial and gender discrimination).

## Methods

### Participants

Participants were a subset of 469 non-Hispanic African-American and White adults from the Morehouse & Emory Team up to Eliminate Cardiovascular Health Disparities (META-HEALTH) Study. The META-HEALTH study aimed to examine psychosocial, cultural, and biological correlates of cardiovascular health and was a two-stage cross-sectional study of randomly sampled African-American and White males and females ages 30–65. Participants were selected from four distinct Metropolitan Atlanta, GA counties, stratified by county median income to ensure the inclusion of an adequate representation of individuals from varying levels of SES backgrounds. During the first stage, from March 2006 to October 2009, a total of 3,391 participants were contacted using random digit dialing methodology and completed phone interviews. Of these, 469 participated in the second stage of the study, which included an extended interview (with sleep assessments) and a clinical exam. In total, 44 participants were excluded due to missing information on experiences of SES discrimination and/or subjective sleep quality. Our final analytic sample of 425 included 215 African-Americans and 210 Whites, and was 67.5% female. An additional 14 participants were excluded due to missing data on covariates during analyses. This study was approved by the Emory and Morehouse institutional review boards and all participants provided written informed consent.

### Reports of Discrimination

Experiences of SES-discrimination were measured using a previously modified version of the Experiences of Discrimination Scale (Krieger, Smith, Naishadham, Hartman, & Barbeau, 2005). Participants were asked if they had ever “been prevented from doing something,” or “been hassled or made to feel inferior” because of their SES, in seven different settings: at school, getting a job, at work, getting housing, getting medical care, from the police or in the courts on the street or in a public setting. Two additional questionnaires asked about experiences of discrimination in the same seven scenarios, but inquired whether experiences could be attributed to race, or gender, respectively. The Experiences of Discrimination scale has been widely used in both African-American and White study populations and has demonstrated high levels of validity and reliability (Krieger et al., 2005). In the current cohort, discrimination scores were highly skewed, with most participants reporting no or only one experience of discrimination; thus, a dichotomous ever/never variable was created for each type of discrimination (Hunte & Williams, 2009).

### Subjective Sleep Quality

Subjective sleep quality was measured with the Pittsburgh Sleep Quality Index (PSQI) (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989), a 19-item questionnaire that measures aspects of sleep over the preceding month. Questions inquire about sleep duration, sleep disturbance, sleep latency (time spent falling asleep), dysfunction during the day due to sleepiness (i.e. trouble staying awake while driving), sleep efficiency (time in bed spent

asleep), and sleep medication use. Composite scores on the PSQI range from 0–21, with higher scores indicating lower quality sleep and more sleep complaints. The PSQI has been widely used across study populations with good validity and high test-retest reliability (Backhaus, Junghanns, Brooks, Riemann, & Hohagen, 2002). Scores of 5 and greater on the PSQI indicate poor sleep quality (Buysse et al., 1989).

### Demographics

Age in years, race (non-Hispanic African-American, non-Hispanic White), and gender were all assessed via self-report. Education was used as an indicator of SES because it remains fairly constant throughout adulthood, is believed to be a major determinant of SES, and is less likely than other measures of SES (e.g. income, wealth) to have a large amount of missing values (Krieger, Williams, & Moss, 1997). Education was self-reported, and a dichotomous college education/no college education variable was created based upon the distribution of education in the sample. Those who reported completing at least a college education were considered to be in the high SES category, and those not reporting the completion of a college education were considered to be in the low SES category.

### Covariates

Covariates including BMI, depressive symptoms, financial stress and perceived stress were selected based on previous literature identifying them as conceptual or empirical correlates of discrimination and/or sleep (Hall et al., 2008; Slopen & Williams, 2014; Tomfohr et al., 2012). BMI was calculated utilizing measured height and weight ( $BMI = \text{weight (kg)} / \text{height (m}^2\text{)}$ ) and was assessed during the clinic visit. Depressive symptoms were assessed with the Beck Depression Inventory-II (BDI-II) (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961), a 21-item questionnaire assessing depressive symptoms in the past two weeks. The question assessing sleep quality in the BDI-II was removed for the purposes of these analyses and a composite BDI-II score was calculated by summing the remaining questions with a potential range of 0–60.

Perceived stress was assessed via the Perceived Stress Scale, a valid and reliable 14-item scale measuring global feelings of stress (Cohen, Kamarck, & Mermelstein, 1983), with possible scores ranging from 0 to 56. Financial stress was measured using three questions examining stress related to paying for food, medical care, or bills. Those reporting financial stress once in a while, fairly often, or very often were given a score of 1 for each respective question, and responses were summed to create an ordinal measure ranging from 0–3.

### Statistical Analysis

Descriptive and correlation analyses were conducted to characterize study variables by race in our sample. Race- and SES-stratified regression analyses were conducted to examine the association between reports of SES discrimination and subjective sleep quality. We ran stratified models based on prior research noting the differential impact of SES-related processes on African-Americans compared to Whites (Fuller-Rowell et al., 2015; LaVeist, 2005; Lewis et al., 2005) and the potential salience of SES discrimination as a stressor for lower SES individuals (Lauderdale et al., 2006; Myers, 2009). Logistic regression models were used to model subjective sleep quality as a dichotomous outcome, and linear regression

models were used to model continuous subjective sleep quality scores. Models were adjusted for age, gender (Step 1), reports of racial and gender discrimination (Step 2), BMI, perceived stress, financial stress (Step 3), and depressive symptoms (Step 4). In addition to those covariates, education was adjusted for in race-stratified models, and race was adjusted for in SES-stratified models in Step 1. We also formally tested for race  $\times$  SES discrimination and SES  $\times$  SES discrimination interactions in minimally and fully adjusted non-stratified logistic and linear models. Finally, because participants reporting SES discrimination may be more likely to also report other forms of discrimination (i.e. racial or gender discrimination), we tested for multicollinearity. All analyses were conducted using SAS software version 9.4 (SAS Institute, Inc., Cary, NC, USA). An alpha level of .05 was used for all analyses.

## Results

### Participant Characteristics

Descriptive statistics of the analytic sample are presented in Table 1. In comparison to Whites, African-Americans were younger ( $p=0.02$ ), less likely to be college educated ( $p<0.01$ ) and more likely to report SES and racial discrimination overall and in a greater number of settings ( $p<0.01$ ). African-Americans also reported worse subjective sleep quality ( $p<0.01$ ), had a higher BMI ( $p<0.01$ ) and were more likely to report financial stress ( $p<0.01$ ) than their White counterparts. In correlation analyses (Supplementary Tables 1 & 2), racial and gender discrimination were moderately correlated with SES discrimination in both races ( $r_s= 0.29$  to  $0.46$ ; all  $p$ -values  $<0.001$ ).

### Primary Analyses

In race-stratified, fully-adjusted logistic regression models (Table 2), African-Americans reporting SES discrimination were significantly more likely to have poor sleep quality (PSQI scores 5 and greater) than African-Americans not reporting SES discrimination ( $OR=2.32$ , 95% Confidence Interval [ $CI$ ] =  $1.14-4.72$ ). However, no significant association between reports of SES discrimination and sleep quality was observed within Whites ( $OR=0.60$ , 95%  $CI= 0.28-1.29$ ) (Table 2). The race  $\times$  SES discrimination interaction was significant in the age, gender and education adjusted model ( $p=0.04$ ), but was reduced to marginal significance in the fully-adjusted model ( $p=0.06$ ). In fully adjusted, race-stratified models, the only other significant covariate in the final logistic models for African-Americans was depressive symptoms. None of the other stress-related variables (including racial discrimination) were significant for African-Americans (Table 3). For Whites, only education and depressive symptoms were significant covariates in the final logistic model (Table 3).

Results from race-stratified, linear regression models with subjective sleep quality as a continuous variable were similar to those observed in logistic models. Self-reported SES discrimination was significantly associated with worse subjective sleep quality in African-Americans after adjustment for age, gender and education ( $b=1.58$ ,  $p<0.01$ ). The association remained significant after adjustment for racial and gender discrimination, BMI, financial stress, and perceived stress ( $b=1.49$ ,  $p<0.01$ ). After further adjustment for depressive

symptoms, the association was reduced to marginal significance ( $b=1.04$ ,  $p=0.06$ ). Again, no significant association between reports of SES discrimination and sleep quality was observed in Whites in linear models after adjustment for demographics and other forms of discrimination ( $b=0.27$ ,  $p=0.59$ ); the race  $\times$ SES discrimination interaction term, however, was not significant ( $p=0.24$ ).

No consistent or significant associations emerged in SES-stratified logistic or linear regression models (data available upon request), and the SES  $\times$ SES discrimination interaction was not significant in non-stratified, fully-adjusted logistic or linear regression models ( $p=0.74$ ,  $p=0.90$ ), respectively). Multicollinearity was not observed.

### Exploratory Analyses

Given our significant findings for SES discrimination among African-Americans only, we ran exploratory descriptive analyses to better understand racial differences in SES discrimination (Supplementary Table 3). These analyses were stratified by SES, in order to determine whether the low-SES African-Americans were driving the elevated reports of SES discrimination among this group. In comparison to Whites without a college degree, African-Americans without a college degree were significantly more likely to report SES discrimination in only 1 out of 7 settings, with 3 additional settings reaching marginal significance. However, among college-educated participants, African-Americans were significantly more likely to report SES discrimination than their White counterparts in 6 out of 7 settings (Supplementary Table 3).

### Discussion

In this population-based cohort of African-American and White Adults, reports of SES discrimination were independently associated with poor sleep quality among African-Americans, but not Whites—even after controlling for important confounding factors. Thus, consistent with research on other SES-related stressors (Szanton et al., 2008), our results suggest that African-Americans may be more vulnerable to the effects of SES-discrimination on health than their White counterparts. In descriptive analyses, we found that African-Americans, regardless of SES, were significantly more likely to report SES discrimination and reported SES discrimination in more settings than Whites. Consequently, educational attainment appeared to be protective against reports of SES discrimination for Whites, but not African-Americans.

This is in line with prior work, which argues that middle-class African-Americans may be less likely to benefit from higher SES due to their race (Cose, 1993; Feagin & Sikes, 1994; Jackson & Williams, 2006). In a recent study of 41,088 African-American and White adults from the National Health Interview Survey, Jackson and colleagues (Jackson, Redline, Kawachi, Williams, & Hu, 2013) found that with increasing occupational prestige, the prevalence of short sleep decreased among Whites, but increased among African-Americans, such that African-Americans from *higher* SES backgrounds had worse sleep than African-Americans from lower SES backgrounds. Although not the primary focus of our analyses, we observed similar findings. In race-stratified logistic regression models, education was protective against poor sleep in Whites, but was not significantly associated with poor sleep

in African-Americans. Thus, SES discrimination was a stronger correlate of poor sleep than actual SES in our sample for African-Americans.

It is unclear why the association between SES discrimination and sleep was stronger than the association between racial discrimination and sleep for African-Americans in our cohort. One possible explanation relates to the very strong link between race and SES in U.S. society. Because race and class are highly correlated (Braveman, 2005), it is possible that even high SES African-Americans are frequently assumed to be lower SES and thus experience (and are impacted by) SES discrimination in a range of contexts more frequently than their White counterparts. Therefore, these individuals would actually be experiencing SES-related discrimination (e.g. in stores and restaurants), but the assumptions underlying the perception of them as low SES would be primarily driven by their race.

Similarly, it is also possible that African-Americans are actually experiencing racial discrimination, but are misattributing these experiences of racial discrimination to SES. Prior research (Levin, Sinclair, Veniegas, & Taylor, 2002) suggests that attributes of discrimination may be confused when study participants hold multiple statuses (i.e., African-American and perceived or actual low SES), so it is possible that the African-Americans reporting SES discrimination in our cohort are attributing mistreatment to SES discrimination even when it could be partially due to racial discrimination. The moderate to strong correlation between reports of racial and SES discrimination in this study provide some support for this concept, suggesting that SES discrimination and racial discrimination may be interconnected. Yet, our finding that reports of SES discrimination were significantly associated with sleep quality in African-Americans independent of reports of racial discrimination suggests that SES discrimination may be an important form of discrimination to consider in future studies.

In exploratory analyses, we found that college educated African-Americans reported more SES discrimination than college-educated Whites. It is possible that SES discrimination is more salient for African-Americans compared to Whites because even at similar levels of education and occupational prestige, African-Americans have less wealth and fewer financial resources than their White counterparts (LaVeist, 2005; McKernan et al., 2013). Childhood SES may also play a role. Heflin and Patillo found that African-Americans who were considered to be middle-class were four times more likely to have come from a poor background than their White middle-class counterparts (Heflin & Patillo, 2006). Thus, it may be that the college-educated African-Americans reporting SES discrimination in this study were more likely to come from a low SES childhood background in comparison to college-educated Whites (Hardaway & McLoyd, 2009). While information on childhood SES was not available in this cohort, childhood SES may be an important confounding factor to consider in the context of our study as evidence suggests that childhood SES is associated with sleep outcomes (Tomfohr, Ancoli-Israel, & Dimsdale, 2010).

Given our exploratory descriptive findings among high SES African-Americans, we also conducted exploratory regression models stratified by high and low SES for African-Americans and Whites, separately, to further examine associations among race, SES, SES discrimination and sleep quality. This analysis was done because results from at least one



prior study suggest that discrimination may have a differential impact on health among higher SES African-Americans (Fuller-Rowell, Doan, & Eccles, 2012). Consistent with this notion, a significant association between reports of SES discrimination and sleep quality emerged for high SES African-Americans in our cohort in exploratory analyses, although it was attenuated once depressive symptoms were controlled for. Reports of both racial and overall discrimination have been consistently associated with depressive symptoms in prior studies (Barnes et al., 2004; Lewis et al., 2013). Thus, some have argued that individuals with symptoms of depression may simply be over-reporting discrimination. However, prospective studies have found that discrimination typically precedes depressive symptoms (Brody et al., 2006; Brown et al., 2000; Schulz et al., 2006). However, because these analyses were largely exploratory in nature, these results should be interpreted with some caution. Additional research is needed to fully understand the associations among SES discrimination, depressive symptoms, and physical health outcomes among college-educated African-American adults.

### Limitations

First, while it is the most widely used methodology for assessing discrimination, our primary exposure, reports of discrimination, was self-reported which may need to be considered when interpreting results (Lewis et al., 2015). Sleep quality was also self-reported. Although there is evidence in the sleep literature that objective and subjective forms of sleep quality are similarly correlated with discrimination (Lewis et al., 2013), the use of objective measures, such as polysomnography, or actigraphy, is preferred. Further, the PSQI does not measure regular sleep schedules. Research suggests that a regular sleep schedule may be important for health (Buysse, 2014), and future studies should consider the association between discrimination and sleep timing and regularity. Second, the cross-sectional nature of our study limits the ability of causal inference of the effect of reports of SES discrimination on sleep quality. Further, reports of discrimination involved “ever” reporting discrimination, while self-reports of sleep reflected the past month; thus, the temporal dynamics around this cross-sectional association are unclear. Third, since our sample was relatively small, there may have been low power for detecting interactions between race or SES and reports of SES discrimination in our study. Finally, although the META-HEALTH study sample is population-based and consists of a cohort that is nearly half African-American, it is comprised of only non-Hispanic African-Americans and Whites from four counties in Georgia. This potentially weakens the ability to generalize the results of this study to other racial/ethnic groups and populations in other geographic locations.

### Conclusions

To our knowledge, this is the first study to examine the association between reports of SES discrimination and sleep quality. In this sample of non-Hispanic African-American and White men and women from a population based cohort, reports of SES discrimination were independently associated with reports of poor sleep quality in African-Americans, but not Whites. These findings add to the growing literature documenting the effects of SES-related stressors on health among African-Americans (Simons et al., 2016). Additionally, although replication is needed, our findings expand upon the current discrimination and sleep literature by incorporating SES discrimination as a factor independently associated with

adverse sleep quality. Thus, SES discrimination—particularly in the context of race—may be an important psychosocial construct and SES-related stressor to consider in future public health research and policy.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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### Research Highlights

- SES discrimination is an understudied, yet potentially important stressor.
- We examined the associations between SES discrimination and poor subjective sleep.
- SES discrimination was linked to poor sleep in African-Americans, but not Whites.
- Associations were not explained by racism, sexism, or other psychosocial factors.
- SES discrimination may be an important risk factor for sleep among African-Americans.

Selected Demographic and Psychosocial Characteristics of African-American and White Adults (N=425) by Race in the META-HEALTH Study.

**Table 1**

Characteristic	African-Americans (N=215)		Whites (N=210)		p
	%	Mean (SD)	%	Mean (SD)	
<b>Age</b>		49.3 (9.6)		51.6 (9.4)	0.02
<b>Female</b>	69.8		65.2		0.32
<b>College education</b>	39.5		71.6		<.01
<b>Experiences of discrimination</b>					
<i>Socioeconomic</i>					
Ever	52.1		31.9		<.01
Number of Settings		1.5 (2.0)		0.71 (1.4)	<.01
<i>Racial</i>					
Ever	71.5		41.4		<.01
Number of Settings		2.6 (2.2)		0.8 (1.2)	<.01
<i>Gender</i>					
Ever	56.1		56.2		0.98
Number of Settings		1.4 (1.6)		1.3 (1.5)	0.18
<b>Depressive symptoms</b>					
		6.7 (6.8)		6.5 (6.9)	0.63
<b>Body Mass Index (kg/m<sup>2</sup>)</b>		31.5 (8.1)		28.2 (6.6)	<.01
<b>Perceived stress</b>		21 (7.8)		20.4 (7.4)	0.55
<b>Financial stress</b>		1.5 (1.2)		0.85 (1.1)	<.01
<b>Subjective sleep quality</b>		6.3 (3.8)		5.1 (3.1)	<.01
<b>Poor sleep quality<sup>a</sup></b>	62.8		49.1		<.01

Note. p-values result from t-tests and Chi-square tests for racial differences. META-HEALTH=Morehouse & Emory Team up to Eliminate Cardiovascular Health Disparities; SD=Standard deviation.

<sup>a</sup>Poor Sleep Quality= Scores of 5 and greater on the Pittsburgh Sleep Quality Index.

**Table 2**

Logistic Regression Models Examining Association between SES Discrimination and Poor Subjective Sleep Quality<sup>a</sup> by Race among African-American and White Adults in the META-HEALTH Study

Model	African-Americans		Whites	
	OR, 95% CI	N	OR, 95% CI	N
<b>Model 1</b>				
SES Discrimination				
Crude association, no adjustments	2.37 (1.35, 4.18)	215	1.11 (0.62, 1.97)	210
<b>Model 2</b>				
SES Discrimination				
A adjusted for age, gender, and education	2.39 (1.35, 4.24)	215	1.03 (0.57, 1.87)	208
<b>Model 3</b>				
SES Discrimination				
A adjusted for model 2 covariates + racial and gender discrimination	2.68 (1.38, 5.19)	213	0.77 (0.40, 1.50)	208
<b>Model 4</b>				
SES Discrimination				
A adjusted for model 3 covariates + body mass index, financial stress, and perceived stress	2.68 (1.34, 5.37)	207	0.76 (0.37, 1.55)	205
<b>Model 5</b>				
SES Discrimination				
A adjusted for model 4 covariates + depressive symptoms	2.32 (1.14, 4.72)	206	0.60 (0.28, 1.29)	205

Abbreviations: CI=Confidence Interval; META-HEALTH=Morehouse & Emory Team up to Eliminate Cardiovascular Health Disparities; OR=Odds Ratio; SES=Socioeconomic status.

<sup>a</sup>Poor Sleep Quality= Scores of 5 and greater on the Pittsburgh Sleep Quality Index.



**Table 3**

Fully Adjusted Logistic Regression Model Examining the Association between SES Discrimination and Subjective Sleep Quality<sup>a</sup> Stratified by Race

Predictor	African-Americans (N=206)	Whites (N=205)
	OR, 95% CI	OR, 95% CI
SES Discrimination	2.32 (1.14, 4.72)	0.60 (0.28, 1.29)
Education (College)	0.83 (0.42, 1.63)	0.41 (0.20, 0.83)
Age	1.00 (0.96, 1.03)	0.99 (0.96, 1.03)
Gender	0.93 (0.46, 1.87)	1.19 (0.57, 2.49)
Racial Discrimination	0.68 (0.30, 1.57)	1.42 (0.70, 2.90)
Gender Discrimination	0.77 (0.37, 1.60)	1.50 (0.69, 3.10)
Body Mass Index <sup>b</sup>	1.00 (0.96, 1.03)	0.97 (0.92, 1.02)
Perceived Stress	1.04 (0.99, 1.09)	1.03 (0.98, 1.09)
Financial Stress	1.17 (0.87, 1.57)	0.82 (0.59, 1.15)
Depressive Symptoms	1.08 (1.01, 1.15)	1.16 (1.08, 1.24)

Abbreviations: *CI*=Confidence Interval; META-HEALTH=Morehouse & Emory Team up to Eliminate Cardiovascular Health Disparities; *OR*=Odds Ratio; SES=Socioeconomic status.

<sup>a</sup>Poor Sleep Quality= Scores of 5 and greater on the Pittsburgh Sleep Quality Index.

<sup>b</sup>Body Mass Index= weight (in kg)/height (in m<sup>2</sup>).