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RESEARCH

Low Socioeconomic Status Negatively Affects Sleep in Pregnant Women

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ABSTRACT

Objective: To evaluate the effect of socioeconomic status on measures of sleep quality, continuity, and quantity in a large cohort of pregnant women.

Design: Prospective, longitudinal study.

Participants: One hundred seventy (170) pregnant women at 10–20 weeks gestation.

Methods: Sleep quality was assessed with the Pittsburgh Sleep Quality Index. Sleep duration and continuity (sleep fragmentation index [SFI]) were assessed with actigraphy at 10–12, 14–16, and 18–20 weeks gestation. Because sleep did not significantly differ across time, averages across all three time points were used in analyses. Socioeconomic status (SES) was defined by self-reported annual household income. Linear regression analyses were used to model the independent associations of SES on sleep after adjusting for age, race, parity, marital status, body mass index (BMI), perceived stress, depressive symptoms, and financial strain.

Results: On average, women reported modestly poor sleep quality ($M = 5.4$, $SD = 2.7$), short sleep duration (391 [55.6] min) and fragmented sleep (SFI $M = 33.9$, $SD = 10.4$. A household income $<$ \$50,000/year was associated with poorer sleep quality ($\beta = -.18$, $p < 0.05$) and greater sleep fragmentation ($\beta = -.18$, $p < 0.05$) following covariate adjustment.

Conclusions: Low SES was associated with poorer sleep quality and fragmented sleep, even after statistical adjustments. Perceived stress and financial strain attenuated SES-sleep associations indicating that psychosocial situations preceding pregnancy are also important to consider.

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During pregnancy women are likely to experience substantial sleep disruption. The most commonly reported disruptions include poor sleep quality and decreased continuity (Okun, 2013). An abundance of data stem from women evaluated in later gestation, and approximately 75% of women in later gestation (28–40 weeks) have substantial sleep complaints (Okun, 2013). In contrast, less is known about sleep in early gestation. A few studies indicate that upwards of 25% of women report considerable sleep disturbance during this time (Facco, Kramer, Ho, Zee, & Grobman, 2010; Okun & Coussons-Read, 2007). Identifying women who experience sleep disturbance in early gestation may be clinically relevant given the recent empirical evidence that shows that sleep disturbances in early pregnancy are significantly associated with an increased risk of having an adverse pregnancy outcome, including glucose intolerance, gestational hypertension, preeclampsia, and preterm birth (Facco, Grobman, Kramer, Ho, & Zee, 2010; Okun, Schetter, & Glynn, 2011; Reutrakul et al., 2011; Williams et al., 2010). Identification and intervention for these sleep issues may mitigate the risk of adverse pregnancy outcomes (Okun, Roberts, Marsland, & Hall, 2009).

Researchers are beginning to evaluate the impact of sociodemographic characteristics on sleep in pregnancy. Low socioeconomic status (SES), for instance, has recently emerged as a putative contributor to poor sleep in a variety of populations, including community-dwelling adults from across the United States and Sweden as well as pre- and postmenopausal women (Grandner et al., 2010; Hall et al., 2009; Jansson & Linton, 2006; Knutson, 2012; Nordin, Knutsson, Sundbom, & Stegmayr, 2005; Patel, Grandner, Xie, Branas, & Gooneratne, 2010). In two large studies of nonpregnant and postpartum women, researchers found that fewer years of education and lower family income were associated with poor sleep quality (Baker, Wolfson, & Lee, 2009; Soltani et al., 2012). Likewise, Hall et al. (2009) reported that among

pre- and peri-menopausal women aged 40–55 years, difficulty in paying for basics was associated with decreased sleep quality and lower objectively-assessed sleep efficiency. Krueger and Friedman (2009) reported in a cohort of 110,000+ adults that women, adults with children < 18 years of age, and those with lower levels of education or income were more likely to have short sleep. Although the evidence strongly supports an association between low SES and sleep in women, none of these researchers examined pregnant women.

Study results indicate that low SES is a predictor of overall health, (Delpisheh, Kelly, Rizwan, & Brabin, 2006; Hall, Bromberger, & Matthews, 1999; Moore, Adler, Williams, & Jackson, 2002; Morgen, Bjork, Andersen, Mortensen, & Nybo Andersen, 2008), including increased susceptibility to infectious disease, cognitive impairment, greater rates of mental illness, heart disease, and all-cause mortality. This relationship has also been demonstrated in pregnancy. Low SES is associated with preterm birth (PTB) (Chiavarini, Bartolucci, Gili, Pieroni, & Minelli, 2012; Morgen et al., 2008; Peacock, Bland, & Anderson, 1995) and infants who are small for gestational age (SGA) (Delpisheh et al., 2006; Lu & Halfon, 2003), even after accounting for other traditional risk factors. Notably, PTB and SGA are associated with adverse health outcomes in the infant, including cognitive impairment, metabolic dysregulation, and later-life cardiovascular disease (Callaghan, Macdorman, Rasmussen, Qin, & Lackritz, 2006; Greenough, 2007; Martin, Kirmeyer, Osterman, & Shepherd, 2009; Tambyraja & Ratnam, 1982; Wen, Smith, Yang, & Walker, 2004). Hence, the consequences of low SES affect the mother and infant.

Given the importance of sleep in pregnancy to maternal and fetal health, it is important to understand the factors that influence sleep during pregnancy, some of which might be static factors that precede pregnancy. Socioeconomic status is one static factor likely to contribute to disturbed sleep in pregnancy. Thus, the overall aim of this study was to examine whether SES, characterized by household income, was associated with sleep quality, continuity, and duration in a cohort of pregnant women. We hypothesized that low SES status, defined as less than $50,000/year annual household income, would be associated with poorer sleep quality, sleep continuity, and shorter sleep duration in early gestation (10–20 weeks') more than other factors that might contribute to poor sleep.

Disturbed sleep and low socioeconomic status are associated with adverse pregnancy outcomes.

Methods

Participants assessed in this secondary analysis were drawn from the Sleep in Pregnancy (SLIP) study, a longitudinal, prospective study of sleep in early pregnancy. Pregnant women between age 18 to 45 residing in the greater Pittsburgh area during October 2008 through December 2010 were recruited between 10 to 14 weeks gestation. Recruitment was by self-referral, physician referral, local advertising, or via participation in University research registries. The breadth of advertising afforded a diverse and highly representative cohort. Interested women contacted the study coordinator for further information and initial screening. Eligible women were then invited to participate. Exclusion criteria included a self-reported diagnosis of any psychopathology, sleep disorder, or active prescription of an anti-depressant medication or treatment/therapy. We were unable to physiologically screen for obstructive sleep apnea/sleep disordered breathing or restless legs. Women with self-reported chronic disease such as diabetes, HIV, or uterine abnormalities were also excluded. Approval was obtained from the University of Pittsburgh Institutional Review Board. All women were compensated and provided written informed consent.

Procedures

The SLIP study protocol was conducted during weeks 10 to 20 of pregnancy. Demographic information was collected at enrollment. Participants completed the Pittsburgh sleep diary daily (Monk et al., 1994) and wore a wrist actigraph (Mini Mitter, Respironics/Phillips, OR) for 2-weeks during three assessment periods (10–12 weeks, 14–16 weeks, and 18–20 weeks gestation). At the conclusion of each 2-week assessment, participants completed a series of online questionnaires assessing psychosocial variables, such as perceived stress and depressive symptoms.

Socioeconomic Status

Socioeconomic status was determined by self-reported annual household income at the time of enrollment. We dichotomized women into two groups: less than or greater than/equal to $50,000/year. This cutoff represents the median split and is consistent with previously published