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## Racial discrimination and perinatal sleep quality

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### ABSTRACT

**Objective:** This research examined the association between perceived everyday racial discrimination, as a psychosocial stressor, and perinatal sleep quality.

**Design:** Cross-sectional (N = 640) and longitudinal associations (N = 133) between everyday experiences of discrimination and sleep quality were examined using a pregnancy and postpartum data registry.

**Participants:** We studied a sample of 640 unique women from the Perinatal Research Repository (PRR), a longitudinal study of mothers, fathers, and babies recruited from Nationwide Children's Hospital and The Ohio State University in Columbus, Ohio.

**Measurements:** Discrimination and sleep quality were assessed using the Experiences of Discrimination Scale and the Pittsburgh Sleep Quality Index, respectively.

**Results:** Overall, everyday discrimination was associated with poorer global sleep quality and all but three sleep sub-measures of the PSQI cross-sectionally, but not longitudinally. When stratified, the adverse effects of everyday discrimination varied by race and perinatal time period. Increases in everyday discrimination were independently associated with poorer sleep initiation, poorer sleep maintenance and poorer daytime dysfunction.

**Conclusions:** Findings suggest that the immediate stressors of everyday racial discrimination were independently associated with poorer sleep quality among pregnant women cross-sectionally. Poorer sleep quality has been associated with numerous adverse perinatal outcomes and this association may be important in understanding racial discrimination as a risk factor. Our failure to identify a longitudinal association makes the direction of causation uncertain, however. Further longitudinal studies are necessary to clarify the association, given the potential importance of poor sleep quality in the pathogenesis of pregnancy complications.

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### Introduction

Sleep disturbances are frequent during pregnancy, yet are often dismissed or attributed to physiological changes. Poor sleep quality during pregnancy has been associated with preterm births and complications such as pre-eclampsia, gestational diabetes, longer time spent in labor, and even postpartum depression.<sup>1–3</sup> Poor sleep varies

during pregnancy and poor sleeping patterns at different times during pregnancy have been associated with different adverse outcomes. Poor sleep early in pregnancy can contribute to an unwarranted inflammatory response, which can lead to adverse changes in metabolic, cardiovascular, and angiogenic systems necessary for a healthy pregnancy.<sup>5–7</sup> Additionally, poor sleep later in pregnancy is associated with fetal growth restriction.<sup>4</sup> Sleep disturbances are associated with inflammatory response, with increased inflammation being a proposed key biological pathway through which adverse pregnancy outcomes develop.<sup>8–10</sup> However, what factors contribute to poor sleep quality during pregnancy remain understudied.

Sleep may serve as one of the key biological pathways in the association between experiences of everyday discrimination and various health outcomes.<sup>11–13</sup> For instance, increases in everyday discrimination are linked with decreased nocturnal systolic and diastolic blood pressure. Further, moderate and high levels of

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chronic everyday discrimination are associated with clinically significant levels of subjective sleep complaints among middle aged women, with chronic exposure to discrimination being independently associated with both subjective and objective indices of poor sleep.<sup>14</sup>

There has been significant growth of the literature exploring the relationship between psychosocial stressors, particularly racial discrimination, and physical health outcomes.<sup>15,16</sup> Recent research has focused on identifying and examining every day, more subtle experiences of discrimination which are considered ongoing, fairly routine, and more common in daily life, and the role they play in pervasive health disparities.<sup>13,17,18</sup> The literature also suggests that experiences of everyday discrimination may be relatively common across racial groups, not just among minority individuals.<sup>19,20</sup>

No previous studies have explored perceived racial discrimination as a psychosocial stressor that contributes to poor sleep during pregnancy and immediately postpartum. Thus, the objective of this research was to examine the association between everyday experiences of discrimination, as a psychosocial stressor, and perinatal sleep quality. We were particularly interested in examining both the immediate and longitudinal relationships between sleep quality and self-reported experiences of discrimination.

We hypothesized that self-reported experiences of everyday racial discrimination would be associated with poorer sleep among pregnant women, and sleep quality would be poorer among non-Hispanic Black women than their non-Hispanic White counterparts, since discrimination and chronic stress are more prominent features in the daily lives of Black women than in the daily lives of White women.<sup>21</sup>

## Participants and methods

### Participants

We studied a sample of 805 questionnaires from 640 unique women from the Perinatal Research Repository (PRR), a longitudinal study of mothers, fathers and babies recruited from Nationwide Children's Hospital and The Ohio State University in Columbus, Ohio. Families were enrolled prenatally (e.g. preterm birth clinics and general OB clinics), immediately antepartum, or from neonatal intensive care units (NICU) at both sites beginning in April of 2010, with sleep, depression and discrimination measures being added in 2012. Upon enrollment, families completed informed consent forms, several self-administered questionnaires, and were asked for release of medical records to explore medical history and pregnancy conditions and outcomes. The repository included women of various racial/ethnic groups but was predominantly Black and White women. Other races/ethnicities were excluded from these analyses because in most cases the sample size for those groups was less than five. Our study was approved by Nationwide Children's Hospital Institutional Review Board.

### Measures

The measures used for this research were the Everyday Discrimination Scale (EDS)<sup>16</sup> and Pittsburgh Sleep Quality Index (PSQI).<sup>22</sup> The EDS is a 9-item scale asking participants about experiences with various forms of interpersonal mistreatment in their day-to-day lives over the previous 12 months. Examples include "You are treated with less respect than other people" and "You are treated as if you are not smart". Responses were assessed with a 6-point scale (0 = never, 1 = less than once a year, 2 = a few times a year, 3 = a few times a month, 4 = at least once a week, 5 = almost every day), which was summed to give a score of 0–45, with higher scores representing more discrimination. The EDS has been widely used

across samples with African American, Caucasian, and Chinese participants<sup>23–26</sup> and has shown high levels of internal consistency and convergent and divergent validity.<sup>23,27</sup> The EDS measures general discrimination and asks participants whether they feel like the experienced discrimination was due to race, gender, age, education, etc. Because our aim is to measure the effects of racial discrimination, we only used responses for participants who exclusively attributed their experiences of discrimination to their race.

The 19-item PSQI Scale uses seven component scores to form an overall measurement of global sleep quality. The seven components of the PSQI are subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication and daytime dysfunction, with component scores ranging from 0–3 and overall scores ranging from 0–21. As scores increase, the quality of sleep diminishes. A score of 5 or higher indicates overall poor sleep quality.<sup>22</sup> The construct validity of the PSQI in pregnancy has previously been validated.<sup>28</sup>

The Center for Epidemiologic Studies-Depression (CES-D) is a standardized self-assessment of depressive symptoms. It has been used in numerous populations, including pregnant women (where it performed similarly in African-American and White women), and has demonstrated good reliability, validity and factor structure.<sup>29–30</sup>

Depending on when mothers were enrolled into the study repository, mothers completed each survey one to four times. For example, a mother recruited during her first trimester would have four time points for each survey, while a mother recruited during labor and delivery would have only one time point for each survey. Each questionnaire was administered each trimester and postpartum. For the longitudinal analysis, only mothers who were recruited prenatally and completed both questionnaires in consecutive trimesters were used (N = 133). There are 640 women in the whole study, and 133 of them were evaluated twice.

### Outcomes

Our primary outcome of interest was the global subjective sleep quality as measured by the PSQI. Our secondary interest was looking at each component of the PSQI: sleep duration, use of sleep medications, subjective sleep quality, sleep disturbances, sleep latency, daytime dysfunction and habitual sleep efficiency. We examined the global score and each component of the sleep scale cross-sectionally and longitudinally. Our cross-sectional analysis examined the association between racial discrimination and sleep within the same trimester, and our longitudinal analysis examined the association between racial discrimination in any given trimester and sleep quality in the consecutive trimester. We were also interested in understanding if these associations were altered when stratified by time of enrollment (prenatally vs. postpartum) and race.

### Covariates

Demographic variables associated with poor sleep and/or discrimination were included in the analysis. These demographic variables included maternal education, race, and marital status. Additionally, the total score of the Center for Epidemiological Studies Depression Scale (CESD) for each mother was included in all models as the literature indicates strong associations between depression and poor sleep quality.<sup>31</sup>

### Statistical analysis

Descriptive statistics were used to characterize the sample population. Wilcoxon Rank-Sum tests were performed to examine

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