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Article

Stress and sleep: Results from the Hispanic Community Health Study/Study of Latinos Sociocultural Ancillary Study



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ABSTRACT

Hispanics/Latinos face specific sociocultural stressors associated with their marginalized status in the United States. While stress is known to cause poor sleep, the differential effects of the specific stressors faced by Hispanics/Latinos have not been evaluated. Using cross-sectional data from the Hispanic Community Health Study/Study of Latinos Sociocultural Ancillary Study, we conducted weighted generalized linear models to evaluate the associations of acculturation stress, ethnic discrimination, and chronic moderate/severe stress with self-reported sleep outcomes (insomnia symptoms, daytime sleepiness, sleep duration) in individual and aggregate models adjusted for site, socio-demographics, behavioral, and medical conditions. Participants included 5313 Hispanic/Latino adults; 43.5% \geq age 45, 54.8% female, and 22.0% US-born. Chronic moderate/severe stress, ethnic discrimination, and acculturation stress were each positively associated with sleep. In the adjusted aggregate model, only chronic moderate/severe stress was associated with insomnia symptoms ($\exp(b) = 1.07$ for each additional stressor, 95% CI = 1.05, 1.09). Both acculturation stress ($\exp(b) = 1.05$ for each additional SD, 95% CI = 1.02, 1.10) and ethnic discrimination ($\exp(b) = 1.05$ for each additional SD, 95% CI = 1.01, 1.08) were associated with daytime sleepiness. Each SD increase in ethnic discrimination related to a 16% and 13% increased prevalence of short (< 7 h) (RRR = 1.16, 95% CI = 1.02, 1.31) and long sleep duration (> 9 h) (RRR = 1.13, 95% CI = 1.00, 1.27), respectively. These associations were consistent across sex. Acculturation stress and ethnic discrimination are associated with poor sleep in Hispanics/Latinos. Future research should explore whether behavioral sleep interventions minimize the impact of sociocultural stressors on sleep.

Introduction

Annually over 50 million adults in the United States (US) suffer from sleep disturbances such as short sleep duration, insomnia, and daytime sleepiness (Luyster, Strollo, Zee & Walsh, 2012; Sleep Disorders and

Sleep Deprivation, 2006; Unhealthy sleep-related behaviors–12 States, 2009). While acute and chronic stressors have been linked to sleep disturbances (Ross, Ball, Sullivan & Caroff, 1989; Hall et al., 2004; Lewis et al., 2013; Akerstedt, 2006; Kim & Dimsdale, 2007), most sleep research has drawn from non-Hispanic white samples. Further, few

Abbreviations: AHI, apnea-hypopnea index; CES-D, Center for Epidemiological Studies Depression Scale; CI, Confidence Interval; ESS, Epworth Sleepiness Scale; HCHS/SOL, Hispanic Community Health Study/Study of Latinos; HSI, Hispanic Stress Inventory; NREM, Non-rapid eye movement; OR, Odds Ratio; PEDQ-CV, Perceived Ethnic Discrimination Questionnaire – Community Version; RRR, Relative Risk Ratio; SCAS, Sociocultural Ancillary Study; US, United States; VIF, variance inflation factor; WHIIRS, Women's Health Initiative Insomnia Rating Scale; SD, Standard deviation

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studies on stress and sleep have examined how exposure to the various psychosocial and sociocultural stressors (e.g., ethnic discrimination, acculturation stress) faced by Hispanics/Latinos and other marginalized racial/ethnic minority groups affects sleep. Consequently, though stress is known to cause poor sleep, the differential effects of the specific stressors faced by Hispanics/Latinos on sleep have not been evaluated. Knowledge into these factors could inform the development of targeted health promotion campaigns to reduce stress and improve sleep among Hispanics/Latinos.

Scientific support for the adverse association between acute and chronic stress and sleep comes from both prospective and cross-sectional research. For example, some prospective studies documented a direct relationship between acute psychological stress during one night and fragmented sleep on the following night (Hall et al., 2004; Akerstedt, Kecklund & Axelsson, 2007). Additionally, other prospective research found that high chronic stress over a nine-year period predicted both self-reported and objectively-measured sleep disturbances (Hall et al., 2015). Recent research with a cohort of African Americans has also documented a strong and consistent relationship between psychosocial stress and short sleep duration (Johnson et al., 2016). Similarly, other work has found that burnout, work stress, and life stress precede the onset of insomnia in otherwise healthy adults (Healey et al., 1981; Linton, 2004; Morin, Rodrigue & Ivers, 2003; Akerstedt et al., 2015).

While racial/ethnic disparities in poor sleep are well documented (Chen et al., 2015), most explanations for these differences focus on the differential distribution of stress and cumulative disadvantage among racial/ethnic minorities compared to Whites, which in turn heightens the risk for adverse health outcomes and health risk behaviors such as poor sleep (Jackson, Redline & Emmons, 2015). To this end, a small but growing body of cross-sectional research has focused on understanding whether and how exposure to specific psychosocial and sociocultural stressors associated with experiences of marginalization are linked to sleep. Most of this research has evaluated how exposure to racial/ethnic discrimination is associated with poor sleep quality among racial/ethnic minority groups living in the United States. Indeed, a recent systematic review of 17 studies found that measures of discrimination on balance were associated with several indicators of poor sleep in multi-ethnic samples, though the associations were not always consistent (Slopen, Lewis & Williams, 2016). Further, other research has found that discrimination explains some of the White vs. non-White differences in objectively and subjectively measured sleep continuity and quality (Owens, Hunte, Sterkel, Johnson & Johnson-Lawrence, 2017). While the prevalence of reported ethnic discrimination among US Hispanics/Latinos is as high as 78% (Arellano-Morales et al., 2015), few studies have analyzed how ethnic discrimination is associated with Hispanic/Latino sleep (Hicken, Lee, Ailshire, Burgard & Williams, 2013; Steffen & Bowden, 2006; Slopen & Williams, 2014).

Moreover, to our knowledge, no extant studies have explored the association of acculturation stress with sleep in Hispanics/Latinos. Acculturation stress, a psychosocial stressor, refers to the psychological distress/worry associated with the multidimensional process of acculturation (Cervantes, Padilla & Salgado de Snyder, 1991) that is the individual process of adaptation and integration resulting from contact with an unfamiliar culture (Schwartz, Unger, Zamboanga & Szapocznik, 2010; Berry, Chun, Balls Organista & Marín, 2003). Instead, most research has examined whether acculturation proxies, such as nativity status (US-born vs. foreign-born) and language proficiency, are associated with sleep in racial/ethnic communities (Hale, Troxel, Kravitz, Hall & Matthews, 2014; Seicean, Neuhauser, Strohl & Redline, 2011; Heilemann, Choudhury, Kury & Lee, 2012; Hale & Rivero-Fuentes, 2011; Patel et al., 2015). Observed nativity status or language differences in sleep are often attributed to the differential distribution of concentrated stress exposures for US- vs. foreign-born or English vs. non-English speaking adults, but the stress associated with the experience of integrating and adapting to US culture is often not directly

measured or tested.

Acute and chronic stressors may disrupt sleep through psychological and physiological mechanisms. Exposure to stressors and subsequent stress may facilitate the development of perseverative cognitions, specifically rumination and worry about past and future stressors, and the prolonged activation of physiological stress responses that over time increase risk of morbidity and mortality (Ottaviani et al., 2016; Brosschot, Verkuil & Thayer, 2010; Hall et al., 2004). Indeed, a recent meta-analysis found that perseverative cognitions were associated with markers of cardiovascular reactivity and other maladaptive physiological risk profiles (Ottaviani et al., 2016).

Importantly, sex interacts in complex ways to shape exposure to and appraisal of psychosocial stress, as well as the physiological and psychological responses to stress, which in turn influence differential morbidity and mortality profiles across sexes (McEwen, 1998; Myers, 2009; Geronimus, 1992; Gallo & Matthews, 2003; Gallo, Bogart, Vranceanu & Matthews, 2005; Hammen, 2005; Kendler, Kuhn & Prescott, 2004). While some studies find that females report increased exposure to stressful life events compared to males and that this exposure partly accounts for higher rates of mental health conditions such as depression (Hammen, 2005; Kessler & McLeod, 1984; Maciejewski, Prigerson & Mazure, 2001), other studies do not (Kendler, Thornton & Prescott, 2001). With regard to sex differences in sleep, multiple studies document that females are more likely than males to report poor subjective sleep quality, including a higher prevalence of insomnia (Hall et al., 2009; Mezick et al., 2008; Arber, Bote & Meadows, 2009; Armitage & Hoffmann, 2001). Further, research suggests that the differential distribution of health risk factors in males and females do not account for differences in observed sleep profiles (Elovainio et al., 2009), which implies that other factors may account for these differential sex effects. Similar to sex effects, it is possible that gender modifies the appraisal of psychosocial and sociocultural stressors and its effect on sleep quality.

We used cross-sectional data from the Hispanic Community Health Study/Study of Latinos (HCHS/SOL) Sociocultural Ancillary Study (SCAS) to: (a) examine the independent association of three different psychosocial and sociocultural stressors (chronic stress, ethnic discrimination, acculturation stress) with self-reported poor sleep (insomnia symptoms, daytime sleepiness, short and long sleep duration) in Hispanics/Latinos; and (b) explore whether sex moderates the stress-sleep association. We hypothesized that each of the psychosocial and sociocultural stressors would be associated with self-reported poor sleep after controlling for potential confounders in individual and aggregate models. We also hypothesized that the association between stress and self-reported poor sleep would be stronger among females than males. Our working conceptual model was that psychosocial and sociocultural stressors would disrupt sleep through psychophysiological mechanisms (e.g., tendency to develop and sustain perseverative cognitions [e.g., rumination], dysregulated stress responses) as described above. Further, the association of stress with self-reported sleep would be stronger among females compared to males because under settings of stress, females are more likely to develop and maintain perseverative cognitions such as rumination, which in turn would lead to greater impairments in sleep quality.

Methods

Data source and sample

The Hispanic Community Health Study/ Study of Latinos (HCHS/SOL) is a community based prospective cohort study of 16,415 self-identified Hispanic/Latino persons (ages 18–74) selected from a two-stage probability sampling design from four US field centers (Chicago, IL; Miami, FL; Bronx, NY; San Diego, CA) with the baseline exam between 2008 and 2011. The goals of the HCHS/SOL are to describe the prevalence and incidence of, and risk and protective factors for, chronic

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