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Racism-Related Experiences, Expectations, and Mothers' Concern about Children's Exposure to Racism Associated with Poor Sleep Quality in African American Women

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Abstract

Racism-Related Experiences, Expectations, and Mothers' Concern about Children's Exposure to Racism Associated with Poor Sleep Quality in African American Women

By Khin Hnit Oo

Rationale: Research linking racism-related stressors to sleep quality in African Americans have typically focused on single stressors despite the fact that multiple stressors often co-occur.
Objective: We sought to examine associations between three racism-related stressors and sleep quality in a cohort of African American women, and to explore whether depressive symptoms severity and trait-based worry attenuated these associations.
Methods: Cross-sectional data from 406 African American women aged 30-46 years in the southeastern US. Stressors were racism-related experiences, expectations of racism, and mothers' concern for their children's exposure to racism measured by the Racism and Life Experiences Scale – Daily Life Experiences, Race-Based Rejection Sensitivity Scale, and Telephone-Administered Perceived Racism Scale – Concern for Children, respectively. Sleep quality was measured using the global sleep quality score of the Pittsburgh Sleep Quality Index. We performed logistic regression analyses of dichotomized sleep quality (cutoff at a score of 5). We further conducted linear regression analyses of continuous sleep quality and standardized coefficients to enable comparison across stressors. We compared associations in the full sample and in a sample restricted to mothers in the cohort to conduct sensitivity analyses.
Results: Daily life experiences (OR=1.74, 95% CI: 1.25, 2.42), expectations of racism (OR=1.20, 95% CI: 1.00, 1.44), and concern for children (OR=1.35, 95% CI: 1.03, 1.75) were positively associated with poor sleep quality in analyses adjusted for sociodemographic factors, body mass index, and current smoking status. The coefficient relating daily life experiences with continuous sleep quality (standardized β=0.20, SE=0.26) was nearly double that of expectations (standardized β=0.10, SE=0.15) and concern for children (standardized β=0.13, SE=0.23). The association of all racism-related stressors with poor sleep was attenuated after accounting for depressive symptoms and worry, leaving daily life experiences as the sole correlate of poor sleep. Between the full and mothers-only samples in the sensitivity analyses, associations differed only for expectations of racism.
Conclusion: We observed strong positive associations of all racism-related stressors with poor sleep quality. Comparative analyses suggested that exposure to racism-related events may be more harmful to sleep quality than stressors due to anticipating such events happening to oneself or one's children.

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Chapter 1

Introduction

Racism and discrimination have been abundantly connected to numerous health outcomes over the past three decades.[1, 2] Researchers have increasingly conceptualized racism, namely racism-related psychosocial stress, as an independent contributor to poor sleep outcomes. Experiences of discrimination including microaggressions and racism-related events in everyday settings have been associated with poor sleep across cohorts.[3-7] A growing body of evidence has also begun to establish strong associations between racism-related vigilance, stress as a result of anticipating discrimination, and adverse sleep outcomes.[3, 8] The objective of our study is to further investigate the influences of different constructs of racism-related stress on sleep.

To examine a particularly salient group of predictors, we examine the relationship between three racism-related psychosocial stressors and sleep quality separately, then analyze their effect sizes comparatively. The exposures are racism-related daily life experiences, expectations of racism, and mothers' concern for their children's exposure to racism. We assess if anticipatory stressors due to racism have a greater effect on sleep quality in comparison to actual experiences of racism. Informed by previous studies that found strong associations between anticipatory stressors and sleep[9, 10], we hypothesize expectations of racism and concern for children will be associated more strongly with poor sleep quality than daily life experiences. Elucidating causes of poor sleep enable us to hone interventions that target the most relevant risk factors and predictors of poor sleep and consequently, mitigate downstream effects.

Chapter 2

Literature Review

We chose to focus on poor sleep as an outcome because a growing body of research has documented that adverse sleep outcomes and disorders disproportionately burden African Americans, relative to other racial/ethnic groups.[11-13] Compared to non-Hispanic whites, shorter sleep duration, greater sleep disturbances, poorer sleep quality, and higher prevalence of sleep disorders such as insomnia and sleep apnea have been observed in African Americans.[14-16] Suffering from such adverse sleep outcomes were shown to be detrimental to many downstream health outcomes. Experimental and national, population-based studies consistently linked poor sleep to various chronic disease outcomes, including obesity, hypertension, diabetes, stroke, impaired cognition, depression, and cardiovascular disease (CVD).[8, 17] Among these studies, a particularly strong association between short sleep duration, poor sleep quality, and cardiovascular disease (CVD) were established.[18-21]

Racial disparities in sleep outcomes have increasingly become accepted as a contributor to similar disparities in CVD.[22] Studies indicated that sleep is a partial mediator of racial disparities in several cardiovascular outcomes.[14, 23] Concurrently, CVD and adverse cardiovascular outcomes impact African Americans more than any other racial/ethnic group in the US and CVD morbidity and mortality disproportionately burden African American women in particular.[24, 25] There is a critical need to further examine sleep as a pathway to cardiovascular health.

Most of the existing literature found these associations within multiracial cohorts and compared effect sizes in African Americans relative to non-Hispanic White populations.[8] However, within such studies, certain aspects of racism-related experiences such as race-based

discrimination or microaggressions may not have applied to non-Hispanic Whites and were left unexamined. Whereas studies with African American cohorts examining racism-related psychosocial stress as an exposure often focused on a single construct of racism. For example, vigilance related stressors from anticipating racism are typically investigated separately from stress caused by actual encounters of discrimination or self-reported racism. To our knowledge, no study has conducted analyses that compare the influences of varying constructs of psychosocial stress due to racism.

Our study extends existing literature by examining multiple psychosocial stressors that span different constructs of self-reported racism. Furthermore, we endeavored to highlight intersectional experiences of African American women by incorporating a manifestation of racism that is believed to uniquely impact African American mothers and parents. Some researchers have argued that African Americans bear a particularly heavy burden of worrying about their children experiencing institutional and interpersonal racism.[26, 27] An ever present concern for African American mothers in the US is the threat of unsecured safety when encountering law enforcement.[28, 29] In response to the killing of Mr. George Floyd in 2020, Mayor Keisha Lance Bottoms of Atlanta, Georgia expressed her constant worry for her sons possibly meeting the same fate of Mr. Floyd one day, despite her political power and authority over the Atlanta police department.[30] Within a solely African American, female cohort, we wanted to be diligent in accurately portraying the weight of this chronic stressor when examining it alongside other more commonly studied racism-related psychosocial stressors.

By introducing the intersectionality of racism-related experiences in our study, we aim to assess various life domains relevant to discrimination and stress in the US context of racial stratification. It is also our hope that this analytical approach may capture the experiences of our

cohort more comprehensively. In analyses limited to either experiences or expectations of racism, scales used to measure such stressors often focused on singular life domains. Scales and their components have tended to discretely measure specific constructs of racism-related stressors such as everyday discrimination, discrimination in workplaces, or gendered racism, for instance. Limiting analyses to one of these stressors restricts our ability to ascertain if some forms of self-reported racism are more harmful to a health outcome than others. Additionally, existing literature posited that psychological risk factors for poor sleep such as stress reactive rumination and depressive symptom severity play a role in the relationship between racism-related psychosocial stressors and adverse sleep outcomes.[9, 31, 32] Thus, examining the pathway between psychosocial stress induced by self-reported racism and sleep outcomes is complex and requires nuance.

Chapter 3

Methods

Study Participants

The Mechanisms Underlying the impact of Stress and Emotions on African American Women's Health Study (MUSE) consisted of a cohort of 422 African American women aged 30-46 years in the southeastern US. The MUSE study sought to investigate the influence of psychosocial stressors on CVD risk. Inclusion criteria entailed self-identification as an African American woman aged between 30-45 years old at the time of screening and premenopausal with at least one ovary. Exclusion criteria included history of clinical cardiovascular disease, current pregnancy or lactation, any chronic illness known to affect atherosclerosis (e.g., HIV/AIDS, autoimmune or chronic inflammatory diseases such as lupus/rheumatoid arthritis, renal disease, liver disease), current psychiatric treatment, current illicit drug use or alcohol abuse, and overnight shift employment.

This study used baseline data collected from December 2016 to March 2019 from this cohort. Representative of 200 unique census tracts, 422 respondents enrolled in the MUSE study and completed the in-person interview. All interviews were conducted in English by interviewers who identified as African American women. Four participants were missing information on the PSQI outcome variable. Restricted to those with complete data on all exposure, outcome, and covariate variables, our analytic sample included 406 participants as shown in Figure 1.

Outcome

To assess global sleep quality (GSQ), our primary outcome of interest, we used the Pittsburgh Sleep Quality Index (PSQI), which is a 19-item questionnaire that measures various components of sleep quality during the previous month.[33] To capture both quantitative and

subjective aspects that comprise the construct of sleep quality, the PSQI measured seven components: subjective sleep quality, sleep duration, sleep disturbance, habitual sleep efficiency (proportion of time in bed spent;. asleep), sleep latency (time spent falling asleep), daytime dysfunction due to sleepiness (i.e., trouble staying awake while driving), and sleep medication use.[33] Each component score ranged from 0-3 with higher scores representing worse sleep quality in relation to that component. A GSQ score was the composite of all seven component scores and ranged from 0-21. GSQ scores greater than 5 on the PSQI was clinically recognized to be indicative of poor overall sleep quality.[11] The PSQI has been implemented widely across populations and had acceptable internal consistency in this sample with a Cronbach's alpha of 0.69.

Race-Related Stressors

Exposures were three race-related stressors: daily life experiences (DLEs) of racism, expectations of racism, and mothers' concern for their children's exposure to racism, which were assessed with the DLE subscale of the Racism and Life Experiences Scale, a modified "expectations" subscale of the Race-Based-Rejection Sensitivity Questionnaire, and the Concern for Children subscale of the Telephone-Administered Perceived Racism Scale.

The frequency of direct experiences of racism was measured with the Daily Life Experiences (DLE) subscale of the Racism and Life Experiences Scale (RaLes), which assessed individual, vicarious, and collective experiences of racism.[34] The DLE captured the frequency of encountering discriminatory actions, hassles, or microaggressions in everyday life by presenting sample experiences to participants.[35] Sample scenarios in items were "Your ideas or opinions being minimized, ignored, or devalued," "Others expecting your work to be inferior," and "Being treated in an "overly" friendly or superficial way." Respondents then

indicated how often those experiences occurred to them as a result of their race on a 4-point scale from 0 “Never” to 4 “Often.” The DLE subscale had good internal consistency in this sample with a Cronbach’s alpha of 0.95.

We assessed expectations of racism with a modified 7-item version of the expectations subscale of the Race-Based-Rejection Sensitivity Questionnaire, which prompted respondents to reflect on how much they would anticipate experiencing racism in a variety of scenarios.[36] Originally, the subscale was designed to be implemented among African-American college students attending predominantly white universities and showed good validity and test-retest reliability[33]. Though 12 items comprise the original scale, we eliminated five items because they are not applicable to nonstudent populations (e.g., items about grades and scholarships) or are deemed currently irrelevant (e.g., an item about using a payphone). Participants responded to the remaining seven items on a six-point scale with higher scores indicating a greater extent of expected racism. They were prompted to respond to items portraying scenarios such as, “Imagine you have just completed a job interview over the telephone. You are in good spirits because the interviewer seemed enthusiastic about your application. Several days later you complete a second interview in person. Your interviewer informs you that they will let you know about their decision soon.” The respondent was then asked whether she “would expect that you might not be hired because of your race/ethnicity.” Another item scenario read, “Imagine that you are in a store, trying to pick out a few items. While you’re looking at the different brands, you notice one of the store clerks looking your way,” to which the respondent replied whether she “would expect that you might not attend to me right away because of my race/ethnicity.” Responses were averaged to maintain the original distribution of the 0–5-point scale. The expectations subscale had good internal consistency in this sample with a Cronbach’s alpha of 0.90.

The Concern for Children Scale is an 8-item scale within the Telephone-Administered Perceived Racism Scale (TPRS), which is a 61-item measurement tool designed to implement in employed Black women. The TPRS entailed five scales that collectively capture multiple dimensions of experiencing racism: Experience of Racism (by Blacks as a group and by the respondent), Emotional Responses, Behavioral Responses, Concern for Child(ren), and Past Experiences of Racism.[37] Its creators endeavored to nuance the experience of African American women by incorporating the added psychosocial stress that African American mothers bear in anticipation of their children's exposure to institutional and prejudicial forms of racism.[27] The responses in the scale ranged from 0 "not at all concerned" to 4 "very concerned." The Concern for Children subscale had good internal consistency in this sample with a Cronbach's alpha of 0.93.

For all exposure scores, we summed scores and divided total sum by the number of items in each scale. Average scores ranged from one to three for the DLE and Concern for Children scales and from one to five for the expectations scale. For missing values within each exposure, we imputed the average score of completed scale items for participants with at least 80% of the scale complete (n=420 for DLE, 421 for expectations, 298 for Concern for Children); participants missing more than 20% of scale items were not given a score (n=2 for DLE, 1 for expectations, 11 for Concern for Children).

Psychological Risk Factors: Depression Symptom Severity and Worry

Existing literature identified depressive symptom severity and worry as conceptual or empirical correlates of race-related stressors and sleep.[10, 38, 39] Depressive symptom severity was assessed with the Beck Depression Inventory (BDI), a 21-item, validated questionnaire assessing depressive symptoms in the past two weeks and is widely used across populations.[40] Adhering to standard practice in studies about stress, discrimination, and sleep, we excluded an item assessing sleep quality and summed the remaining 20 items to calculate a modified composite BDI score that ranged from 0–38. The BDI had good internal consistency in this sample with a Cronbach's alpha of 0.90.

We used the 16-item Penn State Worry Questionnaire (PSWQ) to measure the trait-based construct of worry, which is a dominant feature of generalized anxiety disorder (GAD) and distinguishable from features of other anxiety disorders.[41] The PSWQ captured the excessiveness, generality, and uncontrollable dimensions of having the trait of worry or anticipatory negative thinking. Participants rated their level of agreement with each of the 16 items on a Likert scale from 0 ("not at all typical of me") to 4 ("very typical of me"). Of the 16 items, 5 were reverse coded. Responses were summed with total scores ranging from 0 to 64. The PSWQ had good internal consistency in this sample with a Cronbach's alpha of 0.93.

Other Covariates

We included sociodemographic information on age, educational attainment, household income, employment status, and partner status. Educational attainment was collected as years of education and highest degree attained and then categorized for analyses as high school or less, some college, and college or higher. Household income was collected as a 4-category variable and collapsed based on the distribution of the responses into the following categories: <$35K,

$35-<$50K, $50-<$75K, ≥$75K. Eight "Refused" and "I Don't Know" responses were recoded into one 'Other' category. Employment status was assessed as full-time, part-time, unemployed, or other. Nine "Refused" and "I Don't Know" responses were recoded into one 'Other' category. Partner status was dichotomized as married or cohabitating with a partner, which were collapsed into one category, as opposed to neither. Health-relevant factors known to impact sleep were included as additional covariates, which were body mass index (BMI) calculated as measured weight divided by the square of measured height (kg/m^2) and current smoking status dichotomized as current smoker or not.

Statistical Analyses

We characterized the sample by calculating descriptive statistics for sociodemographic and psychological risk factors. To examine our outcome variable of interest, we graphically depicted distributions of mean global PSQI scores or GSQ across tertiles of exposures' average composite scores. To compare associations between exposures and continuous GSQ, we examined standardized regression coefficients in linear regression models. To model GSQ as a continuous variable, we first fit a set of five linear regression models. Model 1 was unadjusted and Model 1a was age adjusted. Subsequent models adjusted for sociodemographic factors including age, educational attainment, household income, employment status, and partner status (Model 2), and health factors known to affect sleep quality including BMI and current smoking status (Model 3). In addition to these covariates, we evaluated whether associations between exposures and GSQ were independent of depressive symptom severity and worry as they are considered psychological risk factors for poor sleep. We adjusted for depressive symptom severity in Model 4 and worry in Model 5, then calculated percent attenuation of the association in Model 3 after adjustment in Models 4-5. To examine relationships between exposures and

GSQ as a dichotomous outcome, wherein poor sleep quality was dichotomized at a clinical cutoff score of 5, we fit logistic regression models with the same covariate specification as Models 1-5 with continuous GSQ as the outcome.

After adjusting for depressive symptom severity in Models 4 and worry in Models 5, we calculated percent attenuation to explore potential mediation. We reported percent attenuation for both logistic and linear models (e.g. $\left(\frac{\beta_{\text{Model 3}} - \beta_{\text{Model 4}}}{\beta_{\text{Model 3}}}\right) \times 100$) in Models 4-5. Additionally, we conducted exploratory analyses and tested for interactions between exposures and five covariates: BDI, worry, income, and educational attainment in minimally and fully adjusted non-stratified linear models.

The Concern for Children questionnaire was administered only to participants who identified as a parent. Thus, we performed sensitivity analyses by repeating all analyses on a sample restricted to mothers in the cohort (n=309). Among the 309 participants who were mothers, 11 were excluded from further analysis per our study's imputation protocol because they were missing more than 80% of the scale items. We imputed complete composite Concern for Children score among the remaining 299 mothers. Once missing values for all covariates were accounted, the final sample to assess the association between Concern for Children and GSQ were 288 participants. In our sensitivity analyses, we created an alternative sample restricted to the 299 participants who identified as mothers and for whom we had complete data. Of these 299 participants, 287 had complete data on all covariates and a complete imputed Concern for Children score. Repeating analyses within the sample of mothers (n=299), we examined Models 1-5 and compared results to those from the full analytic sample (n=406). All statistical analyses were conducted using Statistical Analysis Software Version 9.4 (SAS Institute Inc. 2013, Cary, NC, USA.). An alpha level of .05 was used for all analyses.

Results

Participant Characteristics

Descriptive statistics of the sample can be found in Table 1. Highly educated, middle aged African American women who are predominantly employed full time with higher incomes comprised this cohort. The mean age was 37 years. Nearly half of the cohort held a college or higher degree and over half of the cohort were employed full-time (64.7%) and earned an income of $50,000 or higher (53.8%). Only 10% of the cohort identified as current smokers. At a mean BMI score of 32.8, many of the participants were obese.

In addition to these characteristics, participants endorsed an average composite score of approximately 0.95 (SD=0.66) out of a total score of 3 for DLEs, 2.16 (SD=1.15) out of 5 for expectations of racism, and 1.91 (SD=0.95) out of 3 for Concern for Children. The average GSQ score as measured with the PSQI was 6.73 (SD=3.53) within a possible range of 0-19. Of the 406 participants, 57% scored greater than 5 on the PSQI. This cohort on average scored low on the BDI with an average BDI score of 5.44 (SD=6.55) within a possible range of 0-38 and scored an average worry score on the PSWQ of 34.18 (SD=15.12) within a possible range of 1-64.

Figure 2 depicts unadjusted levels of mean global PSQI scores separately across tertiles of exposures' scores. Mean global PSQI score were progressively higher by each tertile of DLE and expectations scores, but not for Concern for Children. Although there is an increase from a mean global PSQI score of 6.54 in the lowest tertile (Tertile 1) of Concern for Children to 7.19 in the second tertile, we observed a slight decline to 6.97 in the highest tertile (Tertile 3). Overall, we observed a dose response effect in the graphical representations of mean global PSQI score distributions across two of three average exposure scores.

Associations between All Exposures and Global Sleep Quality Scores

Table 2 presents results from unadjusted and adjusted linear regressions models examining associations between continuous exposure scores and continuous global PSQI score. In the unadjusted model, only DLEs were associated with GSQ. The global PSQI score increased 0.17 point (SE: 0.26, p=0.0004) for each point increase in mean DLEs score. The association remained when adjusting for sociodemographic and psychological risk factors in Models 2 and 3, in which the effect size increased. When adjusting for sociodemographic factors in Model 2, the global PSQI score increased 0.20 point (SE: 0.26, p<0.0001) for each point increase in mean DLEs score and 0.10 point (SE: 0.26, p=0.043) for each point increase in mean expectations score. All exposures were associated with global PSQI score when adjusting for both sociodemographic and psychological risk factors in Model 3. For each point increase in the mean exposure score, the global PSQI score increased 0.20 point (SE: 0.26, p<0.0001) for DLEs, 0.10 point (SE: 0.15, p=0.033) for expectations, and 0.13 point (SE: 0.23, p=0.038) for Concern for Children.

Associations between All Exposures and Poor Sleep Quality

Table 3 presents results from unadjusted and adjusted logistic regressions models examining associations between continuous exposure scores and poor sleep quality (GSQ >5). While expectations were not associated with odds of poor sleep quality in unadjusted and age adjusted models (Models 1 and 1a), DLEs and Concern for Children were positively associated with the odds of poor sleep quality. When adjusting for sociodemographic (Model 2) and psychological risk factors (Model 3), we observed positive associations between all exposures and poor sleep quality with very similar odds ratios in both models. In Model 3, the odds of poor sleep quality were 74% higher (OR=1.74, 95% CI: 1.25, 2.42, p=0.001) for each point of the

mean DLEs score, 20% higher (OR=1.20, 95% CI: 1.00, 1.44, p=0.05) for each point of mean expectations score, and 35% higher (OR=1.35, 95% CI: 1.03, 1.75, p=0.03) for each point of the mean Concern for Children score.

Adjustments in Models 4-5 produced similar attenuation across all exposures as observed in the logistic regression models. Adjusting for depression symptom severity in Model 4 attenuated the coefficients for positive associations in Model 3 by 45% for DLEs, 80% for expectations, and 69% for Concern for Children while adjusting for worry in Model 5 attenuated these associations by 40%, 70% and 54%, respectively. Only the positive association between DLEs and poor sleep quality remained in Models 4 and 5; we no longer observed positive associations with the other two exposures in Models 4-5.

Results from our sensitivity analyses are presented in Tables 4 and 5. Associations between DLEs and Concern for Children and sleep quality within the mothers-only sample did not significantly deviate from those produced by the analytic sample. We observed comparable effect sizes in all linear and logistic regressions models. Within the mothers-only sample, the association between DLEs and sleep quality were attenuated to a greater extent than they were in the analytic sample. For the association between Concern for Children and sleep quality, the effect sizes were nearly the same between the two samples with a 0.01-point difference in Model 5. However, the positive association between expectations of racism and sleep quality that we observed in Models 2 and 3 within the analytic sample did not persist in the mothers-only sample; results from Models 1-5 in all logistic and linear regressions models were not statistically significant for this relationship. Notably, the mothers-only sample produced coefficients in the inverse direction when controlling for depressive symptoms and worry.

Chapter 4

Discussion

In this cohort of African American women in the southeastern US, day-to-day experiences of racism, expectations of racism, and concern for children's exposure to racism are all associated with poor sleep quality. Upon adjusting for sociodemographic and psychological risk factors, separately and together, we observe positive associations between all exposures and sleep quality in both logistic and linear regression models. Standardized coefficients demonstrate that the effect size of DLEs is nearly twice as large as those for expectations and Concern for Children. Contrary to our hypothesis that anticipatory stressors would be stronger predictors of poor sleep, the association between DLEs and worse sleep appears to be most pronounced. The effect size of DLEs is the largest across all logistic and linear models and remains after adjusting for depressive symptoms and worry separately when the other two exposures do not. To our knowledge, this is the first study that comparatively examines how types of racism-related psychosocial stressors influence sleep quality differently.

Comparing these differential influences of direct exposure to racism and stress from anticipating exposure to racism is a novel aspect of this study. In measuring direct exposure to self-reported racism, the DLE subscale we used is a tool less commonly employed in studies of discrimination and sleep. In their 2018 systematic review of discrimination and sleep, Slopen et al. found the Everyday Discrimination Scale (EDS) and Perceived Discrimination subscale from the Scale of Ethnic Experience to be most frequently used among the seventeen studies under review.[8] In one of these studies using the EDS to measure direct exposure to racism, Francis et al. observed experiences of direct racism to be associated with a 0.05 increase in global PSQI score among pregnant African-American women.[42] In a Midlife Development in the United

States Study (MIDUS) study that used the nine-item version of the EDS, Owens et al. reported a 9% increase in odds of poor sleep quality via the PSQI for those with greater experiences of interpersonal racism.[43] However, they did not observe racial/ethnic differences in this outcome. Thus, our findings of stronger effect sizes using the DLE subscale of RaLES (0.20 increase in global PSQI score) are potentially attributable to differences in question items among different scales.

We found that both depressive symptoms and worry partially, if not largely, explain the associations between stressors and sleep quality, with only effects of DLEs persisting after controlling for these factors. However, mediation analyses are not possible in this cross-sectional study. Evidence for the relationship between depression and overall poor sleep health is abundant, with sleep disturbances serving as a clinical indicator.[32] More than 90% of individuals diagnosed with depression report impaired sleep quality.[39] Notably, prospective studies have well substantiated that depression can be developed and escalated through experiences of self-reported racism and discrimination.[2] Per theoretical models that aim to explain this relationship, depression is recognized as a psychological risk factor of poor sleep. Sleep disturbances and autonomic arousal have been attributed to negative affect as well.[9, 38] Many studies places stress reactive rumination or trait worry as mediator between various stressors and sleep outcomes.[9, 31] Rumination and worry are often utilized and referred to interchangeably in this literature.[38] Our results also suggest these associations may be mediated by both depression and worry and moreover, highlight those effects of direct racism-related experiences on sleep quality may be independent of both risk factors.

Using self-report measures for all exposure and outcome variables is a limitation of this study. Despite the fact that self-report methodologies are most commonly used for assessing

discrimination or appraisal of racism related stressors, researchers recommend considering its limitations when interpreting results from such measurements.[2] Though the DLEs and expectations subscales are well established and all three exposures, including the more novel Concern for Children subscale, report good validation and test-retest reliability[35-37]. Our outcome of interest is also assessed using a self-report measure. Although subjective and objective measures have been shown to be similarly correlated with discrimination[6], objective measures such as polysomnography or actigraphy are recognized as the gold standard.[12] The PSQI is a widely used, validated measurement of sleep and enables researchers to incorporate participant-centered aspects of sleep.[33] However, the PSQI does not inquire about regularity of sleep schedules, which have been suggested as important for other health outcomes.[5]

Secondly, the cross-sectional nature of this data limits our ability to make inferences on temporality or causality in the associations between stressors and sleep quality. Moreover, the temporal dynamics within certain cross-sectional associations are unclear; the DLE subscale inquires how often participants have generally experienced each scenario without posing a specific timeframe, whereas in the PSQI, participants report on their sleep over the course of the past month. Lastly, the results in this study may not be generalizable to all African American women and are limited in its generalizability to other populations or geographic areas. All participants are from the Atlanta metropolitan area, of whom half are college educated and two-thirds are employed full-time, both of which are higher than national rates. However, this cohort of predominantly highly educated women remains highly relevant to our hypothesis. The widest sleep disparities have been reported between African-Americans and whites in professional occupations with greater responsibilities.[44] Higher SES African-American women also report more discrimination[45] and experience worse sleep than lower SES African-American

women.[46] Therefore, this cohort may be even more salient to our examination of these associations as higher SES does not appear to be protective against discrimination or poor sleep.

Finally, in our data samples vary among exposures as a result of the Concern for Children subscale being administered only to mothers in the cohort. We have complete data on 406 observations for the DLE and expectations subscales, whereas only 299 observations for Concern for Children. Effect sizes comparable to those observed in the analytic sample persisted in associations between DLEs and sleep quality and essentially the same effect sizes of Concern for Children persisted, while the positive association between expectations and sleep quality did not. Although none of the models produced statistically significant results for the relationship between expectations and sleep quality, the inverse direction of the coefficients is worth noting and exploring further. These differences in results may be partially attributable to the difference in sample sizes. Results may vary from our observations had the Concern for Children subscale been implemented among non-parent participants as well.

This study also has important strengths. Comparing different forms of racism is a unique aspect of this study as studies of self-reported racism and discrimination tend to focus on a single stressor. When examining various forms of racism-related psychosocial stress, the Concern for Children subscale highlights the intersectionality of racism that compounds stressors related to race, gender, and motherhood. As far as we know, no other study has used the Concern for Children scale and compared its unique influence to that of other forms of self-reported racism within the context of sleep outcomes. Findings of the strong association between direct exposures to racism and sleep quality are also important to note as existing literature posits that racism-related vigilance and stressors related to anticipating racism is more strongly associated with poor sleep.

Conclusion and Public Health Implications

In conclusion, direct experiences of racism may be more harmful to sleep quality than stressors due to anticipating racism happening to oneself or one's children. The effect size of experiences of racism on sleep quality are nearly twice as large as those of expectations and Concern for Children, and two to four times as large as effect sizes observed in comparable studies.[8] Despite these larger effect sizes of direct experiences of racism, this study further substantiates the pervasive influence on sleep that is common to various constructs of self-reported racism. The effect size in associations between expectations and Concern for Children and sleep quality were still prominent and greater than those found in other similar studies.[8]

These findings imply that certain forms of racism may warrant particular attention, potentially through intervening on depression and worry traits, both of which may explain part of these effects on sleep. The comparative nature of this study also illuminates the intersectionality in experiences and appraisal of racism, especially within the lived experiences of African American women. Future studies should consider these intersections of different forms of racism-related events and stressors on sleep and how they may have a compounding effect on various health outcomes.

Our findings also show potential to reach beyond the field of sleep research. As sleep is increasingly viewed as a pathway through which many health outcomes and disparities are influenced by racism-related stressors, bolstering the evidence base for its effects on other outcomes is imperative.[47, 48] Particularly in this cohort that was designed to primarily measure CVD risk, elucidating the role of sleep within cardiovascular health will nuance findings on CVD.[22] Moreover, better understanding the importance of sleep may posit sleep

improvement as a point of intervention to reduce and eliminate downstream health outcomes and disparities.

The broader public health implications of our findings are relevant and important to a growing movement toward anti-racist societal change in the US.[49, 50] As recent historical events and the COVID-19 pandemic have shed light on racial disparities that are tightly woven into the fabric of the US, the urgency for racial equity has gained momentum in both public health and sociopolitical spheres.[50, 51] Contributing to the mounting evidence for racial health disparities must ultimately lead to informed action that will rectify past and ongoing harms.

References

1. Shelly P. Harrell, P.D., *A Multidimensional Conceptualization of Racism-Related Stress: Implications for the Well-Being of People of Color.* American Journal of Orthopsychiatry, 2000. **70**(1): p. 42-57.
2. Lewis, T.T., C.D. Cogburn, and D.R. Williams, *Self-reported experiences of discrimination and health: scientific advances, ongoing controversies, and emerging issues.* Annu Rev Clin Psychol, 2015. **11**: p. 407-40.
3. Dayna A Johnson, C.L.J., Natasha J Williams, Carmela Alcántara, *Are sleep patterns influenced by race/ethnicity – a marker of relative advantage or disadvantage? Evidence to date.* Nature and Science of Sleep 2019. **11**: p. 79-95.
4. Fuller-Rowell, T.E., et al., *Day-to-day fluctuations in experiences of discrimination: Associations with sleep and the moderating role of internalized racism among African American college students.* Cultur Divers Ethnic Minor Psychol, 2021. **27**(1): p. 107-117.
5. Van Dyke, M.E., et al., *Socioeconomic status discrimination is associated with poor sleep in African-Americans, but not Whites.* Soc Sci Med, 2016. **153**: p. 141-7.
6. Lewis, T.T., et al., *Chronic exposure to everyday discrimination and sleep in a multiethnic sample of middle-aged women.* Health Psychol, 2013. **32**(7): p. 810-9.
7. Johnson, D.A., et al., *Associations between everyday discrimination and sleep quality and duration among African-Americans over time in the Jackson Heart Study.* Sleep, 2021. **44**(12).
8. Slopen, N., T.T. Lewis, and D.R. Williams, *Discrimination and sleep: a systematic review.* Sleep Med, 2016. **18**: p. 88-95.

9. Hoggard, L.S. and L.K. Hill, *Examining How Racial Discrimination Impacts Sleep Quality in African Americans: Is Perseveration the Answer?* Behav Sleep Med, 2018. **16**(5): p. 471-481.

10. Lewis, T.T., I.I. McKinnon, *Exposure to Discrimination and Sleep*, in *The Social Epidemiology of Sleep*. 2019, Oxford University Press: New York, NY.

11. Kristen L. Knutson, P.E.V.C., PhD; Paul J. Rathouz, PhD; Thomas DeLeire, PhD; Diane S. Lauderdale, PhD, *Trends in the Prevalence of Short Sleepers in the USA: 1975–2006.* SLEEP, 2010. **33**(1): p. 37-45.

12. Lauderdale, D.S., et al., *Objectively measured sleep characteristics among early-middle-aged adults: the CARDIA study.* Am J Epidemiol, 2006. **164**(1): p. 5-16.

13. Hiestand, D.M., et al., *Prevalence of symptoms and risk of sleep apnea in the US population: Results from the national sleep foundation sleep in America 2005 poll.* Chest, 2006. **130**(3): p. 780-6.

14. Johnson, D.A., et al., *Understanding the determinants of circadian health disparities and cardiovascular disease.* Chronobiol Int, 2021: p. 1-8.

15. Chen, X., et al., *Racial/Ethnic Differences in Sleep Disturbances: The Multi-Ethnic Study of Atherosclerosis (MESA).* Sleep, 2015. **38**(6): p. 877-88.

16. Hall, M.H., et al., *Sleep is associated with the metabolic syndrome in a multi-ethnic cohort of midlife women: the SWAN Sleep Study.* Sleep, 2012. **35**(6): p. 783-90.

17. Johnson, D.A., et al., *The Contribution of Psychosocial Stressors to Sleep among African Americans in the Jackson Heart Study.* Sleep, 2016. **39**(7): p. 1411-9.

18. Chandola, T., Ferrie, J. E., Perski, A., Akbaraly, T., & Marmot, M. G., *The effect of short sleep duration on coronary heart disease risk is greatest among those with sleep*

disturbance: a prospective study from the Whitehall II cohort. Sleep, 2010. **33**(6): p. 739–744.

19. Sabanayagam, C., & Shankar, A., *Sleep duration and cardiovascular disease: results from the National Health Interview Survey.* Sleep, 2010. **33**(8): p. 1037–1042.
20. Hoevenaar-Blom, M.P., et al., *Sleep duration and sleep quality in relation to 12-year cardiovascular disease incidence: the MORGEN study.* Sleep, 2011. **34**(11): p. 1487-92.
21. Newman, A.B., Spiekerman, C. F., Enright, P., Lefkowitz, D., Manolio, T., Reynolds, C. F., & Robbins, J. , *Daytime sleepiness predicts mortality and cardiovascular disease in older adults.* Journal of the American Geriatrics Society, 2000. **48**(2): p. 115–123.
22. Jackson, C.L., S. Redline, and K.M. Emmons, *Sleep as a potential fundamental contributor to disparities in cardiovascular health.* Annu Rev Public Health, 2015. **36**: p. 417-40.
23. Cheng, P., et al., *Racial discrimination as a mediator of racial disparities in insomnia disorder.* Sleep Health, 2020. **6**(5): p. 543-549.
24. Lewis, T.T., et al., *Expectations of Racism and Carotid Intima-Media Thickness in African American Women.* Psychosom Med, 2019. **81**(8): p. 759-768.
25. Tsao, C.W., et al., *Heart Disease and Stroke Statistics-2022 Update: A Report From the American Heart Association.* Circulation, 2022. **145**(8): p. e153-e639.
26. Association, A.P.H., *Addressing Law Enforcement Violence as a Public Health Issue*. 2018.
27. Anissa I. Vines, P.a.D.D.B., PhD, *Stress of caring for children: the role of perceived racism.* Journal of the National Medical Association, 2009. **101**(2): p. 156–160.

28. Chambers, B.D., et al., *Black Women's Perspectives on Structural Racism across the Reproductive Lifespan: A Conceptual Framework for Measurement Development.* Matern Child Health J, 2021. **25**(3): p. 402-413.

29. Fielding-Miller, R., et al., *The Interaction of Race and Gender as a Significant Driver of Racial Arrest Disparities for African American Men.* J Urban Health, 2020. **97**(1): p. 112-122.

30. Bottoms, K.L., *Opinion The Police Report to Me, but I Knew I Couldn't Protect My Son*, in *The New York Times*. 2020.

31. Li, Y., et al., *Relationship Between Stressful Life Events and Sleep Quality: Rumination as a Mediator and Resilience as a Moderator.* Front Psychiatry, 2019. **10**: p. 348.

32. Huang, M., et al., *Association of Depressive Symptoms with Sleep Disturbance: A Co-twin Control Study.* Ann Behav Med, 2022. **56**(3): p. 245-256.

33. Jutta Backhausa, K.J., Andreas Broocksa, Dieter Riemannb, Fritz Hohagena, *Test–retest reliability and validity of the Pittsburgh Sleep Quality Index in primary insomnia.* Journal of Psychosomatic Research, 2002. **53**: p. 737-740.

34. Shelly P. Harrell, P.D., Meredith A. Merchant, M.A., Shirley A. Young, M.A., *Psychometric properties of the Racism and Life Experiences Scales (RaLES).* 1997.

35. Shelly P. Harrell, P.D., *Development and initial validation of scales to measure racism-related stress*, W.L.A. Pepperdine University, Editor. 1997.

36. Mendoza-Denton, R., et al., *Sensitivity to status-based rejection: implications for African American students' college experience.* J Pers Soc Psychol, 2002. **83**(4): p. 896-918.

37. Anissa I. Vines, M., Maya Dominguez McNeilly, PhD, June Stevens, PhD, Irva Hertz-Picciotto, PhD, Michael Bohlig, and Donna D. Baird, PhD, *Development and Reliability*

of a Telephone-Administered Perceived Racism Scale (TPRS): A Tool for Epidemiological Use. Ethnicity & disease, 2001. **11**(2): p. 251–262.

38. Tousignant O.H. , T.N.D., Suvak M.K., Fireman G.D., *Effects of Rumination and Worry on Sleep.* Behavior Therapy 2019. **50**: p. 558-570.
39. Dieter Riemann, M.B., Ulrich Voderholzer, *Sleep and depression - results from psychobiological studies: an overview.* Biological Psychology, 2001. **57**: p. 67–103.
40. BECK, A.T., et al., *An Inventory for Measuring Depression.* Archives of General Psychiatry, 1961. **4**(6): p. 561-571.
41. Meyer, T.J., Miller, M. L., Metzger, R. L., & Borkovec, T. D., *Development and validation of the Penn State Worry Questionnaire.* Behaviour research and therapy, 1990. **28**(6): p. 487–495.
42. Francis, B., M. Klebanoff, and R. Oza-Frank, *Racial discrimination and perinatal sleep quality.* Sleep Health, 2017. **3**(4): p. 300-305.
43. Owens, S.L., et al., *Association Between Discrimination and Objective and Subjective Sleep Measures in the Midlife in the United States Study Adult Sample.* Psychosom Med, 2017. **79**(4): p. 469-478.
44. Jackson, C.L., et al., *Racial disparities in short sleep duration by occupation and industry.* Am J Epidemiol, 2013. **178**(9): p. 1442-51.
45. Lewis, T.T. and M.E. Van Dyke, *Discrimination and the Health of African Americans: The Potential Importance of Intersectionalities.* Curr Dir Psychol Sci, 2018. **27**(3): p. 176-182.
46. Petrov, M.E., et al., *Racial differences in sleep duration intersect with sex, socioeconomic status, and U.S. geographic region: The REGARDS study.* Sleep Health, 2020. **6**(4): p. 442-450.

47. Billings, M.E., et al., *Disparities in Sleep Health and Potential Intervention Models: A Focused Review.* Chest, 2021. **159**(3): p. 1232-1240.

48. Jackson, C.L. and D.A. Johnson, *Sleep disparities in the era of the COVID-19 pandemic highlight the urgent need to address social determinants of health like the virus of racism.* J Clin Sleep Med, 2020. **16**(8): p. 1401-1402.

49. Krieger, N., *ENOUGH: COVID-19, Structural Racism, Police Brutality, Plutocracy, Climate Change-and Time for Health Justice, Democratic Governance, and an Equitable, Sustainable Future.* Am J Public Health, 2020. **110**(11): p. 1620-1623.

50. Paine, L., et al., *Declaring Racism a Public Health Crisis in the United States: Cure, Poison, or Both?* Front Public Health, 2021. **9**: p. 676784.

51. Johnson-Agbakwu, C.E., et al., *Racism, COVID-19, and Health Inequity in the USA: a Call to Action.* J Racial Ethn Health Disparities, 2022. **9**(1): p. 52-58.

Tables and Figures

Table 1. Characteristics of participants (n=406) in the Mechanisms Underlying the impact of Stress and Emotions (MUSE) on African American Women's Health study

Sociodemographic Characteristics and Health Covariates	
Age, years, mean (SD)	37.4 (4.2)
Educational attainment, N (%)	
High School or Less	133 (32.6)
Some College	88 (20.9)
College or Higher	200 (47.5)
Married/Partnered, N (%)	152 (36.2)
Employment Status, N (%)	
Unemployed	58 (13.8)
Part-time	81 (19.3)
Full-time	271 (64.7)
Income, N (%)	
<$35K	103 (24.5)
$35 – <$50K	87 (21.7)
$50 – <$75K	95 (23.6)
≥$75K	127 (30.2)
Current Smoker, N (%)	42 (10.0)
Body Mass Index, mean (SD)	32.8 (8.3)
Beck Depression Inventory (missing sleep), mean (SD)	5.4 (6.5)
Penn State Worry Questionnaire (sum), mean (SD)	34.2 (15.1)
Daily Life Experiences Score, mean (SD)	0.95 (0.7)
Expectations of Racism Score, mean (SD)	2.16 (1.2)
Concern for Children Score, mean (SD)	1.91 (1.0)
Global Pittsburgh Sleep Quality Index Score, mean (SD)	6.73 (3.5)

Table 2. Associations of Daily Life Experiences, Expectations of Racism, Concern for Child (per 1-Point Score Increment) with Global Sleep Quality Index scores in the MUSE[a] study

	Daily Life Experiences		Expectations of Racism		Concern for Child	
	n=406		n=406		n=288	
	β[1] (SE)	*p*	β (SE)	*p*	β (SE)	*p*
Model 1. Unadjusted	0.17 (0.26)	0.0004	0.08 (0.15)	0.097	0.11 (0.23)	0.057
Model 1a. Age adjusted	0.20 (0.26)	0.0004	0.08 (0.15)	0.096	0.11 (0.23)	0.056
Model 2. Adjusted for sociodemographic factors[b]	0.20 (0.26)	<.0001	0.10 (0.15)	0.043	0.11 (0.23)	0.073
Model 3. Model 2 + risk factors for sleep[c]	0.20 (0.26)	<.0001	0.10 (0.15)	0.033	0.13 (0.23)	0.038
Model 4. Model 3 + depressive symptoms[d]	0.12 (0.27)	0.02	0.02 (0.15)	0.65	0.04 (0.22)	0.49
Model 5. Model 3 + worry[e]	0.08 (0.27)	0.019	0.03 (0.15)	0.52	0.06 (0.23)	0.39

[a]Mechanisms Underlying the impact of Stress and Emotions (MUSE) on African American Women's Health study

[b]age, educational attainment, employment status, income, and partner status

[c]BMI and smoking status

[d]Beck Depression Inventory (BDI)

[e]Penn State Worry Questionnaire (PSWQ)

[1]All beta coefficients have been standardized across the three exposures.

Table 3. Associations of Daily Life Experiences, Expectations of Racism, Concern for Child (per 1-Point Score Increment) with Poor Sleep Quality[a] in the MUSE[b] study

	Daily Life Experiences		Expectations of Racism		Concern for Child	
	n=406		n=406		n=288	
	OR (95% CI)	*p*	OR (95% CI)	*p*	OR (95% CI)	*p*
Model 1. Unadjusted	1.53 (1.13, 2.09)	0.006	1.13 (0.95, 1.34)	0.15	1.34 (1.04, 1.72)	0.02
Model 1a. Age adjusted	1.56 (1.14, 2.12)	0.005	1.14 (0.96, 1.36)	0.13	1.35 (1.05, 1.74)	0.02
Model 2. Adjusted for sociodemographic factors[c]	1.75 (1.26, 2.44)	0.0008	1.20 (1.00, 1.43)	0.049	1.34 (1.04, 1.74)	0.03
Model 3. Model 2 + risk factors for sleep[d]	1.74 (1.25, 2.42)	0.001	1.20 (1.00, 1.44)	0.051	1.35 (1.03, 1.75)	0.03
Model 4. Model 3 + depressive symptoms[e]	1.35 (0.94, 1.93)	0.103	1.03 (0.84, 1.25)	0.81	1.12 (0.84, 1.49)	0.43
Model 5. Model 3 + worry[f]	1.37 (0.96, 1.96)	0.083	1.06 (0.87, 1.29)	0.56	1.16 (0.88, 1.54)	0.30

[a]Poor sleep quality is defined as a global sleep quality score greater than 5

[b]Mechanisms Underlying the impact of Stress and Emotions (MUSE) on African American Women's Health study

[c]age, educational attainment, employment status, income, and partner status

[d]BMI and smoking status

[e]Beck Depression Inventory (BDI)

[f]Penn State Worry Questionnaire (PSWQ)

Table 4. Associations of Daily Life Experiences, Expectations of Racism, Concern for Child (per 1-Point Score Increment) with Global Sleep Quality Index scores when restricted to mothers in the MUSE[a] study

	Daily Life Experiences		Expectations of Racism		Concern for Child	
	n=299		n=299		n=287	
	β[1] (SE)	*p*	β (SE)	*p*	β (SE)	*p*
Model 1. Unadjusted	0.19 (0.3)	0.0009	0.06 (0.18)	0.31	0.11 (0.23)	0.057
Model 1a. Age adjusted	0.20 (0.32)	0.0007	0.06 (0.19)	0.31	0.11 (0.23)	0.056
Model 2. Adjusted for sociodemographic factors[b]	0.20 (0.32)	0.0008	0.06 (0.19)	0.30	0.11 (0.23)	0.066
Model 3. Model 2 + risk factors for sleep[c]	0.20 (0.31)	0.0005	0.08 (0.18)	0.18	0.13 (0.23)	0.034
Model 4. Model 3 + depressive symptoms[d]	0.09 (0.32)	0.13	-0.03 (0.18)	0.65	0.04 (0.22)	0.43
Model 5. Model 3 + worry[e]	0.12 (0.33)	0.053	-0.01 (0.19)	0.88	0.05 (0.23)	0.37

[a]Mechanisms Underlying the impact of Stress and Emotions (MUSE) on African American Women's Health study

[b]age, educational attainment, employment status, income, and partner status

[c]BMI and smoking status

[d]Beck Depression Inventory (BDI)

[e]Penn State Worry Questionnaire (PSWQ)

[1]All beta coefficients have been standardized across the three exposures.

Table 5. Associations of Daily Life Experiences, Expectations of Racism, Concern for Child (per 1-Point Score Increment) with Poor Sleep Quality[a] when restricted to mothers in the MUSE[b] study

	Daily Life Experiences		Expectations of Racism		Concern for Child	
	n=299		n=299		n=287	
	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p
Model 1. Unadjusted	1.51 (1.06, 2.16)	0.024	1.05 (0.86, 1.28)	0.62	1.34 (1.04, 1.72)	0.24
Model 1a. Age adjusted	1.56 (1.09, 2.24)	0.016	1.06 (0.87, 1.30)	0.57	1.35 (1.05, 1.74)	0.02
Model 2. Adjusted for sociodemographic factors[c]	1.61 (1.10, 2.34)	0.014	1.07 (0.87, 1.32)	0.51	1.34 (1.04, 1.74)	0.026
Model 3. Model 2 + risk factors for sleep[d]	1.59 (1.09, 2.33)	0.017	0.87 (0.87, 1.33)	0.48	1.35 (1.03, 1.75)	0.029
Model 4. Model 3 + depressive symptoms[e]	1.12 (0.73, 1.72)	0.59	0.86 (0.68, 1.09)	0.22	1.12 (0.84, 1.48)	0.45
Model 5. Model 3 + worry[f]	1.24 (0.82, 1.88)	0.32	0.92 (0.73, 1.16)	0.50	1.15 (0.87, 1.53)	0.32

[a]Poor sleep quality is defined as a global sleep quality score greater than 5

[b]Mechanisms Underlying the impact of Stress and Emotions (MUSE) on African American Women's Health study

[c]age, educational attainment, employment status, income, and partner status

[d]BMI and smoking status

[e]Beck Depression Inventory (BDI)

[f]Penn State Worry Questionnaire (PSWQ)

Figure 1. Flow diagram of analytic sample

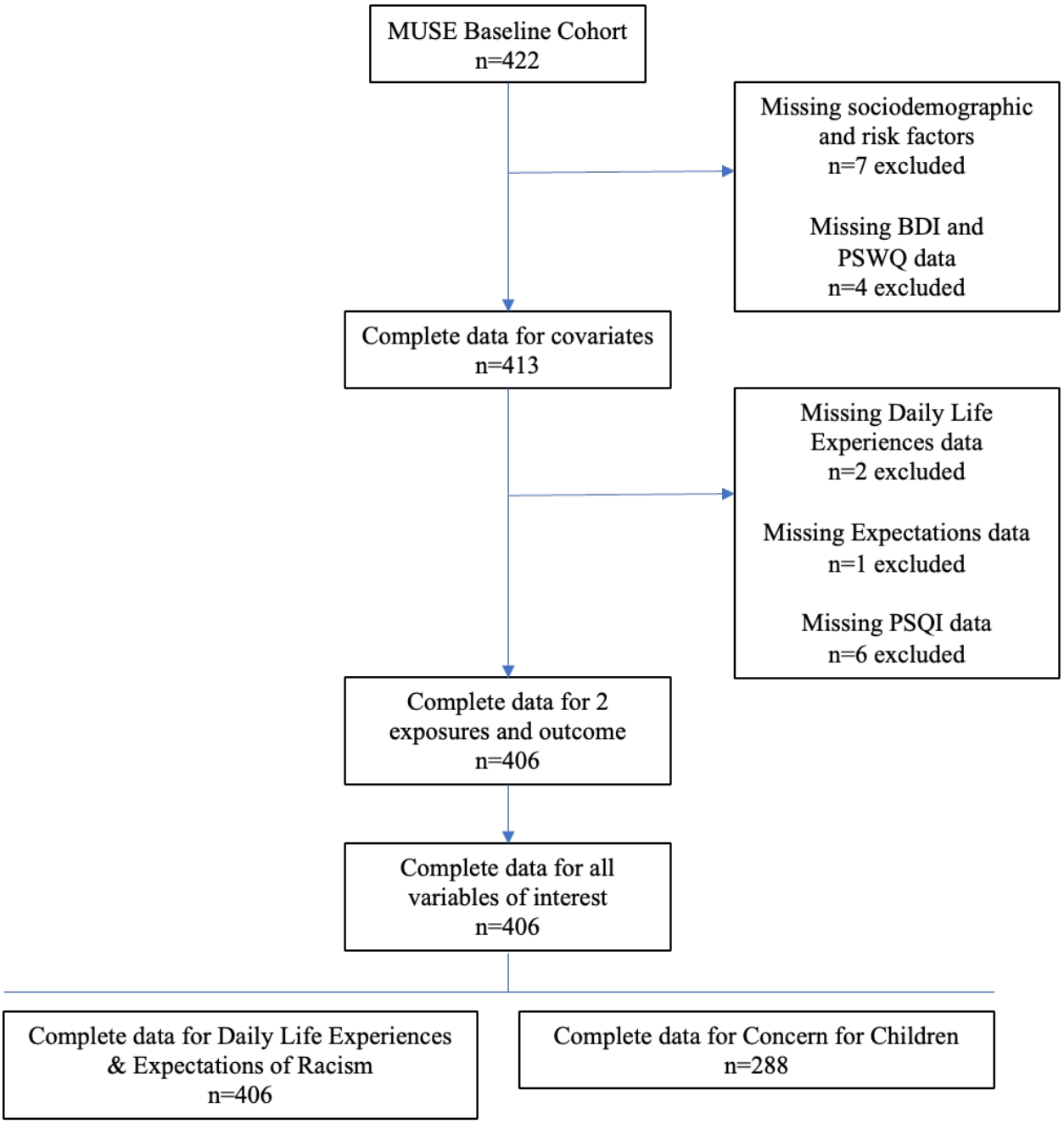

Figure 2. Mean Global Pittsburgh Sleep Quality Index (PSQI) Score by Tertiles of Daily Life Experiences (Panel A), Expectations of Racism (Panel B), and Concern for Child (Panel C)