Examining How Racial Discrimination Impacts Sleep Quality in African Americans: Is Perseveration the Answer?

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Abstract

Background—African Americans experience more problematic and disordered sleep than White Americans. Racial discrimination has been implicated in this disparity. However, the mechanisms by which discrimination disrupts sleep are unclear. It has been theorized that Perseverative Cognition (PC), characterized by recurrent patterns of reflective (i.e., rumination) and anticipatory (i.e., worry) negative thinking about personally relevant stressors, may reflect the functional mechanism linking discrimination to sleep. The present study is the first to empirically examine the dual components of PC as a candidate functional mechanism in the association between racial discrimination and subjective sleep quality.

Participants—Sixty-eight self-identified African American college students (55.9% female; $M_{age} = 20.18$, $SD = 2.93$) were recruited at a large predominantly white public university in the Midwest.

Methods—The participants completed the Perceived Ethnic Discrimination Questionnaire (PEDQ), Pittsburgh Sleep Quality Index (PSQI), Penn State Worry Questionnaire (PSWQ), and Ruminative Responses Scale (RRS).

Results—After adjusting for age, gender, and social class, results revealed a significant indirect effect of racial discrimination (RD) on subjective sleep quality through rumination, 95% CI [.008, .125], but not worry. RD was positively associated with rumination, $b = .50$, $SE = .16$, $p = .$

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003, and rumination, in turn, was positively associated with poorer sleep quality, $b = .09$, $SE = .04$, $p = .012$.

Conclusions—As both RD and poor sleep quality have been directly linked to heart disease, diabetes, depression, and a number of other maladies, our findings suggest that RD, sleep, and coping strategies (e.g., rumination) employed to manage RD experiences may be important targets for addressing racial disparities in health.

Sleep has garnered significant empirical attention in the last decade, as sleep problems and disorders contribute to a litany of negative health outcomes (e.g., Kim & Dimsdale, 2007). Problematic and disordered sleep (e.g., sleep disturbances, sleepiness, short sleep duration) is linked to all-cause mortality, cardiovascular disease, diabetes, obesity, immune functioning, cancer, and mood disorders (e.g., depression; Gallicchio & Kalesan, 2009; Gottlieb et al., 2006; Grandner, Patel, Gehrman, Perlis, & Pack, 2010; Slopen, Lewis, & Williams, 2016). Poor sleep is clearly a major public health concern; a key goal of the U.S. Department of Health and Human Services' Healthy People 2020 is to improve Americans' sleep health (U.S. Department of Health and Human Services, 2016).

Nationally representative and community-based data document poorer sleep quality and greater prevalence of sleep disorders among African Americans than among White Americans (Hall et al., 2009; Knutson, Van Cauter, Rathouz, DeLeire, & Lauderdale, 2010; Slopen et al., 2016). African Americans experience shorter sleep durations, less continuous sleep, and less slow-wave sleep (i.e., deep sleep). In addition to these more quantitative aspects of overall sleep (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989), African Americans also report less restfulness and greater sleepiness (Beatty et al., 2011; Durrence & Lichstein, 2006; Friedman et al., 2006; Mezick et al., 2008; Redline et al., 2004; Slopen & Williams, 2014). Notably, sleep problems and disorders among African Americans are further coincident with various diseases that also disproportionately affect this population, including cardiovascular disease and diabetes (Kochanek, Arias, & Anderson, 2013; Miniño, 2013).

While the pathways linking poor sleep to disease are multifactorial, there has been considerable interest in understanding the contribution of psychosocial factors to sleep problems and disorders among African Americans. Racism and perceived discrimination have come to the forefront as chronic psychosocial stressors contributing to racial and ethnic disparities in sleep (for review, see Slopen et al., 2016). According to the Biopsychosocial Model of Racism, racism is a unique and pervasive, chronic psychosocial stressor that triggers physiological and psychological stress responses (i.e., fight or flight) for African Americans (Clark, Anderson, Clark, & Williams, 1999). Importantly, maladaptive forms of coping (e.g., rumination) are argued to exacerbate the stress process by prolonging physiological and psychological responses to racism-related stressors. Ultimately, this chronic cycle of exposure and response is thought to contribute to global dysregulation of somatic and psychological health among African Americans (Clark et al., 1999).

Contemporary research supports Clark and colleagues' conceptualization, as findings from several studies document that greater exposure to racism and perceived discrimination adversely impacts sleep among African Americans (Beatty et al., 2011; Grandner, Patel,

Gehrman, Xie, et al., 2010; Hicken, Lee, Ailshire, Burgard, & Williams, 2013; Steffen & Bowden, 2006; Yang & Park, 2015). For example, perceived discrimination attributed to race or ethnicity and various other factors (e.g., gender, social class) has been associated with poorer sleep quality, including poorer self-reported 30-day sleep quality (Steffen & Bowden, 2006); less slow-wave sleep (Thomas, Bardwell, Ancoli-Israel, & Dimsdale, 2006); greater self-reported daytime fatigue and sleep disturbances (Grandner et al., 2012); more frequent wake after sleep onset (WASO; Lewis et al., 2013); and shorter overall sleep duration (Slopen et al., 2016). Collectively, these findings suggest that greater self-reported exposure to racism and discrimination is related to greater sleep impairment. While the congruence of these findings with the Biopsychosocial Model of Racism is promising, it is important to further elucidate the potential mechanisms underlying the association between racism and the myriad indicators of poorer sleep among African Americans.

Perseverative Cognition (PC), characterized by recurrent patterns of negative, reflective (i.e., rumination) and anticipatory (i.e., worry) thinking (Brosschot, Gerin, & Thayer, 2006; Brosschot, Pieper, & Thayer, 2005), has been identified as a central mechanism potentially linking racism and racial discrimination (RD) to poorer sleep (e.g., Hicken et al., 2013; Steffen & Bowden, 2006). According to this hypothesis, worry (negative affect-laden and uncontrollable thoughts and images; Borkovec, Ray, & Stober, 1998), rumination (passive and self-reflective perseveration on one's negative emotions and problems; Nolen-Hoeksema, 1991, 2000), and related cognitive processes (i.e., anticipatory stress) all share a common feature: repetitive or recurring negative thoughts. This framework also delineates that such repetitive or recurring thoughts may largely occur outside of conscious awareness (Brosschot, 2010; Brosschot et al., 2010). Research has long indicated that stress-related intrusive thoughts affect multiple domains of sleep, including shorter sleep duration, greater complaints, lower delta sleep ratio, and longer sleep onset latency (Hall et al., 1997; 2000; Kelly, 2002). Moreover, trait worry and rumination have been associated with indicators of poor sleep—including longer sleep onset latency (Pillai, Steenburg, Ciesla, Roth, & Drake, 2014; Takano, Sakamoto, & Tanno, 2014; Zoccola, Dickerson, & Lam, 2009), shorter sleep duration (Nota & Coles, 2014; Takano et al., 2014), and poorer subjective sleep quality (Ottaviani, Medea, Lonigro, Tarvainen, & Couyoumdjian, 2015; Radstaak, Geurts, Beckers, Brosschot, & Kompier, 2014)—as well as with indicators of cardiovascular hyperarousal during sleep (i.e., higher heart rate, lower heart rate variability; Brosschot, Van Dijk, & Thayer, 2007).

Few studies have empirically examined PC as a functional mechanism or process linking RD to sleep among African Americans. In a notable exception, Beatty and colleagues (2011) found that unfair treatment was associated with increased nightly worry, which in turn, was associated with poorer self-reported sleep quality, greater daytime sleepiness, poorer sleep efficiency, and less REM sleep. In an investigation of the anticipatory features of RD experiences, Hicken et al. (2013) found that African American adults reported greater sleep difficulty than White Americans; however, this disparity was completely attenuated after adjusting for racism-related vigilance. To our knowledge, these investigations represent the current empirical literature regarding the potential mechanistic functioning of PC in the association between racism or discrimination and sleep in African Americans. Neither of these studies directly tested whether the relationship between RD, in particular, and sleep

was influenced by both components of PC. In the present study, we examined whether the dual components of PC (i.e., worry and rumination) might serve as the process(es) linking RD and subjective sleep quality among African Americans. In particular, we predicted that more frequent RD experiences would be associated with poorer subjective sleep quality. We also predicted that PC would mediate the association between RD experiences and poorer subjective sleep quality, such that greater RD exposure would be associated with greater PC, which in turn, would be associated with poorer subjective sleep quality.

METHOD

Participants

Sixty-eight self-identified African American college students aged 18 to 37 (55.9% female, $M_{age} = 20.18$; $SD = 2.93$) were recruited at a large predominantly White public university in the Midwest through the Research Experience Program (REP) pool, which allows students to participate in research for partial class credit in an introductory psychology course. Participants were also recruited via flyers, campus newspaper ads, and e-mail listservs; these participants received a small monetary compensation (i.e., $15.00) for their participation.

Procedure

The present questionnaire data were collected during baseline screenings as part of a larger study on PC and health (see Hill et al., in press). All participants provided their written informed consent. Thereafter, participants completed a packet of study questionnaires, including the RD, subjective sleep quality, worry, rumination, and demographics measures. All measures and study procedures were approved by the university Institutional Review Board.

Measures

Racial discrimination—RD was assessed using the brief Perceived Ethnic Discrimination Questionnaire–Community Version (PEDQ-CV; Brondolo et al., 2005). The brief PEDQ-CV is a 17-item questionnaire designed to assess lifetime experiences of RD, particularly in interpersonal and social contexts ($\alpha = .87$). The experiences include different forms of RD that occur in various domains: social exclusion, stigmatization, discrimination at work or school, and threats or actual acts of harassment or harm. Each item is preceded by the stem phrase: "Because of your Ethnicity/Race, How often"; a sample item is "have others ignored or not paid attention to you?" Participants rated the frequency with which they have experienced RD on a 1 (*never*) to 7 (*very often*) scale. All 17 items were summed to create a Lifetime Discrimination scale wherein a higher score indicates more frequent experiences with RD.

Worry—Worry was assessed using the Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec , 1990), a 16-item Likert-scale type instrument used primarily to assess trait-like as well as pathological worry ($\alpha = .90$). A sample item is, "I worry all the time." Participants reported the frequency with which they worry on a scale ranging from 1 (*not at all typical of me*) to 5 (*very typical of me*). A higher score indicates a greater

tendency to worry. The PSWQ has shown strong internal consistency and overall validity (Meyer et al., 1990).

Rumination—Rumination was assessed using the Ruminative Responses Scale (RRS; Nolen-Hoeksema & Morrow, 1991). The RRS is a 22-item scale designed to assess ruminative tendencies ($\alpha = .87$). A sample item is, "How often do you think: Why do I always react this way?" Participants reported the frequency with which they ruminate on a 1 (*almost never*) to 4 (*almost always*) scale. All 22 items were summed to create a total RRS score wherein a higher score indicates greater ruminative tendencies.

Subjective sleep quality—Self-reported sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI; Buysse et al., 1989), a well-validated measure of subjective sleep quality, over the previous month. The 19 primary items were grouped to create seven component scores of overall sleep quality (e.g., duration, sleep efficiency, disturbance, restfulness, daytime dysfunction). These component scores were summed to generate a global or total score ranging from 0 to 21, with higher scores indicating poorer overall sleep quality, and scores greater than 5 indicating clinically significant poor sleep quality.

Covariates—As the extant literature documents gender differences in RD prevalence and vulnerability (Banks, Kohn-Wood, & Spencer, 2006; Sellers & Shelton, 2003) as well as in sleep complaints (Grandner, Patel, Gehrman, Xie, et al., 2010), we adjusted for gender (0 = female, 1 = male). Age was also included as a covariate, as age-related differences in RD experiences, PC, and sleep quality are likely. Finally, we included social class as a covariate, given the evidence linking social class (e.g., SES) to sleep (e.g., Mezick et al., 2008) and to racism exposure and vulnerability (Clark et al., 1999; Williams & Mohammed, 2009). Notably, subjective measures of social class or status have been shown to be more strongly and consistently related to psychological functioning, health outcomes, and disease risk factors (e.g., self-rated health, heart rate, sleep latency) as compared to objective indicators of social status (Demakakos, Nazroo, Breeze, & Marmot, 2008; Freeman, Bauldry, Volpe, Shanahan, & Shanahan, 2016; Singh-Manoux , Marmot, & Adler, 2005). Consistent with previous research examining social class or status via subjective social class identity categories (Jackman, 1979; Ostrove & Long, 2007), participants in the present study were instructed to indicate their subjective social status by selecting one of five possible categorical descriptors (i.e., 1 = Lower Class, 2 = Working Class, 3= Lower Middle Class, 4 = Upper Middle Class, 5= Upper/Higher Class).

Statistical analysis—Descriptive statistics were computed to characterize the sample. Pearson's correlations (*r*) were computed to quantify associations between the study variables. Whereas mediation analysis is commonly associated with testing causal relationships, this statistical methodology or approach may also be applied to test theoretically derived hypotheses regarding the conditional or process-oriented relationships among a set of variables (Hayes 2012; Hayes, 2013; Preacher & Hayes, 2008). We employed the PROCESS computational macro designed by Hayes (2013) to test the hypothesis that worry (M_1) and rumination (M_2) would mediate the association between RD (*X*) and sleep (*Y*). PROCESS is a flexible model estimation utility that incorporates many standard

methods (e.g., Baron & Kenny, 1986; MacKinnon, 2008) for testing conditional effects using an Ordinary Least Squares (OLS) regression approach. Point and interval estimates for direct effects ($X \rightarrow Y$) are automatically generated in PROCESS, which further applies boot-strapping with replacement in the generation of the 95% confidence intervals (CIs) for the indirect effects ($X \rightarrow M \rightarrow Y$). Using bias-corrected bootstrap CIs is ideal, as the sampling distribution may not be normal (Hayes, 2013). To examine the potential mediating roles of worry and rumination while also accounting for their shared association, we simultaneously tested both candidate mediators using the PROCESS parallel mediator model (Model 4). There would be evidence of mediation if the product of the $X \rightarrow M_1$ coefficient (path a_1) and the $M_1 \rightarrow Y$ coefficient (path b_1) or the $X \rightarrow M_2$ coefficient (path a_2) and the $M_2 \rightarrow Y$ coefficient (path b_2) produces a bootstrapped coefficient ($a_1b_1; a_2b_2$) whose CI does not straddle zero. Age, gender, and social class were included as covariates in all analyses.

RESULTS

Descriptive statistics and correlations are reported in Table 1. We note that one person was missing data for the PEDQ-CV, three people were missing data for the PSQI, and one person was missing data for the PSWQ and RRS. These individuals were not included in the statistical analyses. A majority (95.6%) of the participants reported having experienced RD. The sample generally comprised low to moderate trait worriers and ruminators. Approximately two thirds (67.7%) of the sample scored above a 5 on the PSQI, suggesting that the sample generally had clinically significant poor sleep quality.

There were no gender differences in RD exposure $\left[F_{(1, 65)} = 3.54, \; p = .065, \; \eta_p^2 = .05 \right]$, subjective sleep quality $\left[F_{(1, 63)} = .47, \; p = .494, \; \eta_p^2 = .01 \right]$, worry $\left[F_{(1, 65)} = 3.08, \; p = .084, \; \eta_p^2 = .045 \right]$, or rumination $\left[F_{(1, 65)} \leq .001, \; p = .983, \; \eta_p^2 \leq .001 \right]$.

Age was positively correlated with sleep quality ($r = .31, p = .011$) and rumination ($r = .26, p = .037$), but was uncorrelated with RD ($r \; .001, p = .999$) and worry ($r = .13, p = .283$). Social class was negatively correlated with sleep quality ($r = -.30, p = .016$), but was uncorrelated with RD ($r = -.15, p = .225$), rumination ($r = -.18, p = .139$), and worry ($r = -.04, p = .769$). Worry and rumination were moderately correlated ($r = .56, p = <.001$).

Results for our main analyses are reported in Table 2 and in Figure 1. The results revealed a significant total effect of RD on subjective sleep quality, $b = .110, SE = .04, p = .008$ (path c). We found that RD was positively associated with both worry, $b = .348, SE = .17, p = .048$ (path a_1), and rumination, $b = .503, SE = .16, p = .003$ (path a_2). Rumination, $b = .094, SE = .04, p = .012$ (path b_2), but not worry, $b = -.001, SE = .03, p = .986$ (path b_1), was positively associated with subjective sleep quality. We also found no significant indirect effect of RD on subjective sleep quality through worry, as the bootstrapped CIs straddled zero ($a_1b_1 = -.0002$, Bias-Corrected 95% CI [−.031, .026]). Conversely, there was a significant indirect effect of RD on subjective sleep quality through rumination, as the bootstrapped CI did not include zero ($a_2b_2 = .047$, Bias-Corrected 95% CI [.008, .125]).

DISCUSSION

The present study is among the first to examine PC as a functional mechanism in the association between RD and subjective sleep quality. Our results corroborate and build upon the findings of previous research demonstrating that RD is associated with poorer subjective sleep quality in African Americans. Consistent with our first hypothesis, we found that more frequent RD exposure was associated with poorer subjective sleep quality. In support of our second hypothesis, we found a significant indirect effect of RD on subjective sleep quality through rumination. Surprisingly and counter to previous research (i.e., Beatty et al., 2011), we did not find a significant indirect effect for worry. There are key differences that may account for this divergence. First, we utilized a measure of RD whereas Beatty and colleagues (2011) employed a measure of unfair treatment attributable to a number of factors (e.g., race, gender), and not race exclusively. Second, we assessed general or trait worry, not nighttime sleep-related worry. Research documents that nighttime sleep-related worry and stress near bedtime are associated with sleep impairment (Åkerstedt et al., 2012; Lancee, Eisma, van Zantem, & Topper, 2015), which in turn, may increase presleep arousal (Yeh, Wung, & Lin, 2015) that persists into and disrupts sleep. Based on this pattern, it is possible that African Americans engage both in reflection on previous discrimination experiences and worry about future experiences of discrimination at the end of the day. Future research examining both the intrusiveness and affective content of nighttime-related thoughts among African Americans would be illuminative.

In context, our findings are consistent with mounting evidence that rumination may be the more salient component of PC in the association between stressors and sleep impairment. In a recent investigation in college students with moderate depression, Pillai et al. (2014) examined the association between actigraphy-based sleep across a seven-day period and presleep rumination, which was retrospectively assessed each morning via a daily diary. These researchers found that presleep rumination significantly predicted longer actigraphy- and diary-based sleep onset latency (Pillai et al., 2014). Other research documents that individuals with higher levels of trait rumination experience more presleep intrusive thoughts and poorer self-reported sleep quality (Guastella & Moulds, 2007). Despite these findings, there is also evidence that both domains of PC mediate the impact of daily stress on sleep. For example, in a three-day ambulatory study, Dutch EMS helicopter pilots wore actigraphs and completed diary measures of work-related distress, worry and rumination (i.e., single items), and sleep quality. Work-shift related distress significantly predicted sleep onset latency, but this association was fully attenuated by the combined worry and rumination items (Radstaak et al., 2014). We posit that variations in measures used to assess rumination, worry, and sleep may account for some of the discrepancy across research studies. As the literature on PC and sleep continues to mature, it will become further evident whether it is rumination or worry alone, or their synergistic influence that drives the relationship between daily stressors and sleep. Irrespective of these mixed findings, one major implication of this previous work is that *when* PC is assessed may be as important as how (i.e., trait versus diary versus single-item measures).

There are several limitations of the present study that can inform future research. First, our sample comprises African American college students. Thus, our findings may have limited

generalizability to the larger African American population with regard to variations in socioeconomic status, relative developmental stage, and controllability of other secondary factors that might influence sleep. It is further acknowledged that college students generally have poorer sleep hygiene and quality than noncollege samples (Hershner & Chervin, 2014); however, African American college students may not be any more or less likely than other African Americans to encounter RD, or to ponder and reflect upon these experiences. Second, although we employed mediation to test the theoretical function of PC, the present study is cross-sectional. Consequently, the data are limited in informing causal ordering in the association between RD and sleep quality. Longitudinal investigations are needed to assess temporality of the interrelations among RD, PC, and sleep quality over time and the long-term accumulative burden of RD on sleep. Finally, we only included self-reported sleep data. As PSG is the gold standard of sleep measurement, future studies may examine the interrelations among RD, PSG-measured sleep, and PC.

Limitations notwithstanding, our findings raise several considerations for research, practice, and intervention. Cognitive behavioral methods have been shown to be effective in improving some aspects of sleep (i.e., chronic insomnia; Trauer, Qian, Doyle, Rajaratnam, & Cunnington, 2015). However, it is unclear whether these findings extend to African Americans, who remain underrepresented in and are less likely to voluntarily participate in the clinical trials that develop and evaluate the efficacy of these treatments. Fortunately, there has been increasing attention to identifying and addressing such barriers (e.g., George, Duran, & Norris, 2014; Luebbert & Perez, 2016). This work may be of particular interest to researchers seeking to determine whether standard sleep interventions are effective in improving African Americans' sleep.

Additionally, it may be important for practitioners working with African Americans both within and beyond sleep medicine contexts to further consider the exacerbating role of RD on broader mental health. RD is associated with a greater risk for depression among African Americans (for review, see, Lewis, Cogburn, & Williams, 2015), and African Americans may employ more ruminative coping, a common strategy used among individuals with depression, for race-related events as compared to non–race-related events (Hoggard, Byrd, & Sellers, 2012). There is also growing interest in the parallels between aspects of the qualitative experience of RD and features of clinical anxiety (e.g., Earl & Williams, 2009; Hunter & Schmidt, 2010; Soto, Dawson-Andoh, & BeLue, 2011). Paramount among these is hypervigilance, whose presence is well documented in generalized anxiety (GAD) and posttraumatic stress disorder (PTSD). Scholars have increasingly recognized that the constant anticipation of encountering future RD (i.e., vigilance) may be one of the most salient aspects of race-related stress (e.g., Hicken et al., 2013).

Although care should be taken to avoid pathologizing what is for many a chronic daily experience, it may be critical that clinicians and counselors aid their African American patients in identifying and minimizing the use of maladaptive coping strategies (e.g., rumination; worry) and developing more adaptive mechanisms for coping with RD. For example, several culturally based coping models have underscored the effectiveness of social support seeking (Harrell, 2000; Shorter-Gooden, 2004), Africultural coping (Utsey, Adams, & Bolden, 2000), and racial and ethnic identity development (Banks & Kohn-Wood, 2007;

Helms, 1990). Other research indicates that values- and affirmations-based interventions, which encourage individuals to write about their experiences, values, and beliefs, may also be effective in improving coping among African Americans (for review, see Lewis et al., 2015). Testing the effectiveness of these interventions is a worthwhile endeavor, as they may be easily implemented in individual and community-based clinical and research settings.

CONCLUSION

Our findings suggest that the association between RD and sleep quality among African Americans may be twofold, both through a greater frequency of exposure as well as through reflection on past experiences of RD. Given the global importance of optimal sleep for maintaining and promoting mental and physical health, it is essential that the influence(s) of RD be addressed as a unique and pervasive stressor underlying disparities in sleep and other domains.

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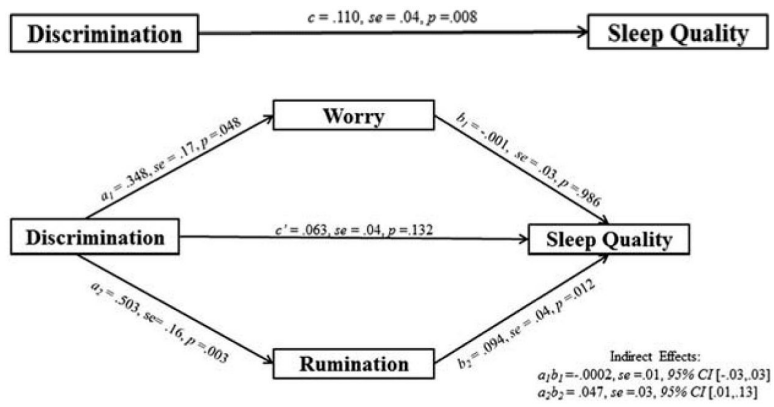
FIGURE 1.

A Effect of racial discrimination on subjective sleep quality.

B Indirect effect of racial discrimination on subjective sleep quality through PC.

TABLE 1

Descriptive Statistics and Correlations for Racial Discrimination, Mediators, Sleep Quality, and Covariates

Variable	M (SD)	Correlations					
		1	2	3	4	5	6
1. Age	20.18 (2.93)	–					
2. Class	3.01 (0.95)	$-.32^{**}$	–				
3. Discrimination	31.52 (10.03)	.00	−.15	–			
4. Worry	48.96 (13.32)	.13	−.04	.18	–		
5. Rumination	43.90 (13.02)	$.26^{*}$	−.18	$.36^{**}$	$.56^{**}$	–	
6. Sleep quality	6.98 (3.41)	$.31^{*}$	$-.30^{*}$	$.35^{**}$	$.25^{*}$	$.51^{**}$	–

Note.

Participants' self-reported social class: 1 = Lower Class (5.9%), 2 = Working Class (22.1%), 3 = Lower Middle Class (41.2%), 4 = Upper Middle Class (26.5%), 5 = Upper/Higher Class (4.4%).

*
$p = .05$,

**
$p = .001$.

TABLE 2

Regression Coefficients, Standard Errors, and Model Summary Information for the Parallel Mediator Model

| | Outcome | | | | | | | | | | | | |
| Predictor | Worry | | | | Rumination | | | | Sleep Quality[a] | | | | Sleep Quality[b] | | |
	Coefficient	SE	P		Coefficient	SE	P		Coefficient	SE	P		Coefficient	SE	P
Discrimination a_1	.35	.17	.048 a_2		.50	.16	.003 c'		.06	.04	.132 c		.11	.04	.008
Worry	-	-	-		-	-	- b_1		-.001	.03	.986		-	-	-
Rumination	-	-	-		-	-	- b_2		.09	.04	.012		-	-	-
Age	.65	.17	.266		1.06	.54	.055		.19	.13	.143		.29	.14	.034
Gender	-7.07	3.42	.043		-1.91	3.18	.551		.43	.78	.586		.25	.80	.754
Class	1.00	1.82	.589		-.60	1.69	.722		-.56	.40	.166		-.62	.42	.147
	$R^2 = .12, p = .119$				$R^2 = .21, p = .008$				$R^2 = .36, p = .0002$				$R^2 = .25, p = .002$		

Note.

[a] = indirect effect model;

[b] = direct effect model.