THESIS

LINKING WORK AND HOME LIFE: MEDIATING EFFECTS OF SLEEP

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ABSTRACT

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Recent nationwide polls suggest that work and home are two dominant sources of stress for Americans. There is a vast literature on the relationships between work and home life (e.g., Eby, Casper, Lockwood, Bordeaux, & Brinley, 2005), and theoretical frameworks such as the work-home resources model (Ten Brummelhuis & Bakker, 2012) seek to elucidate the processes between work and home by specifying linking mechanisms. The present study tested the work-home resources model by specifying sleep as a novel personal resource that links work and home life. Specifically, 6-month self-reported and actigraphic sleep quantity and quality were assessed as mediators of the relationships between baseline psychological work demands and work resources (i.e., decision authority and schedule control) and 12-month attitudes and behaviors at home (i.e., relationship satisfaction and spouse-reported relationship strain) in a sample of nurses and certified nursing assistants. The results demonstrate that work demands predicted self-reported sleep quality, but not sleep quantity. Further, work resources predicted self-reported sleep quantity and quality, but sleep quantity and quality did not relate to outcomes at home. Work-related attitudes and behaviors (i.e., job satisfaction, safety compliance, and organizational citizenship behaviors) were also explored; there was some evidence that self-reported sleep quantity and quality predicted job satisfaction and organizational citizenship behaviors, but not safety compliance. Further, self-reported sleep quantity and quality at 6-months explained the relationships between baseline work resources and 12-month job satisfaction.

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Introduction

Perceived stress is a prevalent issue that has critical implications for the health and wellbeing of our society. Large-scale research endeavors, like the annual American Psychological Association (APA) Stress in America survey, highlight the current interest in the causes and consequences of a nation that is severely "stressed". According to the most recent report, Americans experience high levels of stress and the perceived magnitude of stress has been increasing in recent years (APA, 2016). Notably, the top three most prevalent sources of stress include money, work, and family responsibilities, respectively (APA, 2016). Therefore, research that examines work and family stressors in low-income populations is critical for addressing national public health concerns surrounding stress.

Research in organizational science can be particularly useful for addressing this issue, given that a vast and growing literature has established that work and family are interconnected domains of life (e.g., Amstad, Meier, Fasel, Elfering, & Semmer, 2011; Byron, 2005; Eby et al., 2005; Greenhaus & Beutell, 1985; Michel, Kotrba, Mitchelson, Clark, & Baltes, 2010). Employees' work lives are rarely isolated and distinct from their home lives, and work and home domains can have enriching (i.e., one role improves the quality of another role) and conflicting (i.e., incompatible demands between roles) influences on one another (e.g., Byron, 2005; Greenhaus & Powell, 2006; Ten Brummelhuis & Bakker, 2012). Therefore, understanding how experiences at work can impact employees' lives at home, through enriching or conflicting processes, can help to improve work-related stressors and employees' overall quality of life, both at work and at home.

Furthermore, some have argued that the changing nature of work has exacerbated conflict between work and family roles (e.g., Hammer & Zimmerman, 2011). The American workforce is a dynamic system that is constantly evolving to meet modern labor market demands, and common trends that characterize the current nature of work include an increased focus on technology, outsourcing of jobs, globalization, and changing demographics (e.g., Hammer and Zimmerman, 2011; Wright, 2013). These workforce trends can especially contribute to inter-domain conflict between the work and home lives of employees.

As technology becomes more ubiquitous both at work and in employees' home lives, it can elicit perceptions of telepressure (e.g., felt obligation to respond immediately to work-related emails), which can impede recovery processes and the quality of home life (Barber & Santuzzi, 2015). Next, outsourcing of jobs and globalization are trends that have led some stakeholders to downsize and employ fewer full-time workers (e.g., National Occupational Research Agenda, 2002). This has implications for caregivers because full-time workers are typically afforded greater benefits, which can include childcare and family healthcare. These are particularly important implications because the increasing number of women in the workforce has shifted traditional caregiving responsibilities and heightened the need for childcare and eldercare options. Further, people in part-time positions often have to work multiple jobs for financial reasons; the Bureau of Labor Statistics (BLS) reported that in 2015 nearly 2 million Americans worked multiple part-time jobs (BLS, 2016). The time demands of working several jobs can reduce the availability of time to spend with family and friends outside of work. Finally, the demographics of the workforce are also changing to include greater proportions of older workers, a change that can influence employees' home life because marital quality and caregiving responsibilities are affected by older adults' retirement timing decisions (e.g., Fisher, Chaffee, &

Sonnega, 2016). Overall, the changing trends in the American workforce have important implications for employees' lives outside of work.

Another noteworthy response to changing workforce trends is that organizations are choosing to adopt shiftwork schedules in order to meet the demands of the modern "24-hour society" (e.g., Costa, Sartori, & Åkerstedt, 2006). As of 2004, 17.7% of employed adults reported working alternative shifts that fall outside the standard daytime range (McMenamin, 2007) and as of 2010, this number rose to 28.7% (Alterman et al., 2013). This shift can also be viewed as contributing to perceptions of work-family conflict. For instance, although shiftwork schedules are sometimes preferable (e.g., work hour flexibility), shiftworkers are commonly in low-income positions (e.g., Golden, 2015), often experience conflict between work and family roles (e.g., Eby et al., 2005), and are at a greater risk for deleterious physical and psychological health outcomes compared to people who work standard schedules (e.g., Boivin, Tremblay, & James, 2007; Smith, Folkard, Tucker, & Evans, 2011), all of which can impact employees' relationships with family and friends outside of work. Taken together, these findings shed light on the importance of understanding experienced work-family issues present in shiftworker populations and the need to identify potential resources that can benefit these workers.

Shiftworkers in helping occupations within the healthcare industry, such as nurses and certified nursing assistants (CNAs), experience especially intense occupational stressors that are characteristic of this line of work; "the nurse's role has long been regarded as stress-filled based upon the physical labor, human suffering, work hours, staffing, and interpersonal relationships that are central to the work nurses do" (Jennings, 2008, p. 1). Additionally, compared to other occupations, nurses experience significant workplace bullying, harassment, and violence from coworkers, other hospital workers (e.g., doctors), patients, and families (e.g., Hutchinson,

Vickers, Jackson, & Wilkes, 2006; Jackson, Clare, & Mannix, 2002). These individuals are also prone to experiencing a host of negative outcomes as a result of their work, including burnout (e.g., Cordes & Dougherty, 1993), reduced job satisfaction (e.g, Zangaro & Soeken, 2007), and perceived emotional labor, or the need to display regulated emotions when interacting with others at work (e.g., Henderson, 2001; Zapf, 2002). In addition, nurses are especially likely to experience work-family conflict; in Grzywacz and colleagues' (2006) study, half of the nurses surveyed reported chronic work-family conflict (i.e., experienced at least once a week) and 41% experienced at least some inter-domain conflict (i.e., 1-3 days a month). Others have noted that nurses' work-family conflict is related to their irregular schedules and work overload (e.g., Yildirim & Aycan, 2008). Thus, nurses are an important shiftworker population to study because the stressors they experience from their schedules are compounded with the emotional and physical demands of the environments where they work. Moreover, it is critically important for workers in the healthcare industry to have a favorable work environment because they are responsible for the health and wellbeing of others in their care.

Poor sleep is another common problem experienced by shiftworkers, including nurses, (e.g., Lockley et al., 2007) that is likely to perpetuate negative effects of work on home life. Although disrupted sleep is an especially critical issue for these populations, The Centers for Disease Control and Prevention (CDC) have recognized sleep insufficiency as a public health concern on a larger national level (CDC, 2015). Despite the recommendation for adults to obtain at least 7 hours of sleep per night on a regular basis (Watson et al., 2015), a recent CDC sponsored Morbidity and Mortality Weekly Report, which collected data from all 50 states and the District of Columbia, found that over a third of Americans are not obtaining sufficient sleep of at least 7 hours per night (Liu et al., 2016). This study highlights the apparent problem of

sleep restriction (i.e., obtaining less than optimal sleep) in this country. Of note is that shiftworkers are especially vulnerable to sleep restriction because of the structure of their schedules (e.g., Åkerstedt, 2003).

Of special relevance to this study is the influence that employees' sleep quantity and quality has on home outcomes. Some prior research has shown that sleep is associated with outcomes at home related to partnered relationships. For example, self-reported sleep quality has been related to higher marital satisfaction (e.g., Troxel, Buysse, Hall, & Matthews, 2009) and improved conflict resolution in romantic relationships (e.g., Gordon & Chen, 2014). It is important to consider romantic partnered relationships because the quality of these relationships has an impact on long-term health outcomes (e.g. Umberson, Williams, Powers, Liu, & Needham, 2006). In addition, Forthofer, Markman, Cox, Stanley, and Kessler (1996) found that marital problems are associated with work loss, and estimated based on the income of participants in their study that work loss would cost organizations $6.8 billion per year. Therefore, it is useful for organizational scientists to consider the influence of sleep quantity and quality on outcomes at home because an employee's relationship with their spouse or partner has implications for their home and work life and the organizations that they work for.

The Present Study

In response to the prior literature related to perceptions of work stress, the work-family interface, shiftwork, and sleep, I investigate the process by which work demands and resources influence partner-specific home outcomes in a shiftworking population of nurses and CNAs. Namely, I evaluate sleep as a mediating variable connecting work and home life. I use the work-home resources model (Ten Brummelhuis & Bakker, 2012) as the theoretical framework for investigating these relationships longitudinally. Specifically, psychological job demands and

work resources (i.e., decision authority, schedule control) are examined at baseline as antecedents of 6-month sleep quantity and quality and subsequent 12-month home outcomes (i.e. relationship satisfaction, spouse reports of relationship strain). See Figure 1 for conceptual model.

Contributions.

Theoretical contributions. There are both theoretical and methodological contributions of the present study. First, this study empirically tests the work-home resources model (Ten Brummelhuis & Bakker, 2012), which suggests that personal resources lie at the interface between work and home. Employees' sleep quantity and quality are examined as the linking mechanisms through which attributes of the job (i.e., demands and resources) influence employees' attitudes and behaviors at home toward their romantic partners. According to Eby and colleagues' (2005) 22-year review of the work-family literature in industrial-organizational (I-O) psychology and organizational behavior (OB), only 31% of studies examined mediators in the relationships between work and home. Further, it was noted that the most frequent mediators assessed were in categories of work-family interaction, stress, work attitudes, and nonwork attitudes (Eby et al., 2005). Only 8.3% of mediators were related to health and wellness (e.g., general mental wellbeing), and no studies included in this review assessed sleep-related constructs as mediating variables (Eby et al., 2005).

To our knowledge, no work conducted more recently has considered sleep as mediating the relationships between demands and resources on the one hand, and attitudinal and behavioral outcomes at home on the other. However, Ten Brummelhuis and Bakker (2012) note that sleep is one potentially important personal resource that should be investigated. One way that sleep is different from other mediators is that it is both exogenous (influenced by external factors) and

endogenous (influenced by internal, biological factors). In addition, sleep can be differentiated into distinct constructs of quantity and quality, which is also unique from other personal resources proposed by Ten Brummelhuis and Bakker (2012), such as optimism or mental resilience.

In addition, the home outcomes examined in the present study are a contribution as well because they are specific to spousal and cohabitating partnered relationships, rather than general home outcomes, and are in line with outcomes described in the work-home resources model. Eby and colleagues' (2005) review of the work-family literature recommended that future work-family research should place a greater emphasis on the home lives of employees, as they found relatively little research on home outcomes, including those specific to romantic partnered relationships. Recent work-family meta-analyses have provided evidence that work-to-family conflict and enrichment and family-to-work conflict and enrichment both influence outcomes at work and home, but work-to-family processes have stronger effects for work outcomes, and family-to-work processes have stronger effects for family outcomes (Amstad et al., 2011; McNall, Nicklin, & Masuda, 2009). Although, of the studies included in these meta-analyses, few included family-related outcomes that were specific to partnered relationships. For instance, in Amstad and colleagues' (2011) paper, 12 work-to-family conflict papers included measures of marital satisfaction and no measures of behaviors towards partners were included. Similarly, in McNall and colleagues' (2009) paper, only 8 work-to-family enrichment studies included measures of family satisfaction (some of which included items specific to martial satisfaction). Although one meta-analysis investigated the association between work-family conflict and marital quality outcomes, this study examined research over 30 years and only 33 published papers met the inclusion criteria, suggesting that consideration of partner-specific outcomes in

this research area is still sparse (e.g., Fellows, Chiu, Hill, & Hawkins, 2015). Overall, despite Eby and colleagues' (2005) call, work-family researchers are overlooking partner-specific home outcomes, especially those related to behaviors towards partners rather than relationship satisfaction or quality.

Of note is that the present study does not include measures of perceived work-family conflict or enrichment, but instead investigates the processes that connect work and home life. Specifically, the influence that work demands and resources have on romantic relationships at home, through detriments or improvements in sleep quantity and quality are examined. It is important to consider how work impacts employees' lives at home, especially related to their partnered relationships, because relationship quality is associated with a host of important outcomes, such as health and well-being (Dush & Amato, 2005; Umberson et al., 2006) and work productivity (Forthofer et al., 1996).

Further, I differentiate sleep quantity and sleep quality as separate mediating constructs, which provides insight to the potentially unique role of each of these independent constructs. This is informed by prior work, in which sleep quantity and sleep quality have been noted as conceptually and empirically distinct concepts. Sleep quantity describes the amount of sleep an individual obtains, whereas sleep quality describes characteristics of sleep, such as awakening after the onset of sleep or waking up feeling rested (e.g., Harvey, Stinson, Whitaker, Moskovitz, & Virk, 2008). There is empirical evidence that these two constructs are different as prior research has found a within-person correlation of –.14 between sleep quantity and sleep quality (Barnes, Schaubroeck, Huth, & Ghumman, 2011). Similar findings of low correlations between sleep quantity and quality have been documented in other studies as well (e.g., Crain et al., 2014; Frese & Harwich, 1984). In line with Barnes' (2012) proposition that sleep quantity and sleep

quality should be examined in tandem, the present study considers each as distinct mediating constructs.

Next, this study examines a sample of shiftworking nurses and CNAs. As previously mentioned, both shiftworkers and employees in helping professions are particularly important populations to study because of the compounded stressors they face and the negative outcomes they are vulnerable to. Further, in the work-family literature, scholars have suggested that white-collar managerial and professional positions have been overrepresented (e.g., Agars & French, 2011; Casper et al., 2007; Hammer & Zimmerman, 2011). Overrepresentation of these workers prevents an understanding of the experiences of blue-collar or lower-income workers. Importantly, if interventions are developed to improve worker health and wellbeing, these initiatives will be tailored to the white-collar and professional populations that have been studied, and may not generalize to other groups of workers. Moreover, editors from various organizational psychology fields have encouraged studying underrepresented populations (e.g., Chen, 2016). Therefore, this study examines a population of low-wage shiftworkers in the healthcare industry.

Methodological contributions. Aside from contributions to our theoretical understanding of sleep quantity and quality as links between work and home, this study utilizes specific rigorous methods to add to the current state of the literature. Regarding the conceptualization and measurement of sleep, another contribution is the utilization of objective (i.e., actigraphic), and self-report measures of sleep. Ganster (2008) discussed the strengths and limitations of using subjective and objective measures in stress research and recommended using these measures concurrently. Further, Sadeh's (2011) review attests that there is reasonable validity and reliability evidence for the use of actigraphy to measure sleep in healthy populations. However,

Sadeh (2011) also recommends that it is preferable to use self-report measures of sleep alongside actigraphy. Although a substantial amount work in traditional sleep science and cognitive neuroscience fields have utilized actigraphic measures of sleep, most of the research in organizational science disciplines has relied on self-reported sleep.

Finally, the use of multiple methods for assessing home outcomes serves as another contribution. The utilization of both employee- and spouse-reported measures of home outcomes addresses recommendations to use multiple raters to avoid common method bias (e.g., Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). In Casper, Eby, Bordeaux, Lockwood, and Lambert's (2007) review of research methods in work-family research, it was noted that there is an over-emphasis on individual-level analyses as most studies collected data from only one person. In response to these findings, the authors recommend the use of multisource data (Casper et al., 2007). It is useful to explore behaviors reported by partners because they can directly observe behavior. Asking spouses or partners to report on behaviors provides a more objective measure of employee behavior that would not be possible if reports were only obtained from employees themselves. Thus, there is utility in including other reports in the present study.

Theoretical rationale. To address these gaps in the current literature, this study draws on the work-home resources model (Ten Brummelhuis & Bakker, 2012), a framework that describes the processes of conflict and enrichment between an individual's experiences at work and home. This model is an extension of conservation of resources (COR) theory, which is based on an acquisition-conservation premise that people are motivated to obtain and protect resources (Hobfoll, 1989). According to COR theory, lost resources, the threat of losing resources, and an inability to gain resources contribute to negative outcomes (Hobfoll, 1989). Ten Brummelhuis and Bakker (2012) draw from COR theory in the work-home resources model by describing that

work-home conflict and enrichment are comprised of a series of processes, in which demands and resources in one domain (work or home) influence outcomes in another domain as a result of fluctuations in mediating personal resources.

Despite the extensive application of COR theory, it has been criticized for the broad conceptualization of what constitutes a "resource". Some have argued that any variable someone values could be considered a resource based on Hobfoll's (1989) definition (e.g., Halbesleben, Neveu, Paustian-Underdahl, & Westman, 2014; Thompson & Cooper, 2001). Other critiques of COR theory include the lack of plausibility that resources can lead to negative outcomes, and that simply categorizing resources is an insufficient way to define them (Halbesleben et al., 2014). Given the ambiguous definition of resources in COR theory, Halbesleben and colleagues (2014) provide a refined conceptualization of resources and focus on the goal-oriented component of COR theory to describe resources as: "anything perceived by an individual to help attain his or her goals" (Halbesleben et al., 2014, p. 5).

Ten Brummelhuis and Bakker (2012) draw from the basic tenets of COR theory (i.e., the influence of resources) in the work-home resources model to understand how work and home lives are interrelated. Their model addresses some of the shortcomings of COR theory by clearly defining different types of resources and articulating how they are related in the context of work and home environments. In addition, Ten Brummelhuis and Bakker (2012) expand on these basic tenets by integrating both Hobfoll's (2002) resource theory and Bronfenbrenner's (1994) ecological systems theory to categorize resources. Specifically, resources are categorized into two continuums; one defined by level of transience, and the other defined by the source. The transience continuum ranges from volatile to structural. Volatile and structural resources describe the extent to which resources are fleeting or enduring, respectively; volatile resources are limited

and dynamic (e.g., mood, respect), while structural resources are stable over time (e.g., knowledge, home). Next, the sources of resources are dichotomized as being either contextual or personal. Contextual and personal resources differ because contextual resources exist outside of the self (e.g., employment), whereas personal resources are proximal to the self (e.g., cognitive energy; Hobfoll, 2002; Ten Brummelhuis & Bakker, 2012). Next, key resources, such as self-efficacy, are categorized separately as personal structural resources that facilitate and improve other resources (Hobfoll, 2002). Lastly, in line with Bronfenbrenner (1994), macro resources are a subset of structural and contextual resources that are related to broader contextual factors, such as economic, political, and culture systems.

Of the various resources defined in the work-home resources model, personal resources are emphasized because they are considered the mechanisms through which work and home domains connect (Ten Brummelhuis & Bakker, 2012). According to this model, personal resources are proximal traits or energies that can be utilized to improve outcomes at work and home and are described as the "linking pins" between the two domains (Ten Brummelhuis & Bakker, 2012). Sleep is included as an example of a physical personal resource in the work-home resources model, so this study tests this idea. Notably, no prior work to our knowledge has assessed sleep as the linking mechanism between areas of work and home life. Although sleep can be considered a volatile, energy-based personal resource, I am specifically interested in how contextual structural demands and resources (i.e., those that remain stable) influence average levels of sleep quantity and quality and subsequent outcomes at home over 6-month time intervals. Halbesleben and colleagues (2014) propose corollaries of COR theory, which include that changes in resources lead to downstream impacts. In other words, fewer resources at one point in time should influence subsequent resources loss in the future, and more resources should

similarly lead to additional gains in resources. Accordingly, I believe that a loss or gain in the personal resource of sleep, caused by work demands and resources, should predict spouse-related outcomes at home 6-months later.

According to the work-home resources model, contextual demands in one domain (i.e., work or home) deplete personal resources, such as sleep quantity and quality, which then negatively impact outcomes in the other domain. Moreover, this model describes that contextual resources lead to the facilitation of personal resources, like sleep quantity and quality. In other words, there is a proposed negative relationship between contextual demands and personal resources and a positive relationship between contextual resources and personal resources. Further, greater personal resources should allow for improved outcomes, whereas fewer personal resources should reduce positive outcomes. The expected outcomes suggested by the work-home resources model are categorized into the following subtypes: production (e.g., completing tasks), behavioral (e.g., absenteeism), and attitudinal (e.g., satisfaction) outcomes. Given my focus on outcomes related to one's partner, behavioral and attitudinal outcomes are particularly relevant and examined in this study in the form of spouse reported relationship strain (e.g., starting arguments) and relationship satisfaction.

The notion that sleep quantity and quality are personal resources linking work to partner outcomes at home is motivated by prior research. For instance, aspects of work environments, such as overtime work (e.g., Rau & Triemer, 2004) and job demands (e.g., Åkerstedt et al., 2002) are associated with sleep quality outcomes, which aligns with the work-home resources model proposition that contextual demands deplete personal resources. Similarly, contextual resources have been shown to facilitate personal resources in studies that found a positive association between decision authority at work and sleep quality (e.g., Knudsen, Ducharme, & Roman,

2007). Further, sleep is linked with both attitudinal and behavioral outcomes at home, such as life satisfaction (e.g., Paunio et al., 2009) and conflict resolution (e.g., Gordon & Chen, 2014), which fits with the work-home resources model as authors theorize that work-home processes should affect both attitudinal and behavioral outcomes.

In the work-family literature, mechanisms linking work and home domains have been studied, but sleep has not been specifically assessed (e.g., Eby et al., 2005; Amstad et al., 2011). Further, linking mechanisms in the work-family literature have been critiqued for their ambiguity in terms of sign (i.e., positive or negative), causal structure, and personal intent of relationships between work and home (Edwards & Rothbard, 2000). According to the work-home resources model, personal resources are the mediators in the work-home interface. Assessing sleep quantity and quality as physical personal resources is important because there are distinctive attributes of sleep – such as being both endogenous (i.e., internal or biological) and exogenous (i.e., influenced by the external world) – that distinguishes it from any other personal resource suggested in the work-home resources model.

For instance, there is a biological component of sleep, which relies on a dual-process of both a homeostatic "sleep drive" process and circadian process (Borbély, 1982). The sleep drive describes the increased propensity to sleep following longer periods of wakefulness, which interacts with the circadian process (e.g., Borbély & Achermann, 1999). The circadian process relies on diurnal rhythms, in which the need to sleep depends on the time of day (Borbély & Achermann, 1999). However, there is also a volitional aspect of sleep, in which motivation can (to some extent) override the biological need to sleep. For example, people can consciously choose to stay awake to complete work tasks or housework. Sleep is also especially interesting because it can be separated into constructs of quantity and quality, as previously discussed, and

therefore offers the potential for greater depth of understanding. For example, sleep quantity may be influenced more by work-related policies, such as flexible schedules or reduced obligations to work from home, which would allow more time available for sleep. On the other hand, sleep quality may be more influenced by stressors in the work environment that impair workers' ability to unwind and fall and/or stay asleep.

Other conceptualizations of personal resources in the work-home resources model include psychological (e.g., optimism), affective (e.g., gratefulness), intellectual (e.g., knowledge), and capital (e.g., money) resources. Arguably, none of these categories of personal resources, or examples of other physical personal resources (e.g., health, energy, vigor), have the same defining characteristics that sleep has, including both an endogenous and exogenous component, and distinct constructs (i.e., quantity and quality). Therefore, sleep is believed to be a unique personal resource linking experiences of demands and resources at work with attitudes and behaviors at home, such that employees who have greater demands and fewer resources at work will have disrupted sleep quantity and quality and will subsequently experience negative impacts on attitudes and behaviors in their romantic relationships. Conversely, employees who have fewer demands and greater resources at work should have better sleep quantity and quality and subsequently experience positive attitudes and behaviors towards their partners.

In summary, this study tests the work-home resources theoretical framework by examining sleep quantity and quality as physical personal resources that link work-related demands and resources with behavioral and attitudinal outcomes at home. Specifically, contextual structural psychological work demands are examined alongside structural contextual work resources of decision authority and schedule control. Spouse-reported relationship strain is studied as a behavioral outcome and relationship satisfaction is studied as an attitudinal outcome.

The tenets of the work-home resources model were tested by assessing whether contextual structural work demands negatively impact home outcomes through the depletion of physical personal resources (i.e., sleep quantity and quality). Additionally, the notion that contextual structural work resources positively influence personal resources and subsequent outcomes at home will also be considered. Finally, Halbesleben and colleagues (2014) describe that downstream changes of resource loss and gain should affect subsequent losses and gains in resources and Ten Brummelhuis and Bakker (2012) describe that there is a need to better understand how work and home processes (e.g., enrichment and conflict) develop over time. Accordingly, I employ a longitudinal design in the present study to examine the temporal relationships amongst work, sleep, and home. Specifically, I consider the influence of demands and resources at baseline as they influence subsequent personal resources 6-months later, and finally how the level of personal resources influence romantic partnered relationships at 12-months.

Past literature related to sleep. Before motivating specific hypotheses, the current state of the literature related to sleep is considered. Although limited, prior research in the organizational science literatures has considered sleep quantity and/or quality as variables of interest. Some authors have theorized links between sleep and work-related outcomes (e.g., Barnes, 2012; Barnes & Hollenbeck, 2009; Mullins et al., 2014), but have not theorized links amongst work, sleep, and outcomes in the home domain. The sleep research that has been conducted in these fields primarily falls into one of two topic areas: work performance and behavior and work-family issues.

A number of performance and behavioral outcomes of sleep have been studied in prior research. For instance, past research shows that self-reported sleep is related to job performance

(e.g., Krueger, 1989; Rosekind et al., 2010), engagement (e.g., Barber, Grawitch, & Munz, 2013), and workplace injuries (e.g., Barnes & Wagner, 2009; Salminen et al., 2009). Additionally, leadership research has demonstrated that sleep deprived leaders are perceived as less charismatic by their followers (Barnes, Guarana, Nauman, & Kong, 2016). Other work has shown that extra-role behaviors, such as organizational citizenship behaviors, are influenced by employees' objective (i.e., polysomnographic) sleep quantity (Barnes, Ghumman, & Scott, 2013). In addition, counterproductive work behaviors have also been examined in relation to employees' sleep. Prior research has revealed that workplace deviance (Christian & Ellis, 2011), unethical work behaviors (e.g., Barnes et al., 2011), cyberloafing (Wagner, Barnes, Lim, & Ferris, 2012), and abusive supervisor behaviors (Barnes, Lucianetti, Bhave, & Christian, 2015) are each present when people report poor or disrupted sleep (exceptions include Barnes et al., 2011, who also used actigraphy, and Wagner et al., 2012, who used a quasi-experimental design during daylight savings time as a proxy for sleep loss).

In the work-nonwork literature, there is evidence that poorer self-reported sleep quality (e.g., Crain et al., 2014; Lallukka, Rahkonen, Lahelma, & Arber, 2010; Sekine, Chandola, Martikainen, Marmot, & Kagamimori, 2006) and self-reported and actigraphic sleep quantity (e.g., Crain et al., 2014) are associated with work-family conflict. Previous studies have also shown that time spent on work and family demands has negative effects on self-reported total sleep time (Barnes, Wagner, & Ghumman, 2012). Lastly, work-family interventions have been shown to have positive effects on employees' self-reported (e.g., Moen, Kelly, & Tranby, Huang, 2011) and actigraphic (Olson et al., 2015) sleep quantity and quality.

The present study aligns with and adds to trends in existing sleep research in the organizational sciences. Similar to the prior work, behavioral outcomes are be measured, but

behavioral outcomes at home between employees and their partners are be investigated rather than work-related behaviors. Additionally, attitudes towards romantic partners, rather than towards the job, are also considered. The present study therefore contributes to the work-family literature by examining the interface between work and home, with a focus on behaviors and attitudes in romantic partnered relationships. Unlike prior work-family studies, the present work does not measure work-family conflict, but rather the influence of work demands and resources on outcomes between employees and their romantic partners, through changes in employees' sleep quantity and quality. In addition, although Barnes and colleagues (2012) examined domains of work, home, and sleep, only time spent in each domain was measured; I examine experiences at work and home, rather than time allocated to each of these areas of life. Finally, in the work-family literature, sleep has exclusively been assessed as an outcome variable and primarily been measured with self-reports. Accordingly, the present work considers both self-reported and actigraphic sleep quantity and quality as mediating mechanisms connecting experiences between work and home.

Hypotheses

The relationship between contextual work-related demands and sleep quantity and quality. Work demands are defined as the "physical, psychological, social, or organizational aspects of the job that require sustained physical and/or psychological costs" (Bakker & Demerouti, 2007, p. 312). According to the work-home resources model, contextual demands have direct negative effects on personal resources (Ten Brummelhuis & Bakker, 2012). For the purpose of this study, psychological job demands are considered and resultant sleep quantity and quality are defined as personal resources. Examples of psychological work demands include working conditions that require employees to work very hard, very fast, or under time constraints

(e.g., Karasek et al., 1998), which aligns with Ten Brummelhuis and Bakker's (2012) description of the "overload" subtype of contextual demands.

Previous literature has investigated relationships between work demands and an array of health outcomes. For instance, psychological job demands have been shown to increase the risk of obesity (e.g., Brunner, Tarani, & Chandola, 2007), body pain (e.g., Fischer et al., 2005), and cardiovascular disease (e.g., Chandola et al., 2008; Schnall, Landsbergis, & Baker, 1994). A recent meta-analysis describes the association between workplace stressors and negative health outcomes as comparable to the relationship between exposure to secondhand cigarette smoke and poor health outcomes, suggesting that work-related stressors are similar in magnitude to secondhand smoke for predicting poor physical health (e.g., Goh, Pfeffer, Zeniors, & Pajpal, 2015). Additionally, mental health outcomes have been linked to work demands; a three-year cross-lagged study provided evidence that job demands predict depression and that burnout mediates this relationship (Hakanen, Schaufeli, & Ahola, 2008). Moreover, the influence of chronic occupational demands has been shown to impact cardiovascular and skin temperature responsivity (e.g., Schaubroeck & Ganster, 1993), thus providing physiological evidence of the detrimental effects of work demands over time.

In addition to influencing employee health outcomes, characteristics of the work environment have also been shown to impact outcomes related to sleep quantity. In a nationally representative sample, the amount of time people spent working was negatively associated with the amount of time they spent sleeping, and authors contend that "compensated work time is the most potent determinant of sleep time" (Basner et al., 2007, p. 1090). This study highlights how work-related demands, including those related to time pressure, can impact the amount of sleep

employees receive. However, less is known about the extent to which psychological job demands of working hard and fast influence sleep quantity.

With regards to sleep quality, epidemiological research has provided evidence that experiencing stressful events significantly predicts the onset of self-reported clinical insomnia symptoms (according to the DSM-IV diagnostic criteria for insomnia) one-year later, an effect that is especially strong (i.e., moderated) when the events are chronic (Pillai, Roth, Mullins, & Drake, 2014). Although stressful events were not specific to participants' experiences at work, it is plausible that work factors are related to these findings. Indeed, other researchers have explicitly considered the influence of the workplace on employee sleep quality.

For example, Linton (2004) found that people who reported no baseline sleep problems were more than twice as likely to report that they developed problems sleeping one-year later if they worked in poor psychosocial work environments. Similarly, Åkerstedt and colleagues' (2002) cross-sectional study identified that employees with high work demands are more than twice as likely to report disturbed sleep. There is also longitudinal evidence that over a one-year time period job demands predict poorer subjective sleep quality (de Lange et al., 2009). A number of other studies have also found that job demands have negative effects on sleep quality. For instance, psychological job demands have been negatively associated with self-reported measures of sleep quality (e.g., Kalimo, Tenkanen, Harma, Poppius, & Heinsalmi, 2000; Knudsen, Ducharme, & Roman, 2007; Sekine et al., 2006). In a study that specifically examined a sample of nurses, psychological job demands were associated with increased self-reported insomnia symptoms, a measure of sleep quality (Portela et al., 2015). The notion that characteristics of work impact sleep quality has also been shown in polysomnographic (i.e., recording of brain waves to identify periods of sleep and wake, which is the gold-standard of

sleep measurement) studies; participants who were more apprehensive about the following workday had reduced slow wave sleep (SWS) – a sleep stage known for its restorative benefits – and lower subjective sleep quality (Kecklund & Åkerstedt, 2004). Overall, there is evidence that work environments impact employees' sleep quality as well.

Finally, some studies have considered the influence of work demands on both sleep quantity and sleep quality. For instance, in a study that examined shiftworkers, psychological job stressors, such as time pressure, had a negative impact on sleep quality but not sleep quantity (Frese & Harwich, 1984). Similarly, compared to employees who worked their scheduled work hours, employees who worked overtime were found to exhibit more sleep quality disturbances, but not reduced sleep quantity (Rau & Triemer, 2004). However, both of these studies utilized self-reported sleep measures, so it is unknown how work demands influence objective measures of sleep quantity and quality. Importantly, these findings reveal that different aspects of the work environment differentially impact sleep quantity and sleep quality. Therefore, it is important to measure the influence of psychological job demands on both constructs of sleep with self-reports and actigraphy.

Overall, demanding work environments have been shown to have detrimental health consequences for employees, including disrupted sleep quantity and quality. Given that prolonged stressors over time can impact health outcomes, sleep is assessed six months following the measurement of psychological job demands. Further, the use of a shiftworker sample of nurses and CNAs explicates how psychological job demands influence sleep quantity and quality for these employees in particular. The psychological job demands assessed in the present study (i.e., working very hard, working very fast, and not having enough time to complete work) are especially important for nurses, given the compounded emotional stressors

they are faced with, and because their work is critically important to the health and rehabilitation of their patients. For instance, nurses and CNAs who are required to work hard, fast, and within time constraints should have reduced sleep duration and poorer sleep quality. This can be due to trouble falling and staying asleep due to ruminative thoughts about their job stressors, given other research indicating that work-related rumination close to bedtime has a negative association with self-reported sleep quality (Cropley, Dijk, & Stanley, 2006). Finally, assessing the influence of contextual work demands on personal resources aligns with the propositions outlined in the work-home resources model.

Hypothesis 1: Baseline psychological job demands will be negatively related to 6-month sleep quantity and quality.

The relationship between contextual work-related resources and sleep quantity and quality. In light of what is known about the effects of contextual work demands, it is important to also assess contextual work resources, as these can facilitate positive, rather than negative, outcomes. Resources have been described as characteristics that are functional to the attainment of goals (Halbesleben, 2014) and organizational scholars have theorized that work resources should predict employee sleep (e.g., Budnick & Barber, forthcoming). According to the work-home resources model, contextual resources are directly and positively related to personal resources (Ten Brummelhuis & Bakker, 2012). For the purpose of this study, sleep quantity and quality are defined as personal resources that are influenced by contextual resources of decision authority and schedule control.

Decision Authority. One frequently examined resource is decision authority – the extent to which an employee has control/autonomy over how they meet job demands and complete their work (e.g., Karasek, 1979). Spector's (1986) meta-analysis provides evidence that employees

with more decision authority have less physical health symptoms and emotional distress. Others have found that greater decision authority is linked with reduced risk of heart attacks and coronary heart disease (e.g., Bosma, Peter, Siegrist, & Marmot, 1998; Theorell et al., 1998). There is also longitudinal evidence that for people who work in highly demanding jobs, higher levels of decision authority are associated with decreased risk of mortality (Gonzalez-Mulé & Cockburn, 2016). Decision authority has also been linked with psychological wellbeing (e.g., Van der Doef & Maes, 1999) and work outcomes of job satisfaction, commitment, performance, and motivation (e.g., Spector, 1986).

In addition to these more general health- and work-related outcomes, decision authority has been shown to positively impact sleep-related outcomes as well. For example, negative associations have been shown between decision authority and self-reported sleep quality (e.g., Kalimo et al., 2000; Knudsen et al., 2007; Nomura, Nakao, Takeuchi, & Yano, 2009; Sekine et al., 2006). In a sample of nurses, low decision authority was positively associated with self-reported insomnia symptoms (Portela et al., 2015). Taken together, this prior research supports the notion that increased decision authority at work is related to improved self-reported sleep quality outcomes, and decreased decision authority is related to reduced sleep quality. However, these studies are limited to self-reported measures of sleep and did not investigate the influence of decision authority on sleep quantity.

Schedule control. It has been proposed that schedule control – the extent to which employees decide where and when they work – can be a particularly effective tool for improving outcomes both at work and at home (Kelly & Moen, 2007). Schedule control is described as an extension of Karasek's (1979) notion of job control with an emphasis on "when and where work is done rather than how it is done" (Kelly & Moen, 2007, p. 4). Prior work has examined the

effects of perceived schedule control and found that it is associated with less psychological distress, burnout, sick days, poor general health, and physical problems (e.g., Fenwick & Tausig, 2001; Hurtado et al., 2015). Additionally, Thomas and Ganster's (1995) study of the influence of control over both work and family responsibilities provided evidence that perceptions of control are related to favorable outcomes, such as reduced work-family conflict, improved job satisfaction, and positive health outcomes. The Results Only Work Environment (ROWE) initiative is an organizational strategy that focuses on establishing norms of flexibility regarding where and when employees complete their work (e.g., Kelly, Moen, & Tranby, 2011). The ROWE initiative has demonstrated significant improvements in employees' perception of schedule control, which has been predictive of reduced work-family conflict, increased exercise frequency, increased willingness to see a doctor when sick, and reduced likelihood to work when sick (e.g., Moen et al., 2011). Overall, prior research findings suggest that increasing employees' discretion over where and when they complete their work can have positive effects on health, wellbeing, and work-related outcomes.

As research that considers schedule control is growing, researchers are beginning to study the influence of schedule control on sleep-related outcomes. For instance, the ability to take time off of work has been associated with improved self-reported sleep quality (Haley & Miller, 2015). Although, other forms of schedule flexibility such as compressed workweeks were not correlated with sleep quality or quantity outcomes (Haley & Miller, 2015). Other work has found that control over work time buffers the negative effects of night shifts on self-reported sleep quantity and quality outcomes (Tucker, Bejerot, Kecklund, Aronsson, & Åkerstedt, 2015). Additionally, The ROWE initiative was examined in relation to sleep outcomes and Moen and colleagues (2011) found that employees who participated in the initiative that promoted schedule

control reported sleeping almost an hour more on work nights compared to employees who did not participate in the initiative. The ROWE initiative was also found to influence self-reported sleep quality indirectly through increased schedule control and decreased work-home spillover. However, this study measured sleep quantity and sleep quality with single-item self-report questions (Moen et al., 2011). Therefore, more research is needed to understand how schedule control influences sleep quantity and quality as measured with actigraphy and more comprehensive questionnaires. One study did investigate schedule control in relation to actigraphic and self-reported sleep, and found that employees who participated in an intervention targeting control over work hours and family-supportive supervisor behaviors reported reduced sleep insufficiency (i.e., feeling well-rested upon waking up) and obtained an hour more sleep per week (Olson et al., 2015). These authors further identified that increased schedule control and reduced work-family conflict were mediators between the intervention and measures of sleep quality (i.e., sleep insufficiency). These studies suggest that increased schedule control can be facilitative to favorable sleep outcomes.

Although the prior work shows that decision authority and schedule control are independently related to improved sleep outcomes, these two contextual resources have not been examined as individual predictors of sleep. It is useful to consider both because they each capture an aspect of work-related autonomy; control over how work is completed and control over when, where, and how much one works. In addition, much of the extant research has been conducted with white-collar workers. Indeed, of the two intervention studies that assessed sleep outcomes in relation to schedule control, samples included participants from the headquarters of a retail corporation and an information technology firm, respectively.

Nurses and CNAs can be especially vulnerable to impaired sleep because of their work schedule and limited discretion to make decisions at work (e.g., Lockley et al., 2007; Weston, 2010). Therefore, an understanding of how decision authority and schedule control can positively influence the sleep of these shiftworking employees is needed. Given the aforementioned challenges these workers face, developing strategies to improve the quality of working life for nurses and CNAs can be achieved by identifying contextual work resources that facilitate the personal resources of sleep quantity and quality, in line with the work-home resources model.

For instance, nurses and CNAs who have a lot of say in their job should have improved sleep-related outcomes. Perhaps workers prefer to work in certain workgroups, with some patients, or in specific units. Providing decision authority related to these preferences can reduce nurses' cynicism towards the work they do, which is particularly important because nurses have been noted as having high levels of occupational burnout, in which cynicism is one facet (e.g., Demerouti, Bakker, Nachreiner, & Schaufeli, 2000; Maslach, Shaufeli, & Leiter, 2001). Further, prior work has identified an association between burnout and polysomnographic sleep quality (e.g., Ekstedt et al., 2006). These processes can also influence ruminative work-related thoughts prior to bedtime (e.g., Cropley et al., 2006). In addition, nurses and CNAs that have the flexibility to schedule their work hours around nonwork (i.e., marital, caregiving, personal) responsibilities can allow for improved sleep and wake times. Similarly, if nurses and CNAs have control over the time their shift starts and ends, this can allow workers to match their sleep patterns with their morningness-eveningness orientation. For instance, an "evening person", who feels more rested and alert when they go to sleep later and wake up later, could choose to work afternoon shifts rather than morning shifts and avoid disrupting their sleep preferences.

Hypothesis 2a: Baseline decision authority will be positively related to 6-month sleep quantity and quality.

Hypothesis 2b: Baseline schedule control will be positively related to 6-month sleep quantity and quality.

The relationship between sleep and behavioral outcomes at home. The work-home resources model emphasizes the connections between work and home domains and suggests that behavioral outcomes follow processes of work-home conflict and enrichment. Therefore, behavioral outcomes at home are assessed in the present study. Prior work has shown that behaviors outside of work, such as how people act towards their partners, are likely to be affected by poor sleep quantity and quality. A laboratory study found that compared to people who are well-rested, sleep deprived people are worse at accepting blame during a conflict and are more inclined to direct blame and hostility toward others (Kahn-Greene, Lipizzi, Conrad, Kamimori, & Killgore, 2006), and these findings can be generalized and applied to couples in romantic relationships. One study that examined romantic couples found that when partners reported obtaining better quality sleep, they exhibited improved conflict resolution and were more cognizant of their partners' emotions the following day (Gordon & Chen, 2014). In addition, Hasler and Troxel (2010) found bidirectional dyadic relationships between actigraphic sleep quality and relationship functioning, though this study examined partners' interactions as being either positive or negative, rather than assessing more specific behavioral characteristics. Another study found that spouses' reported sleep problems were negatively associated with their partner's happiness in their marriage (e.g., Strawbridge, Shema, & Roberts, 2004). However, in this study only older adults (ages 51 to 94) were included, marriage quality was assessed with a single-item measure, sleep quantity was not considered, and no objective measures of sleep were

used. Further, although this study utilized a spouse report of marriage quality, specific partner-related behaviors that can contribute to attitudes about marriage were not considered.

To my knowledge, no previous work has considered spouse reports of their partner's behavior as a result of their partners' sleep. To address this, I include spouse reports of strain in their relationship as a way to measure employee behavior (example item: "does he/she argue with you?"). Examining spouse reports provides a useful method for studying employee behavior at home; there have been calls in the organizational psychology literature to utilize reports from multiple sources given problems surrounding common method variance when relying solely on the same type of measurement, such as self-reports (e.g., Podsakoff et al., 2003). Further, as previously mentioned, there is a relative dearth in work-family literature that specifically assesses home outcomes, such as those pertaining to romantic partnered relationships (e.g., Amstad et al., 2011; Eby et al., 2005).

Assessing behavioral outcomes at home, as they are influenced by fluctuations in personal resources (i.e., sleep quantity and quality) tests the tenets of the work-home resources model, which states that personal resources should have an effect on subsequent outcomes. Compared to those who sleep well, nurses and CNAs who receive less sleep and poorer sleep quality on average should act differently towards their spouses and partners, such as being more critical or argumentative. Alternatively, spouses and partners of well-slept employees should report that their partners are less critical, less argumentative, and make them feel less tense in their relationship.

Hypothesis 3: 6-month sleep quantity and quality will be negatively related to 12-month spouse-reported relationship strain.

The relationship between sleep and attitudinal outcomes at home. In addition to behavioral home outcomes, the work-home resources model also suggests studying the influence of personal resources on attitudinal outcomes as well. It has been theorized that sleep results in affective states that influence attitudinal outcomes (e.g., Barnes, 2012; Mullins et al., 2014), and although these authors only identify work-related outcomes, sleep should similarly influence affectivity in the home domain as well. A large body of research has recognized that disrupted sleep quantity and quality is associated with impaired emotion regulation (e.g., Palmer & Alfano, 2016), negative mood (e.g., Short & Louca, 2015), and clinical mood disorders (e.g., Rumble, White, & Benca, 2015). Based on previous literature that suggests sleep impacts affective and states and mood, sleep quantity and quality are assessed as predictors of relationship satisfaction.

Self-reported sleep quality has been shown to influence attitudes in the home domain, such as life satisfaction and quality of life (e.g., Pauino et al., 2009; Leger et al., 2001). Romantic relationship satisfaction, or the attitudes towards partnered relationships such as division of labor in housework (e.g., Huston, McHale, & Crouter, 1986), has also been associated with sleep quality. Related to partnered relationships, it has been demonstrated that an individual's sleep quality is associated with their relationship satisfaction and happiness, as shown in studies that have utilized both self-reported (e.g., Strawbridge et al., 2004; Troxel et al., 2009) and actigraphic (e.g., Insana, Costello, & Montgomery-Downs, 2011) measures of sleep. These effects have been shown at the daily level as well; on nights when people reportedly slept more, they also reported greater marital satisfaction the following day (Maranges & McNulty, 2016). In a review of the literature on the relationship between marital quality and sleep, Troxel and colleagues (2007) acknowledge that sleep problems and relationship problems tend to happen in parallel, though they describe that these relationships are reciprocal. Notably, in their review, the

majority of the studies examined the influence of sleep-disordered breathing (e.g., sleep apnea) on relationship quality rather than general sleep disturbances or reduced sleep duration (Troxel et al., 2007).

Given the theorized affective consequences of sleep, and the proposition in the work-home resources model that personal resources should influence attitudes, sleep quantity and quality are assessed in relation to subsequent relationship satisfaction. The prior work that has investigated the impact of sleep on attitudes indicates that sleep influences home attitudes, including feelings towards romantic relationships. The present study examines this by studying self-reported and actigraphic sleep quality and quantity in a healthcare industry sample. Nurses and CNAs who obtain less and poorer quality sleep on average should perceive lower relationship satisfaction at a later time point, due to the links among sleep, affectivity, and mood (e.g., Barnes, 2012; Short & Louca, 2015), and proposed downstream effects of resource loss (e.g., Halbesleben et al., 2014). Impaired sleep quantity and quality can reduce relationship satisfaction because of influences in affectivity, such as being in a bad mood. Alternatively, when nurses and CNAs obtain healthy durations and quality of sleep on average, their general affect and mood should be more positive, resulting in higher perceived relationship satisfaction.

Hypothesis 4: 6-month sleep quantity and quality will be positively related to 12-month relationship satisfaction.

Sleep as a mediating personal resource. According to the work-home resources model, contextual demands and resources influence personal resources, which in turn have an influence on outcomes at home (Ten Brummelhuis & Bakker, 2012). Specifically, contextual work demands are theorized to negatively impact outcomes through a reduction of personal resources, and contextual work resources are thought to improve outcomes by increasing personal resources

(Ten Brummelhuis & Bakker, 2012). Thus, the present study tests the work-home resources model by assessing contextual work demands and resources as they influence behavioral and attitudinal outcomes at home through mediating effects of sleep quantity and quality. In their review of work-family research, Casper and colleagues (2007) suggest that future research should investigate the influence of shiftwork on life outside of work, and also recommend further research on policies that can benefit employees' and their families. The present work examines a population of shiftworkers and considers workplace policies – control over when, where, and how work is completed – as they relate to employees' sleep and outcomes at home.

Contextual work demands and outcomes at home as mediated by sleep quantity and quality. Past research provides evidence that demanding work environments influence employees' behaviors at home. For instance, Bakker, Demerouti, and Dollard (2008) found that employees' psychological job demands are related to their work-to-family conflict, which in turn influences their partners' perceived home demands and family-to-work conflict, suggesting that job demands are related to home outcomes for both employees and their partners. Interestingly, this study also found that social undermining (i.e., when people acted negatively towards their partner) mediated the relationship between employees' work-to-family conflict and their partners' perceived home demands (Bakker et al., 2008). Other work has found that marital conflicts are more prevalent in couples when one partner reports high job demands (Lingard & Sublet, 2002). Another study that assessed husbands' work demands found a positive association between men's job demands and outbursts towards their wives (Burke, Weir, & DuWors, 1980). Similarly, on days that husbands reported greater job demands, their wives also reported that their husbands exhibited more withdrawn behaviors at home (Repetti, 1989). These studies

suggest that the job demands employees experience influence their behavior at home towards their spouse or partner.

Job demands have been shown to influence home attitudes as well, such as marital satisfaction (e.g., Mauno & Kinnunen, 1999; Lingard & Sublet, 2002). In Mauno and Kinnunen's (1999) study, work exhaustion and psychological health mediated this relationship. Notably, exhaustion was measured using six fatigue-related items. In addition, this study examined an array of stressors, including time pressure at work – a facet of the psychological job demands measure that is utilized in the present study. Further, no crossover effects were found in this study, in other words, employees' job stress did not influence their partners' marital satisfaction (Mauno & Kinnunen, 1999). However, in the present study, spouse reports of relationship strain are measured as a way to gauge employees' behavior, rather than assessing spouses' relationship attitudes. Others have examined the influence of characteristics of one's job on measures of marital quality, and found partial support for mediating effects of work-family variables on these relationships (e.g. Hughes, Galinsky, & Morris, 1992). However, the authors note that affective states have a greater influence on marital quality than stressors involved with meeting work and home demands (Hughes et al., 1992). Although this study didn't explicitly consider sleep, given the previously mentioned links between sleep and affectivity, sleep quantity and quality are investigated as the mediating variables in these relationships.

In line with the work-home resources model, I expect that psychological job demands will have a negative relationship on home outcomes, namely those specific to romantic partnered relationships. Nurses who have demanding jobs on average may experience negative spillover, wherein their experienced work-related stress is carried over once they are at home. This can lead to negative stress-induced behavior towards their partners and reduce their relationship

satisfaction. This aligns with prior work in which external stressors (including work-related stressors) are associated with both partners' perceived marital quality through mediating effects of relationship stress (e.g., Ledermann, Bodenmann, Rudaz, & Bradbury, 2010). Moreover, given the previously described links between job demands and sleep, and sleep and relationship behaviors and attitudes, sleep quantity and quality will be assessed as the mechanisms that link demanding work environments with home outcomes. For instance, nurses and CNAs who are usually required to work hard, fast, and with inadequate time to complete job tasks can have trouble sleeping, on average, because of ruminative work-related thoughts that can impair their ability to fall and stay asleep and to obtain a healthy amount of total sleep. These disruptions to sleep should in turn impact how they act towards their partners and their overall relationship satisfaction.

Hypothesis 5a: The relationship between baseline psychological job demands and 12-month spouse-reported relationship strain will be mediated by 6-month sleep quantity and quality.

Hypothesis 5b: The relationship between baseline psychological job demands and 12-month relationship satisfaction will be mediated by 6-month sleep quantity and quality.

Contextual work resources and outcomes at home as mediated by sleep quantity and quality. Autonomy in how, where, and when work is done should relate positively to improved behaviors and attitudes at home. First, related to decision authority, prior work has shown that people with less job autonomy are more likely to exert control over their spouses, an effect that authors contribute to a compensatory process in which lack of control in one domain causes people to seek control in another (Stets, 1995). This study suggests that decision authority at work may be related to behavioral outcomes at home towards romantic partners.

Furthermore, there is meta-analytic evidence that decision authority at work is associated with job satisfaction (e.g., Loher, Noe, Moeller, & Fitzgerald, 1985; Spector, 1986), including a meta-analysis that specifically assessed nurses' job satisfaction (e.g., Blegen, 1993). Although there is evidence that job satisfaction can spillover to home and influence marital satisfaction (e.g., Ilies, Wilson, & Wagner, 2009), research that has assessed the influence of decision authority on romantic relationship satisfaction is limited. One study that assessed decision authority at work did not find evidence for spillover to marital satisfaction (e.g., Mauno & Kinnunen, 1999), but this effect is contrary to theory, and the extant literature in this area is incomplete.

Next, the control employees' have over their schedule in terms of where and when they complete their work has been negatively associated with work-family conflict (e.g., Hill, Hawkins, Ferris, & Weitzman, 2001; Kelly et al., 2011; Thomas & Ganster, 1995). Other work has demonstrated that for shiftworkers, negative effects of their schedule on family quality are attenuated when employees have greater schedule control (e.g., Staines & Pleck, 1986). Although Kelly and Moen (2007) propose that schedule control should influence home behaviors such as parenting, to my knowledge, no research has explicitly considered behavioral outcomes at home related to romantic relationships, or considered mediating influences of sleep quantity and quality.

Control over work schedules is also related to attitudinal outcomes. In a study that examined shiftworkers, schedule control was associated with general satisfaction in life (e.g., Fenwick & Tausig, 2001). However, both schedule control and life satisfaction were measured with single-items. Furthermore, in the present study relationship satisfaction rather than general satisfaction in all areas of life will be investigated. Additionally, perceptions of schedule control

have been positively associated with reduced work-family conflict, job satisfaction, and physical and mental health outcomes (Thomas & Ganster, 1995). However, this study considered control over schedules related to both work and family and assessed attitudes related to work, and the present study is interested specifically in perceived control over work schedules and attitudes at home. Some work has considered attitudinal relationship outcomes and found that control over work hours is associated with marital quality, but this effect was only found among parents (e.g., Hughes et al., 1992). Overall, there is a limited understanding of the effects schedule control has on outcomes at home specific to relationships, and no prior work has considered mediating effects of sleep.

According to the work-home resources model, contextual work resources should have a positive influence on behavioral and attitudinal outcomes at home. Furthermore, this model emphasizes the role of personal resources, which have positive associations with contextual resources, and lead to improved outcomes. In the present study, sleep quantity and quality are examined as the linking mechanisms facilitating positive outcomes between contextual work resources and improved behaviors and attitudes at home in partnered relationships. For instance, nurses and CNAs that can complete job tasks in a manner that best suits their work style (i.e., high decision authority) should have greater sleep quantity and quality, because having a sense of control over how work is completed should produce less work-related stress, less subsequent negative spillover, and less ruminative thoughts. Alternatively, nurses and CNAs who have a choice in when they take time off of work, or leave work early, should experience less work-related stressors because of their ability to self-select when they need time to recover. This flexibility and control over their schedule should allow nurses to obtain more sleep. As a result

of better sleep, these employees should treat their partners better and feel more satisfied in their relationships.

Hypothesis 5c: The relationship between baseline decision authority and 12-month spouse-reported relationship strain will be mediated by 6-month sleep quantity and quality.

Hypothesis 5d: The relationship between baseline decision authority and 12-month relationship satisfaction will be mediated by 6-month sleep quantity and quality.

Hypothesis 5e: The relationship between baseline schedule control and 12-month spouse-reported relationship strain will be mediated by 6-month sleep quantity and quality.

Hypothesis 5f: The relationship between baseline schedule control and 12-month relationship satisfaction will be mediated by 6-month sleep quantity and quality.

In summary, the present study addresses current gaps in the work-family literature by drawing on the work-home resources framework to assess how contextual work demands and contextual work resources influence attitudinal and behavioral outcomes at home by investigating potential mediating effects of sleep quantity and quality. Furthermore, examining these relationships will also inform research on shiftworkers, specifically those who work in the healthcare industry.

Methods

Participants

The present study used data from the CDC- and NIH-funded Work, Family, and Health Study (WFHS), which was developed to assess how workplace practices influence work, family, and wellbeing outcomes for employees and their families through a randomized controlled trial. I examined a subset of the data collected in the larger intervention study, with a sample of low-wage hourly workers in the long-term care industry. Workers in this sample were comprised of nurses and CNAs who work at long-term nursing home facilities and are involved in direct patient care. The worksites (n = 30) were located throughout all six New England states: Massachusetts (n = 12), Rhode Island (n = 2), Connecticut (n = 4), Vermont (n = 1), New Hampshire (n = 5), and Maine (n = 6).

Data were collected from participants over three time intervals (baseline n = 1499–1524; 6-months n = 963–1273; 12-months n = 134–184). Power considerations were based primarily on the mediation analyses that were proposed. According to Fritz and MacKinnon (2007), when using Sobel first-order tests of mediation, a sample size of at least 90 participants is recommended to detect medium-sized "a" and "b" (i.e., indirect) paths. Additionally, in Fritz and MacKinnon's (2007) review of the literature, the median sample size was 142.5 for mediation studies that tested indirect effects. Over half of the mediation studies included in their review used sample sizes of 200 participants or less, suggesting that this study had sufficient power to detect effects in mediation models.

Long-term care industries were recruited as part of the WFHS through recruitment brochures that were distributed to potential nursing home industry partners. All recruited

industries were asked a standard set of questions during recruitment related to basic characteristics of the organization (e.g., number of sites, number of employees per site, employee demographics, relationship with management, reason for interest in participating). Afterwards, an industry was selected and worksites within each center were recruited. First, administrators of each worksite were contacted and informed that their facility was selected to participate in the WFHS and were offered to have phone meetings to receive additional information. Once worksites agreed to participate, specific action plans were developed for the research project. One long-term care industry was selected, which was comprised of 30 long-term care (i.e., nursing home) facility worksites that were included in the study.

Of the 30 facilities, approximately 50 employees from each worksite agreed to participate. Subject recruitment involved multiple approaches, such as emails, letters, meetings, flyers, memos of endorsement from top leadership, study fact sheets, and brochures. All recruited employees received informed consent and understood that their participation was entirely voluntary without risk of penalty in the event they declined to participate or withdrew from the study during data collection. Employees who agreed to participate were asked to provide information about their living arrangements, including if they lived with a spouse or partner. Next, spouses and partners were recruited through phone calls and through information provided to the employee to share with their spouse or partner. Separate consent procedures were used for spouses and partners that agreed to participate.

Eligible participants included employees who were scheduled to work an average of 22.5 hours or more per week in roles that required direct patient care. Eligible participants also included those who worked a regular daytime shift, a regular evening shift, a variable shift (one that changes from day to day), a rotating shift (one that changes regularly from days to evenings

or nights), or a split shift (one of two distinct periods each day). Employees who worked night shifts (i.e., 11p.m. to 7a.m.) were excluded from the intervention. Employees on the night shift were excluded for a few reasons. First, holding sessions (related to the intervention) during the night shift was not feasible for facilitators on the research team because it required commitments for several nights within a week, and it was not possible for facilitators to have sessions during night shifts and the following day shifts. In addition, it was challenging to hold sessions during the night shift because there were fewer back-up workers available to help employees that would be participating in sessions.

Procedure

60-minute Computer Assisted Personal Interviews (CAPI) were administered in-person by trained field interviewers between the years 2010–2013. Data were collected at baseline, 6-months, and 12-months. Participants were compensated $20 for completion of the CAPI interview at each time point. In addition to interviews, consenting participants were asked to wear actigraph sleep-tracking devices for seven consecutive days on their non-dominant wrist. An additional $20 incentive was provided for employees who consented to participate in actigraphy data collections. Those who participated in the actigraphy portion of the study wore an actigraph during each of the data collection periods (i.e., baseline, 6-months, and 12-months). A final $30 incentive was provided to participants who participated in the home interview portion of the survey.

Measures

Psychological job demands. Psychological job demands were measured with a 3-item version of the psychological job demands subscale of the job content questionnaire (JCQ; Karasek, et al., 1998; $\alpha = .63$). The JCQ is a highly-cited measure that was deemed reliable in its

initial scale development study, which utilized over 15,000 participants across six studies in four countries (Karasek et al, 1998). This measure prompted participants to consider functions of their job when answering questions (e.g., "Your job requires very fast work"; see Appendix A). Response options range from 1 to 5 (1 = *Strongly Disagree*; 5 = *Strongly Agree*) with higher scores reflecting greater psychological job demands.

Decision authority. Decision authority was selected as one measure of contextual work resources. The 3-item decision authority subscale of the JCQ was utilized (e.g., Karasek et al., 1998; $\alpha = .55$). Similarly, this measure asked participants to consider functions of their job and respond to the questions related to the amount of autonomy they perceive in their work environments (e.g., "You have a lot of say about what happens on your job"; see Appendix B). Participants responded on a 1 to 5 scale (1 = *Strongly Disagree*; 5 = *Strongly Agree*) in which higher scores indicate greater decision authority.

Schedule control. Another measure of contextual work resources is schedule control, or the extent to which employees have decision authority in when and where they complete their job tasks. A modified version of the schedule control measure developed in Thomas and Ganster's (1995) study was used ($\alpha = .64$). The original 14-item scale included schedule control for both work and family responsibilities, and was therefore shortened to an 8-item version that only included items relevant to work. After conducting confirmatory factor analyses (CFAs), this measure was shortened to a 6-item measure (see results section for additional information on CFAs). This measure asked participants to think about how much control they have in their work schedule (e.g., "How much choice do you have over when you begin and end each work day?"; see Appendix C). Response options range from 1 to 5 (1 = *Very little*; 5 = *Very much*), with higher scores indicating greater control over work schedule.

Self-reported sleep quantity. Sleep duration is a measure of sleep quantity, and was measured using items from the Pittsburg Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). The PSQI is considered an easy to use and accessible measure of habitual sleep characteristics (Buysse et al., 1989). In addition, there are limited surveys that measure sleep and the PSQI is the most widely used questionnaire for identifying sleep characteristics (Grandner et al., 2006). Sleep duration items included: "Over the past four weeks, what time did you usually turn the lights off and go to sleep?" and "Over the past four weeks, what time did you usually get out of bed?" (see Appendix D). These items were used to calculate participants' typical sleep duration.

Self-reported sleep insufficiency. Sleep insufficiency is a measure of sleep quality, and was measured with the following single-item (Buxton et al., 2009; Buxton et al., 2012); "How often during the past four weeks did you get enough sleep to feel rested upon waking up?" (see Appendix E). Scores range from 1 to 5 (1 = *Very Often*; 5 = *Never*), in which higher scores represent greater sleep insufficiency.

Self-reported insomnia symptoms. Insomnia symptoms are an additional measure of sleep quality and were measured by utilizing two items on the PSQI (Buysse et al., 1989); "During the past four weeks, how often could you not get to sleep within 30 minutes?" and "During the past four weeks, how often did you wake up in the middle of the night or early morning?" (see Appendix F). Participants rated both items on a 1 to 4 scale (1 = *Never*; 4 = *Three or more times a week*), in which higher scores represent greater insomnia symptoms. The two items were averaged to compute an aggregated insomnia symptoms score.

Objectively measured sleep. While there are many advantages of using self-reported measures of sleep (e.g., low cost, easy to administer, provides a measure of subjective

perception), the feasibility of these options can sometimes be offset by the quality of the data. In general, the validity of self-report measures has been criticized in survey research (e.g., Podsakoff et al., 2003), though subjective measures are often the best or only possible option due to feasibility (e.g., devices and accompanying software programs to measure and analyze objective sleep are expensive and require training). Researchers have questioned how self-reported measures align with objective measures of sleep (e.g., Kushida et al., 2001) and some have found evidence that the correlation between subjective and objective measures of sleep is moderate, though biased by over-reporting on subjective measures (Lauderdale, Knutson, Yan, Liu, & Rathouz, 2008). Although organizational psychology researchers have typically relied on self-reported measures of sleep, recent work has begun utilizing objective measures, as well (e.g., Barnes et al., 2011; Crain et al., 2014).

The gold standard for objectively measuring sleep is polysomnography, which is comprised of electroencephalography (i.e., a measure of bioelectric impulses to record brain waves), electrooculography (i.e., a measure of eye movement) and electromyography (i.e., a measure of muscle activity; Spriggs, 2008). Polysomnography allows for the recording of brain activity during periods of wake and sleep. While polysomnography is highly reliable and valid for measuring sleep quantity and quality, this technique is expensive, arduous to apply, can be uncomfortable, and is often not feasible for organizational research that is conducted in field settings rather than traditional sleep laboratories.

Actigraphy is an alternative to using polysomnography because it has been validated for the identification of sleep and wake activity in healthy populations (Marino et al., 2013) and is adequately comparable to polysomnography for the measurement of sleep quantity and quality (e.g., Kosmadopoulos et al., 2014). Actigraphy is a tool to measure sleep in which wristwatch

devices (i.e., actigraphs) are worn on the non-dominant wrist. Actigraphs contain accelerometers to measure movement, which allows for the distinction between sleep and wake cycles. The amount of published research utilizing actigraphic measures of sleep compared to polysomnographic measures has grown from 1 in 10 to 1 in 4 from 1991 to 2009 (Sadeh, 2011), which demonstrates the growing interest and appreciation of actigraphy as a viable option for measuring sleep-wake patterns. Further, actigraphs are especially useful in applied settings due to the ease at which they can be administered. For these reasons, the present study uses a well-validated actigraphic measure of sleep (Actigraph Spectrum; Philips Respironics; Marino et al., 2013) in conjunction with self-reports.

Actigraphy. For each actigraphic record, valid days were determined by two researchers trained in actigraphy scoring according to a number of criteria. First, invalid days are those in which there were malfunctions in the devices, such as when data were unable to be retrieved, data showed evidence of false activity, or batteries in the devices failed. Invalid days were also present if participants did not follow the instructions specified by researchers, such as removing the device for at least four hours, or removing it for at least one hour within ten minutes of a bedtime period. Discrepancies between trained actigraphy scorers were checked and all sleep periods were confirmed by checking each 30-second interval.

The Actiware sleep-scoring program uses an algorithm to determine wake and sleep patterns, as validated by Marino and colleagues (2013). This algorithm is based on 30-second epoch time intervals in which activity counts are measured. Activity counts are identified for each 30-second epoch, and when an epoch exceeds a threshold of 40 counts, the epoch is scored as “wake”. When activity counts fall below the 40-count threshold, the epoch is scored as “sleep”. When “wake” or “sleep” indicators occur consecutively in a pattern determined by the

Actiware software program, a given timeframe (typically an interval of several hours) is scored as either wake or sleep.

Actigraphic sleep quantity. Actigraphic sleep duration is as a measure of sleep quantity (i.e., total sleep time). To compute sleep duration from actigraphic records, the total number of minutes spent sleeping per valid day, according to epochs coded as "sleep", was divided by the total number of valid days to compute an average sleep duration. Marino and colleagues' (2013) review attests that actigraphic sleep duration in field and workplace settings is a measure comparable to polysomnography.

*Actigtraphic sleep quality***.** Wake after sleep onset (WASO) is a measure of actigraphic sleep quality. WASO is the amount of time, in minutes, spent awake during a period of nocturnal sleep. To calculate WASO, the total number of "wake" counts coded during a sleeping period per valid day was divided by the total number of valid days to compute an average WASO score. Greater WASO scores indicate poorer sleep quality (i.e., more time spent awake during a sleeping period). Actigraphic WASO has also been deemed valid in field and workplace studies (Marino et al., 2013).

Spouse-reported relationship strain. To investigate employees' behaviors at home, a 5-item spouse-/partner-reported measure of relationship strain was used. The original spouse support and strain measure was used in the Midlife in the United States Study (e.g., MIDUS; Grzywacz & Marks, 1999) but only the strain measure was used in the present study ($\alpha = .83$). Items assess the extent to which participants perceive their partner causes strain in the relationship (e.g., "How much does he/she argue with you?" and "How much does he/she criticize you"; see Appendix G). Response options are on a 4-point scale (1= *Not at all*; 4 = *A*

lot) such that higher scores represent greater perceptions of relationship strain from spouses and partners, and lower scores reflect more positive employee behaviors.

Relationship satisfaction. To understand attitudinal home outcomes, employees' satisfaction in their romantic relationship was assessed. A 10-item measure of marital and family satisfaction was shortened to a 3-item measure for the purpose of only including marital satisfaction items (Huston et al., 1986; $\alpha = .78$). Participants were asked to describe their level of satisfaction with their spouse in the prior month (e.g., "How satisfied are you with how the two of you divide housework such as cooking, cleaning, yard work, and so on?"; see Appendix H). Response options are on a 5-point scale (1 = *Extremely dissatisfied*; 5 = *Extremely satisfied*), in which higher scores reflect greater relationship satisfaction.

Control Variables. Below describes a list of control variables selected according to theory and past research as described in Spector and Brannick's (2011) discussion of the use of statistical control variables (see Appendix I). Accordingly, control variables that are potentially related to variables of interest were selected as a way to control for alternative explanations of relationships in the model. Spector and Brannick (2011) discuss potential issues related to contamination and spuriousness that third variables can have on variables of interest. Contamination occurs when a third variable influences the accuracy of how substantive variables in a model are measured. Spuriousness, on the other hand, occurs when variables of interest are related because of an underlying relationship with a third variable. In the present study, all control variables (except for the intervention indicator) were selected because they theoretically can influence spurious relationships between variables of interest. Finally, in line with recommendations made by Spector and Brannick (2011), all analyses were performed both with and without control variables to determine their effect and appropriateness of inclusion.

Demographic controls. Racial and ethnic minority groups typically have poorer sleep than Caucasians (e.g., Hale & Do, 2007), therefore, employee race was dichotomized as white and nonwhite were controlled for. Gender was also controlled for because women have been shown to have better sleep quality (e.g., Goel, Kim, & Lao, 2005) and quantity (e.g., Burgard & Ailshire, 2013) compared to men, though it is noted that these differences vary across the life course (Burgard & Ailshire, 2013). Further, there may be differences in home-related outcomes, such as behaviors, due to gender roles in romantic relationships (e.g., traditional versus egalitarian). Additionally, because there are known age-related changes in sleep, particularly that with increasing age sleep architecture becomes fragmented and is characterized by frequent awakenings throughout the night (e.g., Neikrug & Ancoli-Israel, 2010), age was also controlled for.

Work-related controls. Work hours were controlled for given that prior research has linked work hours with sleep outcomes (e.g., Åkerstedt, 2003; Åkerstedt & Wright, 2009; Landrigan et al., 2004). Work hours may also be related to home outcomes, because greater number of hours at work can reduce available time to spend with partners at home. In addition, because jobs demands may differ for nurses depending on the shift they work, work schedules were controlled for. Finally, the WFHS implemented a randomized-controlled trial intervention aimed at increasing schedule control and family supportive supervisor behaviors. However, because the intervention is not a substantive variable of interest for the present study, the effects of the intervention were controlled for.

Family-related controls. People with caregiving responsibilities have less time available for sleep (APA, 2012). Further, parental status has also been related to relationship satisfaction

(e.g., Lawrence, Rothman, Cobb, Rothman, & Bradbury, 2008), and can be related to behaviors towards partners as well. Therefore, number of children was controlled for.

Analytic Strategy

Data Cleaning and Preliminary Analyses

Given that data were utilized from a larger study, relevant data from multiple waves and sources were merged to create the final dataset for this study. Prior to regression analyses, data were thoroughly examined and assessed for missing values and/or errors. Mean imputed scale scores (computed if 75% or more of the items per scale were present) were created for each variable that had two or more items, and listwise deletion scale scores were used for two-item measures. The use of mean imputed scale scores is standard in the WFHS because the attrition rate within each wave was low (i.e., typically less than 2% of item-level missingness). All statistical assumptions were checked, descriptive statistics were computed to assess measures of central tendency and variability, and psychometric tests were conducted to identify the validity and reliability of measures by conducting CFAs and computing Cronbach's alpha for each measure. Bivariate correlations were examined to determine descriptive relationships among all study variables.

Multilevel modeling. Multilevel modeling was considered because nurses and CNAs were nested within 30 distinct nursing home facilities. Additionally, multilevel modeling is advantageous because it can estimate random effects to identify correlations among Level 1 variables (e.g., Bauer, Preacher, and Gil, 2006). In other words, estimating random effects allows for effects to vary at random within individual nursing home facilities, rather than assuming effects are fixed across individuals within each of the distinct nursing home facilities. Specifically, multilevel modeling allows intercepts (means) and slopes (relationships amongst predictors and outcomes) to vary within the higher-level facilities.

To account for the nested data, intraclass correlation coefficients (ICCs) were computed to determine whether multilevel modeling should be used in the analyses. The ICC values ranged from 0 to .05, with an average ICC value of .02 across study variables. Given the low ICC values, there was limited evidence that there was shared variance within nursing home facilities to warrant the use of multilevel modeling. Despite the low ICC values, I still attempted multilevel modeling as a conservative approach, as the likelihood of making a Type I error is reduced when using multilevel modeling. All assumptions of multilevel modeling were checked (e.g., normality, linearity, homoscedasticity) as outlined in Tabachnik and Fidell's (2013) and Bauer and colleagues' (2006) work. However, several of these multilevel models (i.e., CFAs, regression analyses, structural equation modeling analyses) did not converge. Due to the lack of convergence and the low ICC values, all reported analyses were conducted with standard ordinary least squares (OLS) techniques.

Hypothesis Testing

Direct effects. OLS multiple regression analyses were performed in SAS version 9.4 to assess relationships amongst work demands, work resources, sleep, and partner-related outcomes at home. All analyses were conducted with and without the inclusion of control variables (e.g., Spector & Brannick, 2011), though there were no substantive differences in the results. To test the first set of hypotheses, measures of sleep quantity and sleep quality at 6-months were regressed on baseline contextual work demands and contextual work resources. Specifically, to test *hypothesis 1* measures of 6-month sleep quantity were regressed on baseline psychological job demands and measures of 6-month sleep quantity were regressed on baseline psychological job demands. To test *hypothesis 2a* measures of 6-month sleep quantity were regressed on baseline decision authority and measures of 6-month sleep quality were regressed on baseline

decision authority. For *hypothesis 2b*, measures of 6-month sleep quantity were regressed on baseline schedule control and measures of 6-month sleep quality were regressed on baseline schedule control. Next, to test *hypothesis 3,* 12-month spouse-reported relationship strain was regressed on 6-month sleep quantity and 12-month spouse-reported relationship strain was regressed on 6-month sleep quality. For *hypothesis 4*, 12-month relationship satisfaction was regressed on 6-month sleep quantity and 12-month relationship satisfaction was regressed on 6-month sleep quality.

Indirect effects. Sobel's (1982) methods were used to test indirect effects of work demands and resources on home outcomes through sleep quality and quantity. This method has multiple advantages over the traditional mediation method proposed by Baron and Kenny (1986). Baron and Kenny's (1986) step-wise approach requires a significant relationship between a predictor and an outcome in order to test for mediation. Due to this, when using Baron and Kenny's (1986) approach, there is low power and, relatedly, also a higher likelihood of making a Type II error. On the other hand, the Sobel (1982) approach does not require a significant relationship between a predictor and an outcome to test for mediation. Instead, the Sobel (1982) approach tests for indirect effects by determining the significance of the product of the direct effects (i.e., the predictor to the mediator, and then mediator to the outcome). Thus, under the Sobel (1982) approach, there is higher power and a reduced likelihood of making a Type II error.

Using this method, *hypothesis 5a* tested measures of 6-month sleep quantity as mediators in the relationship between baseline psychological job demands and 12-month spouse-reported relationship strain, and measures of 6-month sleep quality as mediators in the relationship between baseline psychological job demands and 12-month spouse-reported relationship strain. *Hypothesis 5b* tested measures of 6-month sleep quantity as mediators in the relationship

between baseline psychological job demands and 12-month relationship satisfaction, and measures of 6-month sleep quality as mediators in the relationship between baseline psychological job demands and 12-month relationship satisfaction. *Hypothesis 5c* tested measures of 6-month sleep quantity as mediators in the relationship between baseline decision authority and 12-month spouse-reported relationship strain, and measures of 6-month sleep quality mediators in the relationship between baseline decision authority and 12-month spouse-reported relationship strain. *Hypothesis 5d* tested measures of 6-month sleep quantity as mediators in the relationship between baseline decision authority and 12-month relationship satisfaction, and measures of 6-month sleep quality as mediators in the relationship between baseline decision authority and 12-month relationship satisfaction. *Hypothesis 5e* tested measures of 6-month sleep quantity as mediators in the relationship between baseline schedule control and 12-month spouse-reported relationship strain, and measures of 6-month sleep quality as mediators in the relationship between baseline schedule control and 12-month spouse-reported relationship strain. Lastly, *Hypothesis 5f* tested measures of 6-month sleep quantity as mediators in the relationship between baseline schedule control and 12-month relationship satisfaction, and measures of 6-month sleep quality as mediators in the relationship between baseline schedule control and 12-month relationship satisfaction.

Results

Data Management and Assumption Checking

First, missing data within scales were examined. For baseline measures, there was 0.07-1.64% of missing data within scales, and for baseline control variables there was 0-0.33% of missing data. At 6-months, there was 0.24% of missing data within scales, and 7.10% of missing actigraphy data. Finally, at 12-months, there was 0-35.27% of missing data within scales. All analyses were run with listwise deleted scales and mean imputed scales, but because there were no substantive differences in the results, all reported analyses used mean imputed scales. For correlations, SAS version 9.4 employs a pairwise deletion method, and in OLS regression analyses, SAS handles missing data via listwise deletion (i.e., cases are excluded from analyses if they are missing on any of the variables in the model).

To identify univariate outliers, frequency distributions and histograms were assessed. There were four outliers on the work hours control variable and eight outliers on the self-reported sleep quantity variable. For work hours, participants who worked less than 12 hours or more than 72 hours per week were identified as outliers. For self-reported sleep quantity, participants who slept more than 15 hours per night were considered outliers. These outliers were removed, and new variables with the outliers excluded were created and used in all analyses. To identify multivariate outliers, scatterplots of pairs of variables were assessed. No multivariate outliers were identified. Next, histograms and scatterplots (i.e., of relationships and residuals) were used to check the assumptions of linear regression - normality, linearity, homoscedasticity, and independence of errors. There was no evidence for non-linearity, heteroscedasticity, or non-independence of errors.

Regarding skew, the psychological job demands measure was moderately negatively skewed, spouse-reported relationship strain was substantially positively skewed, and relationship satisfaction was moderately negatively skewed. To address this, new transformed versions of these variables were created according to Tabachnick and Fidell's (2013) recommendations (i.e., a reflect and square root transformation was applied to psychological job demands and relationship satisfaction, and a logarithmic transformation was applied to spouse-reported relationship strain) and used in all reported analyses. Following the transformations, the distributions of these variables appeared more normal, and skewness and kurtosis statistics were improved. Of note is that for transformations that were reflected, the direction of the interpretation is reversed (e.g., Tabachnick & Fidell, 2013). For this reason, all reported data (i.e., correlations and relationships amongst variables) are already reversed in-text and in the tables to aid in interpretability. All analyses were run with and without transformations for a conservative approach to analyzing the data, and there were no substantial differences in the results. Finally, multicollinearity was assessed by examining the correlations amongst the independent variables. Although significantly correlated in the expected directions (see Table 1), the correlations were small to moderate in size (i.e., a range of .10 to .36), and therefore did not provide evidence of multicollinearity (e.g., Tabachnick & Fidell, 2013).

Psychometric tests. For all psychometric tests, the following fit statistics were considered (Yu, 2002; Hu & Bentler, 1999): χ^2 statistic (greater than .05 indicates good model fit), CFI (greater than or equal to .95 indicates good model fit), TLI (greater than or equal to .95 indicates good model fit), RMSEA (less than or equal to .06 indicates good model fit), and SRMR (less than or equal to .08 indicates good model fit). I followed Raykov and Marcoulides'

(2011) suggestion that factor loadings greater than .40 were sufficient, with higher factor loadings being preferable.

Confirmatory factor analyses. Before testing the study hypotheses, I conducted CFAs for all measures with at least four items, because 3-item measures are always just identified (i.e., enough data to run analyses, but not enough to accurately determine model fit), and two-item measures are always under identified (i.e., not enough data to run analyses). OLS CFAs were performed to establish that the items were loading onto one common factor (i.e., construct validity).

Schedule control. A single-factor CFA was performed to assess the internal structure of the 8-item schedule control measure. Initially, only SRMR (.03) provided evidence of model fit. Further, most of the residuals were large (i.e., greater than 1.0), and the factor loadings for four out of the eight items were below .40. To address these issues, I checked modification indices and implemented changes based on theory. Based on the modification indices, I decided to remove item 5 ("how much choice do you have over doing some of your work at home or at another location, instead of at your organization?") and item 7 ("How much choice do you have over the amount or times you take work home with you?"), as these had the highest covariance, and were both related to working from home – which is not relevant to a sample of nurses and CNAs based on theory. Therefore, I believe that the reason participants were responding differently to these two items is because there was high residual covariance (i.e., shared error variance). For these reasons, I dropped both item 5 and item 7. Once these two items were dropped, the 6-item version of the schedule control measure had sufficient model fit; $\chi^2(8) = 19.40$, $p < .01$, CFI = .90, TLI = .98, RMSEA = .03, and SRMR = .02. Although the chi-square test of model fit was significant, this fit statistic is greatly influenced by sample size and

significant values are not uncommon (e.g., Yu, 2002). The factor loadings for this modified measure of schedule control were still low, as only three of the six items were greater than .40. However, this modification significantly improved the model fit ($\Delta \chi^2 = 635.93$, $p < .01$). As a result of this modification (i.e., dropping items 5 and 7), a new 6-item schedule control measure was created and used in all analyses.

Spouse-reported relationship strain. A single-factor CFA was performed to assess the internal structure of the 5-item spouse-reported relationship strain measure. The model fit statistics for this measure were sufficient; $\chi^2(5) = 5.56$, $p = .09$, CFI = .98, TLI = .96, RMSEA = .07, and SRMR = .03. Further, the factor loadings were similar and high (all greater than 6.10).

Statistical Analyses

Descriptive statistics. Descriptive statistics and correlations among study variables are provided in Table 1. Of the proposed control variables, race, gender, age, work hours, condition, and number of children were included in the analyses. Despite originally proposing work schedule and length of time married or living with a spouse/partner as control variables, they were decidedly removed from analyses after further reflection and investigation of results. Specifically, work schedule and time married were not significant predictors in the analyses. Further, these control variables were removed for theoretical reasons. Spector and Brannick (2011) describe that statistical controls should not be potential outcomes of variables of interest, therefore, work schedule and length of time married or living with a spouse/partner were removed as they were considered the least theoretically plausible control variables.

Bivariate correlations demonstrated that psychological job demands were significantly and positively associated with sleep insufficiency and insomnia symptoms, but not significantly associated with self-reported sleep quantity, actigraphic sleep duration, or actigraphic WASO.

Decision authority was significantly and positively associated with self-reported sleep quantity, and significantly and negatively associated with sleep insufficiency, but not with insomnia symptoms, actigraphic sleep duration, or actigraphic WASO. Schedule control was significantly and positively associated with self-reported sleep quantity, and significantly and negatively associated with sleep insufficiency, but not with insomnia symptoms, actigraphic sleep duration, or actigraphic WASO. None of the work-related variables, or sleep variables, were significantly correlated with the home outcomes, though relationship satisfaction and spouse-reported relationship strain were significantly and negatively correlated with each other.

Test of hypotheses.

Psychological job demands on sleep quantity and sleep quality. As shown in Table 2, my results indicate that psychological job demands at baseline did not predict self-reported sleep quantity (B = -0.19, $t(1254)$ = -1.13, p = .26), or actigraphic sleep duration at 6-months (B = 8.74, $t(954)$ = 1.14, p = .25). As shown in Table 3, psychological job demands at baseline significantly and positively predicted sleep insufficiency (B = .28, $t(1263)$ = 2.76, p = .01) and insomnia symptoms (B = 0.19, $t(1262)$ = 2.17, p = .03), but not actigraphic WASO (B = -3.03, $t(954)$ = -1.22, p = .22). Therefore, hypothesis 1 was only partially supported; although psychological job demands significantly predicted measures of sleep quality (i.e., greater sleep insufficiency and insomnia symptoms), psychological job demands did not predict an actigraphic measure of sleep quality (i.e., WASO), or measures of sleep quantity.

Decision authority on sleep quantity and sleep quality. As shown in Table 4, my results indicate that decision authority at baseline significantly and positively predicted 6-month self-reported sleep quantity (B = 0.17, $t(1247)$ = 2.98, $p < .01$), but did not significantly predict 6-month actigraphic sleep duration (B = 1.90, $t(948)$ = 0.70, p = .48). As shown in Table 5,

decision authority significantly and negatively predicted 6-month sleep insufficiency (B = -0.12, t(1256) = -3.33, p < .01), but did not significantly predict insomnia symptoms (B = -0.02, t(1255) = -.50, p = .62) or actigraphic WASO (B = -0.79, t(948) = -0.89, p = .37). Therefore, hypothesis 2a was partially supported; there is evidence that greater decision authority significantly predicted greater self-reported sleep quantity and reduced sleep insufficiency, but decision authority did not significantly predict actigraphic sleep duration, insomnia symptoms, or actigraphic WASO.

Schedule control on sleep quantity and sleep quality. As displayed in Table 4, schedule control at baseline significantly and positively predicted 6-month self-reported sleep quantity (B = 0.17, t(1237) = 3.14, p < .01), but did not significantly predict 6-month actigraphic sleep duration (B = -3.88, t(943) = -1.57, p = .12). As shown in Table 5, schedule control significantly and negatively predicted 6-month sleep insufficiency (B = -0.08, t(1246) = -2.27, p = .02), but did not significantly predict insomnia symptoms (B = -0.05, t(1245) = -1.81, p = .07) or actigraphic WASO (B = -1.30, t(943) = -1.63, p = .10). Therefore, hypothesis 2b was also partially supported; schedule control significantly predicted greater self-reported sleep quantity and reduced sleep insufficiency, but schedule control did not significantly predict actigraphic sleep duration, insomnia symptoms, or actigraphic WASO.

Taken together, both of the work resources had a significant positive influence on self-reported sleep quantity and sleep insufficiency, though they were unrelated to insomnia symptoms, or actigraphic measures of sleep quantity and quality.

Sleep quantity and sleep quality on spouse-reported relationship strain. As displayed in Tables 6 and 7, measures of 6-month sleep quantity and sleep quality were not significant predictors of 12-month spouse-reported relationship strain (self-reported sleep duration: B = -

0.01, $t(168) = -0.69$, $p = .49$; actigraphic sleep quantity: $B = -0.00$, $t(153) = -0.42$, $p = .67$; sleep insufficiency: $B = 0.00$, $t(175) = 0.09$, $p = .93$; insomnia symptoms: $B = 0.01$, $t(175) = 0.80$, $p = .43$; actigraphic WASO: $B = 0.00$, $t(153) = 0.39$, $p = .69$). Therefore, hypothesis 3 was not supported.

Sleep quantity and quality on relationship satisfaction. As displayed in Tables 8 and 9, measures of 6-month sleep quantity and sleep quality were not significant predictors of 12-month relationship satisfaction (self-reported sleep quantity: $B = -0.01$, $t(131) = -0.35$, $p = .73$; actigraphic sleep duration: $B = -0.00$, $t(107) = -0.92$, $p = .36$; sleep insufficiency: $B = -0.01$, $t(131) = -0.23$, $p = .82$; insomnia symptoms: $B = -0.03$, $t(131) = -0.92$, $p = .36$; actigraphic WASO: $B = -0.00$, $t(107) = -0.91$, $p = .36$)). Therefore, hypothesis 4 was not supported.

Mediating effects of sleep quantity and quality. Mediation analyses were conducted through the use of Sobel tests of indirect effects. There was no evidence of indirect effects; measures of sleep quantity and sleep quality did not mediate the relationships between work demands and resources and partner-specific home outcomes. As such, hypothesis 5a-5f were not supported.

Supplemental Analyses

A number of supplemental analyses were also conducted[1] (see Appendix J).

Discussion

In this study, I tested sleep quantity and quality as linking mechanisms between contextual work demands and resources and behavioral and attitudinal home outcomes for employees and their partners. This study contributes to our understanding of how experiences at work and at home are related to employees' sleep. In addition, an aim of this study was to reconsider the way sleep is studied; instead of being primarily assessed as a predictor or an outcome variable, sleep quantity and quality were viewed as mediators.

Overall, I found that job demands at baseline had a negative relation with measures of sleep quality (i.e., self-reported sleep insufficiency and insomnia symptoms) 6 months later, but did not predict self-reported or actigraphic sleep quantity. Further, work resources – decision authority and schedule control – at baseline had a positive relation with measures of both sleep quantity (i.e., self-reported sleep quantity) and sleep quality (i.e., self-reported sleep insufficiency). However, there was no empirical support that work demands and resources influenced actigraphic sleep quantity and quality, and sleep variables at 6-months did not predict partner-specific home outcomes at 12-months. Finally, there was no empirical evidence that self-reported or actigraphic sleep quantity and quality at 6-months mediated relationships between job demands and resources at baseline and partner-specific outcomes at 12-months.

Theoretical and Methodological Implications

This work tested the work-home resources model (Ten Brummelhuis & Bakker, 2012), with employees' sleep quantity and quality being assessed as the mediating personal resources that connect the contextual work demands and resources they experience to outcomes with their romantic partners. The results of this study lend partial support to the tenets of this theory;

whereas work-related demands and resources did influence employees' personal resources of sleep quantity and quality, there were no subsequent effects on later attitudinal and behavioral outcomes at home. One possible reason for these lack of effects is the small sample size at 12-months, which increases the likelihood of making a Type II error. Another reason that significant effects were not detected can be attributed to the skewed outcome variables. Although the outcome variables were transformed to reduce the severity of the skew, overall, most people reported high relationship satisfaction, and their partners reported low relationship strain. Thus, the sample primarily represented employees and partners with a positive perspective of their relationship. One explanation for this is that people who are not satisfied in their relationships, or who experience high levels of strain from their partner, would otherwise be divorced or separated (and would not have participated in this survey). This reduced variance in the outcome measures could explain the lack of significant results. While my results suggest that sleep quantity and quality are not linking mechanisms that connect work experiences and partner-specific outcomes at home, it is possible that this theory would be better supported if different home outcomes were considered (e.g., relationships with children, other relatives, or friends).

Many of the results from the present study confirm findings from past research. For instance, these results suggest that psychological job demands have a negative relation with self-reported sleep quality, which has been shown in prior work (e.g., de Lange et al., 2009; Sekine et al., 2006). Although I also tested whether sleep quantity would be influenced by psychological job demands, which has not been examined in prior work, my results did not support this hypothesis. Demanding work environments may be disruptive to sleep quality, perhaps due to ruminative thoughts near bedtime about these work-related stressors (e.g., Cropley et al., 2006), but may not disrupt the average amount of time someone sleeps. Additionally, my results align

with prior studies which found that resources of decision authority and schedule control are related to improved self-reported sleep quality (e.g., Knudsen et al., 2007; Takahashi et al., 2012). I also found that decision authority was related to greater self-reported sleep quantity as well – an effect that has not been reported in previous literature. The relation between perceived schedule control and greater self-reported sleep quantity has been previously found and was replicated in the present work (e.g., Moen et al., 2011).

One finding from the present study was discrepant with what has been found in past research. The supplemental analyses revealed that participants who reported receiving more sleep on average exhibited fewer OCBs, which is contrary to Barnes and colleagues' (2013) findings. It is possible that this opposite effect was due to the present study being comprised of a sample of nurses and CNAs, whereas Barnes and colleagues sampled participants from a broad range of occupations. Perhaps obtaining more sleep enabled the participants in the present study to focus on their specific job tasks rather than spending time going beyond these tasks to help others or the organization. The work performed by nurses and CNAs requires frequent direct patient care, and patient-specific responsibilities may be more critical than contextual (e.g., helping) behaviors in this occupation. Future research could investigate occupation as a moderator in the relationship between sleep and work-related outcomes like OCBs.

A theoretical strength of this study is the consideration of shiftworking nurses and CNAs, because shiftworkers are especially vulnerable to sleep problems (e.g., Akerstedt, 2003) and because nurses and CNAs experience heightened work-related stressors (e.g., Hutchinson et al., 2006), and work-family issues (e.g., Grzywacz et al., 2006). Further, studying this population addresses concerns that research in the fields of I-O and OB are over-representative of managerial occupations (e.g., Casper et al., 2007). A deeper understanding of the experiences of

nurses and CNAs has implications for the development of intervention strategies targeted specifically for shiftworkers.

Methodologically, the use of self-reported and actigraphic measures of sleep is another strength of this study. As shown in Table 1, the correlations between actigraphic and self-reported measures of sleep were small to moderate, suggesting that participants' perception of the amount and quality of their sleep did not strongly correspond with the objective actigraphic measures. In Marino and colleagues' (2013) validation study of actigraphy, participants simultaneously wore an actigraphic device and polysomnographic (PSG) equipment, and the researchers compared the scoring of wake and sleep between the two methods. The results indicate that although actigraphy has high sensitivity (i.e., actigraphy correctly classified sleep in comparison to PSG), it has lower specificity (i.e., correctly classifying wake). In light of this methodological shortcoming, it is possible that wake that occurred after participants initially fell asleep (i.e., WASO) was not always detected (e.g., Sadeh, 2011). Thus, the small to moderate correlations between self-reported and actigraphic sleep could be due to the algorithm rather than to inaccurate reporting of sleep experiences by participants. These discrepancies may help explain why effects were found with self-reported measures, but not actigraphic measures of sleep. This suggests that when investigating effects of work-related experiences on sleep, self-reported measures (i.e., subjective appraisals) of sleep may be better able to detect effects than actigraphic measures of sleep. However, it is also possible that effects were only found with self-reported sleep because of common method variance (e.g., Podsakoff et al., 2003).

Practical Implications

In light of the aforementioned theoretical implications, this study has practical implications as well. For instance, because psychological job demands were found to have a

negative relation with self-reported sleep insufficiency and insomnia symptoms, reducing psychological job demands could improve workers' sleep quality. One way to achieve this would be by allowing employees more time to complete their work, as this would decrease their perceptions that they have inadequate time and that they have to work hard and fast to meet job requirements. Although certain patient care responsibilities cannot be completed at a reduced pace, certain job tasks, like paperwork or maintenance, can reasonably have more flexibility. Alternatively, increasing the number of workers in a work unit can reduce workloads and mitigate perceptions of job demands. However, increasing the number of employees can be financially burdensome to healthcare organizations, so another option would be to use strategic scheduling. For instance, shiftwork can be redesigned to yield the best sleep outcomes for employees, such as reducing quick changeovers (i.e., short periods between shifts), reducing the number of consecutive shifts worked, and providing places where employees can nap onsite (e.g., Åkerstedt, 2003).

Finally, because work resources were found to be facilitative to self-reported sleep, organizations could also aim to change workplace policies and norms to increase perceptions of schedule control, or decision authority in how work demands are met. Notably, Mark, Lindley, and Jones (2009) found that favorable working conditions for nurses, such as autonomy and decision-making, do not increase costs for healthcare organizations. Results from this study did not provide evidence that sleep quantity and quality were related to outcomes at home, thus, it is unclear whether intervening on employees' sleep would produce favorable outcomes at home with their partners.

Limitations and Future Research

There are a number of limitations of the present study and avenues for future research. First, there are limitations related to the psychometric properties of some of the study variables. Specifically, all of the baseline measures of work demands and resources had low internal consistency reliability, as indicated by the low Cronbach's alpha values, which were below .70 (see Table 1). Given that Cronbach's alpha is influenced by sample size, one reason for low reliability coefficients could be that the job demands and decision authority measures had only three-items. Additionally, it is possible that the homogeneity of the nursing sample reduced the reliability coefficients. Further, the schedule control measure did not have sufficient model fit until two items were removed, and the factor loadings for this measure were low. Therefore, although the specified single-factor structure fit the schedule control data, some of the items (e.g., "how much choice do you have over shifting to a part-time schedule (or full-time if currently part-time) while remaining in your current position if you wanted to do so?") were not closely related to the underlying common factor.

Additionally, though the use of 6-month time lags between average levels of predictors, mediators, and outcome variables serves to test downstream effects as outlined by Halbesleben and colleagues (2014), it is possible that some effects were not detected due to the length of the time lags. In the present study, I employed 6-month time lags to assess how processes amongst work, sleep, and home unfold over time, but recognize that sleep also varies day-to-day. Therefore, future research that assesses these processes with shorter between-person time lags, or at the daily-level would be fruitful.

For example, participants could wear actigraph devices for two weeks and report on their prior night of sleep each morning, while reporting on work-related experiences (e.g., perceptions

of demands, decision authority, and schedule control) and home-related experiences (e.g., perceptions of relationship satisfaction or behavior towards family members) at the end of each work day. This could elucidate how daily work-related demands and resources influence employees' sleep, and how their sleep influences their life at home the following day (see Ohly et al., 2010 for a review of diary studies in organizational research). Relatedly, these processes could also be examined with experience sampling methodology (ESM) by having participants report on work experiences, perceptions of fatigue, and home experiences, at multiple pre-determined times throughout a workday. Then, these daily experiences could be examined alongside daily reports of sleep or with the use of actigraph devices (see Beal, 2015 for a review of ESM in organizational research). Further, as commercial sleep-tracking devices (e.g., FitBits) gain popularity, researchers could request access to this information from participants as a way to offset research costs.

However, these study designs would require consideration of the potential drawbacks regarding the reliability and validity of commercial sleep-tracking devices, and related ethical issues (e.g., Mantua, Gravel, and Spencer, 2016). For instance, although Mantua and colleagues found that commercial sleep-tracking devices are comparable to Actigraphs and PSG for detecting total sleep time, these devices are not comparable for measures of sleep quality, like the length of time it takes to fall asleep. If data collected from sleep-tracking devices are used to provide participants with sleep-related recommendations, or are used in published research, it is imperative that the devices are reliable and valid. Otherwise, inaccurate information could be disseminated to participants and in the research literature. Related to this, all sleep-tracking devices have proprietary components in their algorithm; this "black-box" also presents ethical issues because researchers are not fully aware of how sleep and wake periods are derived from

proprietary algorithms. Lastly, the ways organizations choose to use employees' sleep data can pose ethical issues. For example, because sleep is closely related to health, the use of sleep-related employee information can be in violation to the Health Insurance Portability and Accountability Act (HIPAA).

Moreover, although some researchers have suggested using actigraphy to assess daily processes (e.g., Eatough, Shockley, and Yu, 2016), there is insufficient validity evidence that these devices can be used at the daily-level (e.g., Marino et al., 2013). Only a few articles have used actigraphy in a daily design. For example, Knutson and colleagues (2006) measured daily actigraphic sleep over three consecutive days at one point in time, and then measured sleep over another three consecutive days one year later. These authors found that although sleep characteristics (e.g., duration, latency) were stable when measured over a year, sleep characteristics were highly variable at the daily level. Of note is that in the present study, one week of actigraphy data was collected at each time point, and only data for which there were at least three valid days were used in analyses. A daily design that only includes three days of actigraphy would not be able to use this approach. Therefore, there is a need for future work to conduct validation studies on the use of actigraphy for daily designs.

Further, although both contextual work demands and resources were examined as predictors, some theories suggest that resources not only predict but also moderate relationships between job demands and subsequent outcomes. Interactions between demands and resources have been extensively considered in Karasek's (1979) job demands-control (JD-C) model and Demerouti and colleagues' (2001) job demands-resources (JD-R) model. In the present study, work resources are analyzed as predictors, rather than moderating variables, to fit the propositions outlined in the work-home resources model (Ten Brummelhuis & Bakker, 2012).

However, moderating effects of work resources were explored in supplemental analyses (see Appendix J), though there was no empirical support for buffering effects of decision authority or schedule control on the relationships between psychological job demands and sleep- and home-related outcomes. For this reason, future research could consider other work resources (i.e., social support from supervisors and/or coworkers) as moderators of these relationships. This is in line with Bakker and Demerouti's (2017) 15-year review of the JD-R theory, in which they recommend that researchers consider additional interactions within the JD-R theory (e.g., Demands X Demands) because the effects of multiple demands and/or multiple resources can "accumulate and interact with each other" (Bakker & Demerouti, in press, pg. 278). Relatedly, Budnick and Barber (2017) specifically theorize how JD-R can be applied to employee sleep and propose that feedback loops exist in which sleep also influences the appraisal of job demands and resources; future work could also investigate these ideas.

In addition, Halbesleben and colleagues (2014) argue that researchers should consider how participants value resources, rather than just measuring their availability. For instance, if an employee doesn't value having control over work tasks, then even if they believe they can exert control over how they complete their work, they may choose not to (i.e., the resource of decision authority would not be utilized because it isn't valued). Even when resources are available and valued, they may not be utilized by employees because of organizational norms and/or stigmas. For example, if an organization that offers family-friendly benefits doesn't have a culture that supports the use of these benefits, employees may refrain from using them. Relatedly, Kossek and Lautsch (in press) describe how experiences and outcomes of work-life flexibility practices differ across upper-, middle-, and lower-level occupational groups. For these reasons, future work could consider moderators that influence the effects resources have on outcomes,

including: perceived value of the resources, organizational culture related to the resource, and occupational-level.

Additionally, because Ten Brummelhuis and Bakker (2012) also identify key and macro resources that are theorized to moderate the relationships described in the work-home resources model, future research could also test possible buffering effects of personality or culture. For example, prior work has shown positive associations between agreeableness and sleep quantity and between conscientiousness and sleep quality (e.g., Hintsanen et al., 2014), suggesting that personality traits may moderate relationships between work-related variables and sleep quantity and quality outcomes. It is also plausible that workers in national cultures that are more capitalistic obtain poorer sleep quantity and quality compared to workers in some Spanish and Latin cultures that encourage siestas, or Italian cultures that have riposos, (i.e., mid-day naps or breaks during the work week), so these relationships may also depend on the culture that an organization and its workers are embedded in.

Although a contribution of this study is the sample population of shiftworking nurses and certified nursing assistants, less than 2% of the participants in the nursing home sample of the WFHS worked a night shift schedule because the larger intervention study involved components that were not able to be implemented with night workers. I believe that future research would benefit by studying the potentially unique experiences of night shift employees because these workers experience the most sleepiness during their shifts due to their schedules occurring during low points of their circadian rhythms (e.g., Åkerstedt, 2003).

The rate of attrition across 6-month time lags is another limitation related to the sample used in the present study. There were substantially smaller samples sizes for the 12-month home outcomes (i.e., 134 out of an original 1524 for relationship satisfaction; 184 out of an original

1340 for spouse-reported relationship strain) and lack of statistical power is one possible reason that significant effects were not found with 12-month home outcomes. For these reasons, follow-up analyses were conducted to investigate person-level missingness. First, t-tests were run to assess whether participants who did not respond to the 12-month home survey were different than those who did respond. Then, logistic regressions were conducted to assess whether baseline demographic and work-related variables, and 6-month sleep-related variables predicted whether someone participated in the 12-month home survey. All reported differences reflect significant t-tests and significant logistic regressions.

For relationship satisfaction, missing and non-missing participants were compared based on their demographics, work-related demands and resources, and measures of 6-month sleep quantity and quality. Compared to non-missing participants, those who responded to the 12-month survey had significantly more children and significantly lower job demands. It is possible that people with fewer children may have been less inclined to participate in the 12-month survey related to their home and family life, and/or that higher job demands prevented participants from perceiving that they had enough time to complete the survey. For spouse-reported relationship strain, missing and non-missing participants were compared based on the demographics of their spouse/partner. Compared to non-missing participants, those who responded to the 12-month spouse survey were more likely to have a white spouse/partner. Additionally, the average age of participants' spouses/partners was higher amongst participants who responded; those with younger spouses/partners were more likely to be missing at 12-months. Finally, participants with spouses/partners in the intervention group were more likely to be missing at 12-months than those with spouses/partners in the control group. Taken together, these analyses suggest that the 12-month sample may have been less representative of nurses and

CNAs with fewer children and higher job demands, and may be less representative of spouses/partners in relationships with younger and non-white individuals.

Finally, although there was no empirical evidence that work demands, resources, or sleep influenced outcomes at home amongst employees' and their partners, results from the supplemental analyses demonstrate that work resources influenced attitudinal outcomes (i.e., job satisfaction) in the work domain, and that these relationships were mediated by sleep insufficiency and self-reported sleep quantity. Van Laethem and colleagues' (2013) review of longitudinal and intervention research suggests that changes in decision authority predicts improved sleep quality. However, they did not consider other forms of work-related autonomy, such as schedule control, did not consider sleep quantity, and did not consider subsequent outcomes beyond sleep. In light of the results from the present study, increasing employees' perceived decision authority and schedule control should have a positive impact on both their self-reported sleep quantity and quality, and on their job satisfaction. Relatedly, improving sleep quantity and quality should also lead to increases in employees' job satisfaction as well. It is especially advantageous to intervene at the level of mediating variables when it is not feasible for organizations to provide increased flexibility for their workers.

Indeed, researchers should strive to develop, implement, and evaluate sleep-related workplace interventions. Prior workplace interventions that sought to increase employees' perceived flexibility, autonomy, and social support (e.g., family-specific support), or reduce job demands, have been interested in sleep-related outcomes (e.g., Moen et al., 2011; Olson et al., 2015; Van Laethem and colleagues, 2013). Although, less work has considered sleep-specific workplace interventions. One exception includes Barnes, Miller, and Bostock's (2017) cognitive behavioral therapy intervention for insomnia, in which participants were involved in an online

training to learn how to change their thoughts and behaviors to improve sleep (e.g., using consistent bedtimes). Although Barnes and colleagues (2017) examined work-related outcomes, the intervention occurred at the individual-, rather than the organizational-level. Additionally, this study is an example of a secondary intervention (i.e., aimed at reducing existing stressors).

Therefore, future researchers could develop primary (i.e., preventative) interventions which target organization-level variables that should have a positive influence on employees' sleep. To achieve this, organization-level intervention strategies could include training supervisors to exhibit sleep leadership behaviors (e.g. Gunia, Sipos, Lopresti, & Adler, 2015), establishing norms within the organizational culture that health and sleep are valued (e.g., not condoning employees who claim to have sacrificed sleep to complete work tasks), regulating work hours, especially for shiftwork (Barnes & Drake, 2015), or by providing nap rooms for employees to use during work breaks or between shifts. There is also utility in individual-level interventions, as prior work has found that mindfulness-based training interventions (e.g., Crain, Schonert-Reichl, & Roeser, 2017; Hülsheger, Feinholdt, & Nübold, 2015; Querstret, Cropley, & Fife-Schaw, in press), and educational health promotion programs (e.g., Levenson et al., 2016) have improved participants' sleep. Additionally, teaching employees about sleep hygiene behaviors (e.g., avoiding caffeine and alcohol, reducing bedroom noise, maintaining consistent sleep schedules) may also be valuable, though less is known about the effectiveness of sleep hygiene interventions in healthy, non-clinical populations (e.g., Irish et al., 2015). Finally, the National Institutes of Occupational Safety and Health (NIOSH) developed Total Worker Health® as a strategy to protect and promote worker health, safety, and wellbeing (e.g., Schill & Chosewood, 2013; Anger et al., 2015). Total Worker Health® integrates aspects of

organizational- and individual- level interventions and could therefore be an effective framework to use for a workplace sleep intervention.

Conclusion

Poor sleep is nationwide public health concern that has serious implications for workers, their families, and the organizations they work for. By drawing from the work-home resources model, the present study aimed to identify how contextual work demands and resources are related to employees' self-reported and actigraphic sleep quantity and quality, and how their sleep has a later impact on their attitudes and behaviors at home with their partners. Results from this work demonstrated that although work demands and resources influence self-reported sleep quantity and quality, sleep does not in turn have an impact on employees' relationship satisfaction or how they act towards their partners. However, there is some evidence that work resources predict greater job satisfaction, and that these relationships are mediated by self-reported sleep quantity and quality. Researchers and practitioners in industrial-organizational psychology, occupational health psychology, and related fields should continue to identify ways to create work environments that support healthy employee sleep, and should further investigate how employees' sleep impacts their attitudes and behaviors at home and at work.

Endnote

[1]Although direct effects between baseline predictors and 12-month outcomes were not hypothesized, OLS regressions were run to assess the relations between all baseline variables and all 12-month home and work outcomes, controlling for race, gender, age, number of children, and the condition indicator.

There were no significant direct effects of psychological job demands, decision authority, or schedule control on 12-month relationship satisfaction or spouse-reported relationship strain. There were significant direct effects of baseline work demands and resources on 12-month work-related outcomes. Specifically, there was a significant and negative relation between baseline psychological job demands and 12-month job satisfaction and a significant and positive relation between baseline psychological job demands and 12-month OCBs and safety compliance. Additionally, both baseline decision authority and schedule control had significant and positive relations with 12-month job satisfaction and safety compliance. Taken together, nurses and CNAs who reported more job demands at baseline reported lower job satisfaction, more OCBs, and greater safety compliance one-year later. Further, nurses and CNAs who reported more decision authority and schedule control at baseline reported high job satisfaction and greater safety compliance one-year later.

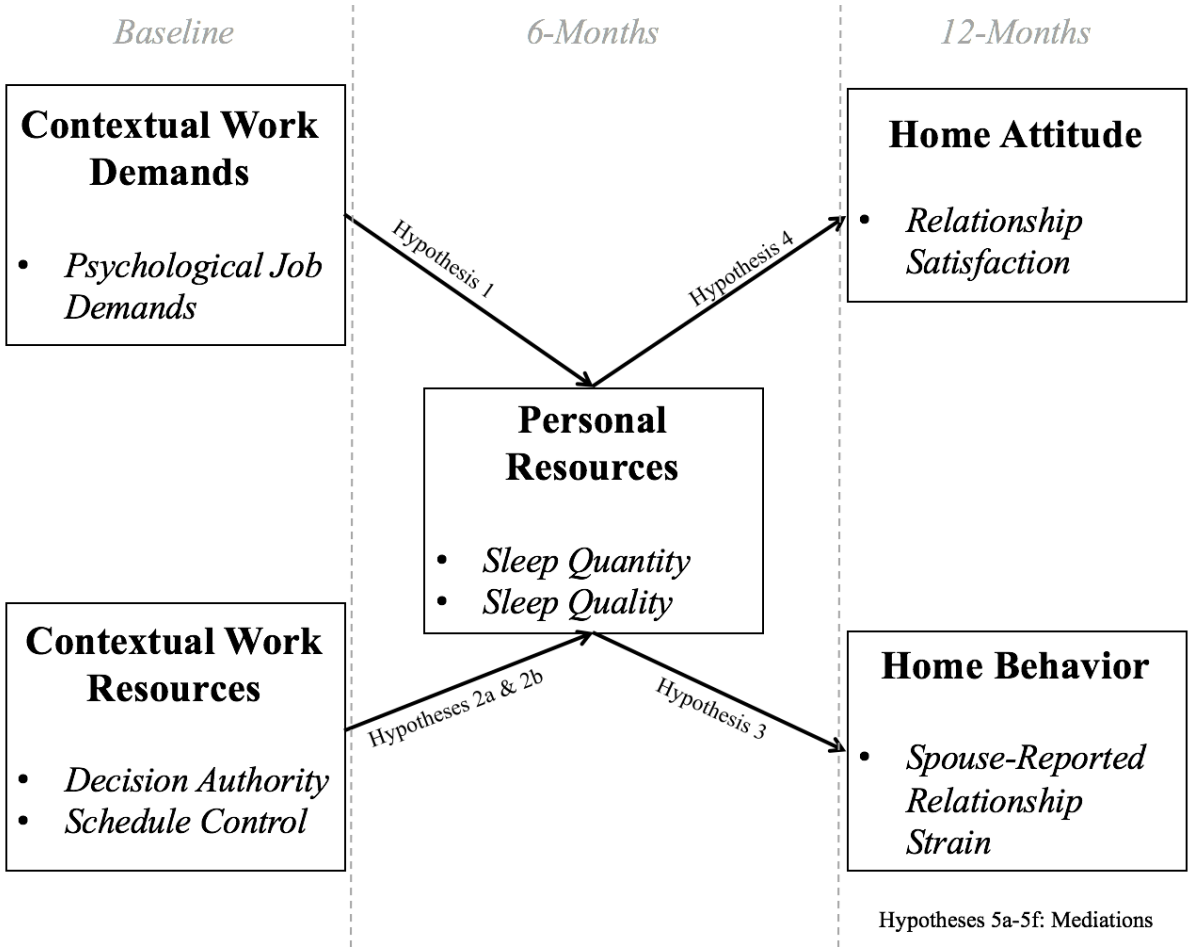

Figure 1. Conceptual Model.

Table 1

Descriptive Statistics and Correlations Among Study Variables

Variable	*N*	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11
1. Race	1524	0.67	0.47											
2. Gender	1524	0.08	0.27	-0.14										
3. Age	1522	38.52	12.48	0.11	-0.05									
4. Work Hours	1519	36.84	6.84	0.03	0.06	0.07								
5. Condition	1524	0.48	0.50	0.02	-0.04	-0.04	-0.06							
6. Number of Children	1523	1.04	1.17	-0.11	-0.08	-0.08	-0.04	-0.03						
7. Psychological Job Demands (B)	1523	1.45	0.26	0.13*	-0.04	-0.03	0.01	0.06*	-0.02	0.63				
8. Decision Authority (B)	1511	3.45	0.76	0.16*	0.02	0.05*	0.10*	-0.02	-0.03	-0.12*	0.55			
9. Schedule Control (B)	1499	2.90	0.79	0.08*	0.00	0.05*	0.07*	0.06*	0.00	-0.10*	0.36*	0.64		
10. S-R Sleep Quantity (6m)	1264	7.26	1.47	0.03	-0.06*	-0.01	-0.02	-0.04	0.10*	-0.03	0.08*	0.08*		
11. Act. Sleep Quantity (6m)	963	7.55	1.10	0.24*	-0.18*	-0.01	-0.09*	0.03	-0.11*	0.06	0.04	-0.04	0.20*	
12. Sleep Insufficiency (6m)	1273	2.99	0.94	-0.01	-0.02	-0.17*	0.00	0.00	0.10*	0.09*	-0.10*	-0.08*	0.22*	-0.02
13. Insomnia Symptoms (6m)	1272	2.84	0.81	0.14*	-0.06*	-0.03	0.01	0.00	-0.04	0.08*	0.01	-0.05	-0.04	0.11*
14. Act. WASO (6m)	963	50.76	19.30	0.04	0.01	0.03	-0.01	-0.01	-0.04	-0.05	-0.04	-0.06	0.14*	0.29*
16. Sp-R Relationship Strain (12m)	184	0.23	0.14	-0.14	0.09	-0.11	-0.15	-0.11	0.09	0.06	-0.15	-0.08	0.09	-0.08
15. Relationship Satisfaction (12m)	134	1.45	0.26	0.09	-0.10	0.11	0.04	-0.10	-0.19*	0.04	0.14	0.10	-0.01	0.02

Note: Psych. Job Demands = Psychological Job Demands. S-R Sleep Quantity = Self-Reported Sleep Quantity Act. Sleep Quantity = Actigraphic Sleep Quantity. Act. WASO = Actigraphic Wake After Sleep Onset. Sp-R Relationship Strain = Spouse-Reported Relationship Strain. Sleep Duration and Act. Sleep Quantity (in hours); Act. WASO (in minutes). Race (1 = White, 0 = Other); Gender (0 = Female, 1 = Male Condition (0 = Control, 1 = Intervention); Psychological Job Demands (transformed scale: 1.0-2.24); Decision Authority (scale: 1-5); Schedule Control (scale: 1-5); Sleep Insufficiency (scale: 1-5); Insomnia Symptoms (scale: 1-4); Spouse-Reported Relationship Strain (transformed scale: 0-.58); Relationship Satisfaction (transformed scale: 1.0-2.24). Measures that have reflected transformations (i.e., Psychological Job Demands and Relationship Satisfaction) have been reversed for interpretability. Cronbach's alpha reliability coefficients are provided on the diagonals.

* $p < .05$.

Table 1 Continued

Descriptive Statistics and Correlations Among Study Variables

Variable	12	13	14	15	16
1. Race					
2. Gender					
3. Age					
4. Work Hours					
5. Condition					
6. Number of Children					
7. Psychological Job Demands (B)					
8. Decision Authority (B)					
9. Schedule Control (B)					
10. S-R Sleep Quantity (6m)					
11. Act. Sleep Quantity(6m)					
12. Sleep Insufficiency (6m)					
13. Insomnia Symptoms (6m)	0.21*				
14. Act. WASO (6m)	0.01	0.29*			
16. Sp-R Relationship Strain (12m)	0.03	-0.09	0.01	0.83	
15. Relationship Satisfaction (12m)	-0.04	-0.02	-0.08	-0.50	0.78

Note: Psych. Job Demands = Psychological Job Demands. S-R Sleep Quantity = Self-Reported Sleep Quantity Act. Sleep Quantity = Actigraphic Sleep Quantity. Act. WASO = Actigraphic Wake After Sleep Onset. Sp-R Relationship Strain = Spouse-Reported Relationship Strain. Sleep Duration and Act. Sleep Quantity (in hours); Act. WASO (in minutes). Race (1 = White, 0 = Other); Gender (0 = Female, 1 = Male Condition (0 = Control, 1 = Intervention); Psychological Job Demands (transformed scale: 1.0-2.24); Decision Authority (scale: 1-5); Schedule Control (scale: 1-5); Sleep Insufficiency (scale: 1-5); Insomnia Symptoms (scale: 1-4); Spouse-Reported Relationship Strain (transformed scale: 0-.58); Relationship Satisfaction (transformed scale: 1.0-2.24). Measures that have reflected transformations (i.e., Psychological Job Demands and Relationship Satisfaction) have been reversed for interpretability. Cronbach's alpha reliability coefficients are provided on the diagonals.

* $p < .05$.

Table 2

Effect of Work Demands on Sleep Quantity

	Outcome					
	Sleep Duration			Act. Sleep Duration		
Predictor	*B*	*SE B*	ß	*B*	*SE B*	ß
Intercept	-7.53***	0.37	0.00	-496.88***	17.38	0.00
Race	-0.03	0.09	-0.01	-28.38***	4.21	-0.21
Gender	0.37*	0.16	0.07	37.33***	7.32	0.16
Age	0.00	0.00	0.03	0.22	0.16	0.04
Work Hours	0.01	0.01	0.02	0.87**	0.29	0.09
Condition	0.14	0.08	0.05	-0.06	3.90	-0.00
Number of Children	0.14***	0.04	0.11	4.68**	1.68	0.09
Psychological Job Demands	-0.19	0.16	-0.03	8.74	7.65	0.04
R2	0.01			0.09		

Note. Psych. Job Demands = Psychological Job Demands (transformed scale: 1.0-2.24). Due to the reflected transformation of the psychological job demands measure, results have been reversed for interpretability.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 3

Effect of Work Demands on Sleep Quality

	Outcome								
	Sleep Insufficiency			Insomnia Symptoms			Act. WASO		
Predictor	*B*	*SE B*	ß	*B*	*SE B*	ß	*B*	*SE B*	ß
Intercept	-3.74***	0.23	0.00	-3.12***	0.20	0.00	-51.05***	5.64	0.00
Race	-0.03	0.06	-0.01	-0.22***	0.05	-0.13	1.30	1.37	0.03
Gender	0.07	0.10	0.02	0.14	0.08	0.05	-0.35	2.37	-0.01
Age	0.01***	0.00	0.16	0.00	0.00	0.05	0.05	0.05	0.03
Work Hours	-0.00	0.00	-0.01	-0.00	0.00	0.01	0.02	0.09	0.01
Condition	0.02	0.05	0.01	0.02	0.05	0.01	0.73	1.27	0.02
Number of Children	-0.06**	0.02	-0.08	0.02	0.02	0.03	0.8	0.54	0.05
Psych. Job Demands	0.28**	0.10	0.08	0.19*	0.09	0.06	-3.03	2.48	-0.04
R^2	0.04			0.02			0.00		

Note. Race (1 = White, 0 = Other); Gender (0 = Female, 1 = Male) Condition (0 = Control, 1 = Intervention); Decision Authority (scale: 1-5); Schedule Control (scale: 1-5). Sleep Insufficiency (scale: 1-5); Insomnia Symptoms (scale: 1-4).

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 4

Effect of Work Resources on Sleep Quantity

	Outcome					
	S-R Sleep Duration			Act. Sleep Duration		
Predictor	*B*	*SE B*	ß	*B*	*SE B*	ß
Decision Authority						
Intercept	7.33***	0.32	0.00	479.24***	14.96	0.00
Race	-0.01	0.09	-0.00	28.06***	4.27	0.21
Gender	-0.37	0.16	-0.07	-37.78***	7.32	-0.16
Age	-0.00	0.00	-0.03	-0.24	0.16	-0.05
Work Hours	-0.01	0.01	-0.03	-0.88**	0.29	-0.09
Condition	-0.14	0.08	-0.05	0.19	3.90	0.00
Number of Children	-0.14***	0.04	-0.11	-4.86**	1.68	-0.09
Decision Authority	0.17**	0.06	-0.09	1.90	2.71	0.02
R^2	0.02			0.09		
Schedule Control						
Intercept	7.36***	0.30	0.00	491.13***	14.10	0.00
Race	0.01	0.09	0.00	29.28***	4.24	0.22
Gender	-0.39*	0.16	-0.07	-36.97***	7.39	-0.16
Age	-0.00	0.00	-0.03	-0.20	0.16	0.04
Work Hours	-0.01	0.01	-0.03	-0.81**	0.29	-0.09
Condition	-0.16	0.08	-0.05	0.64	3.93	0.01
Number of Children	-0.13***	0.04	-0.10	-4.54**	1.69	-0.09
Schedule Control	0.17**	0.05	0.09	-3.88	2.47	-0.05
R^2	0.02			0.09		

Note. S-R Sleep Duration = Self-Reported Sleep Quantity. Act. Sleep Duration = Actigraphic Sleep Duration. S-R Sleep Duration and Act. Sleep Duration (in hours). Race (1 = White, 0 = Other); Gender (0 = Female, 1 = Male) Condition (0 = Control, 1 = Intervention); Decision Authority (scale: 1-5); Schedule Control (scale: 1-5).
* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 5

Effect of Work Resources on Sleep Quality

	Outcome								
	Sleep Insufficiency			Insomnia Symptoms			Act. WASO		
Predictor	*B*	*SE B*	ß	*B*	*SE B*	ß	*B*	*SE B*	ß
Decision Authority									
Intercept	3.64***	0.20	0.00	2.87***	0.17	0.00	57.92***	4.88	0.00
Race	0.07	0.06	0.04	0.24***	0.05	0.14	-1.38	1.39	-0.03
Gender	-0.07	0.10	-0.02	-0.14	0.09	-0.05	0.42	2.39	0.01
Age	0.01***	0.00	-0.16	-0.00	0.00	-0.05	-0.04	0.05	-0.03
Work Hours	0.00	0.00	0.02	0.00	0.00	0.01	-0.02	0.10	-0.01
Condition	-0.01	0.05	0.00	-0.01	0.05	-0.01	-0.72	1.27	-0.02
Number of Children	0.07**	0.02	0.08	-0.02	0.02	-0.03	-0.84	0.55	-0.05
Decision Authority	-0.12***	0.04	-0.09	-0.02	0.03	-0.01	-0.79	0.88	-0.03
R^2	0.04			0.02			0.00		
Schedule Control									
Intercept	3.50***	0.19	0.00	2.96***	0.17	0.00	59.12***	4.55	0.00
Race	0.06	0.06	0.03	0.24***	0.05	0.14	-1.48	1.37	-0.04
Gender	-0.06	0.10	0.02	-0.13	0.09	-0.04	0.36	2.38	0.00
Age	-0.01***	0.00	-0.16	-0.00	0.00	-0.05	-0.04	0.05	-0.03
Work Hours	0.00	0.00	0.02	0.00	0.00	0.01	-0.02	0.09	-0.01
Condition	-0.00	0.05	-0.00	-0.01	0.05	-0.01	-0.78	1.27	-0.02
Number of Children	0.06**	0.02	0.08	-0.02	0.02	-0.03	-0.85	0.54	-0.05
Schedule Control	-0.08*	0.03	-0.06	-0.05	0.03	-0.05	-1.30	0.80	-0.05
R^2	0.03			0.02			0.00		

Note. Act. WASO = Actigraphic Wake After Sleep Onset. Act. WASO (in minutes). Race (1 = White, 0 = Other); Gender (0 = Female, 1 = Male) Condition (0 = Control, 1 = Intervention); Decision Authority (scale: 1-5); Schedule Control (scale: 1-5); Sleep Insufficiency (scale: 1-5); Insomnia Symptoms (scale: 1-4).

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 6

Effect of Sleep Quantity on Spouse-Reported Relationship Strain

	Outcome		
	Spouse-Reported Relationship Strain		
Predictor	*B*	*SE B*	ß
S-R Sleep Quantity			
Intercept	0.30**	0.10	0.00
Race	-0.03	0.03	-0.09
Gender	0.04	0.05	0.07
Age	-0.00	0.00	-0.05
Work Hours	-0.00	0.00	-0.02
Condition	0.03	0.02	0.10
Number of Children	0.02	0.01	0.14
S-R Sleep Duration	-0.01	0.01	-0.05
R^2	0.03		
Act. Sleep Quantity			
Intercept	0.29*	0.13	0.00
Race	-0.01	0.03	-0.04
Gender	0.04	0.05	0.07
Age	-0.00	0.00	-0.07
Work Hours	-0.00	0.00	-0.02
Condition	0.04	0.02	0.12
Number of Children	0.02*	0.01	0.18
Act. Sleep Quantity	-0.00	0.00	-0.04
R^2	0.04		

Note. S-R Sleep Quantity = Self-Reported Sleep Quantity. Act. Sleep Duration = Actigraphic Sleep Duration. Sleep Duration and Actigraphic Sleep Duration (in hours). Race (1 = White, 0 = Other); Gender (0 = Female, 1 = Male) Condition (0 = Control, 1 = Intervention); Spouse-Reported Relationship Strain (transformed scale: transformed scale: 0-.58). Due to the reflected transformation of the spouse-reported relationship strain measure, results have been reversed for interpretability.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 7

Effect of Sleep Quality on Spouse-Reported Relationship Strain

	Outcome		
	Spouse-Reported Relationship Strain		
Predictor	*B*	*SE B*	ß
Sleep Insufficiency			
Intercept	0.26**	0.09	0.00
Race	-0.03	0.03	-0.08
Gender	0.05	0.05	0.07
Age	-0.00	0.00	-0.05
Work Hours	0.00	0.00	-0.02
Condition	0.03	0.02	0.10
Number of Children	0.02	0.01	0.15
Sleep Insufficiency	0.00	0.01	0.01
R^2	0.02		
Insomnia Symptoms			
Intercept	0.23**	0.08	0.00
Race	-0.03	0.03	-0.09
Gender	0.05	0.05	0.08
Age	-0.00	0.00	-0.05
Work Hours	0.00	0.00	-0.02
Condition	0.03	0.02	0.11
Number of Children	0.02	0.01	0.14
Insomnia Symptoms	0.01	0.01	0.06
R^2	0.03		
Act. WASO			
Intercept	0.23*	0.10	0.00
Race	-0.02	0.03	-0.04
Gender	0.05	0.05	0.08
Age	-0.00	0.00	-0.06
Work Hours	-0.00	0.00	-0.01
Condition	0.04	0.02	0.12
Number of Children	0.02*	0.01	0.19
Act. WASO	0.00	0.00	0.03
R^2	0.04		

Note. Actigraphic WASO = Actigraphic Wake After Sleep Onset. Actigraphic WASO (in minutes). Race (1 = White, 0 = Other); Gender (0 = Female, 1 = Male) Condition (0 = Control, 1 = Intervention); Sleep Insufficiency (scale: 1-5); Insomnia Symptoms (scale: 1-4); Spouse-Reported Relationship Strain (transformed scale: transformed scale: 0-.58). Due to the reflected transformation of the spouse-reported relationship strain measure, results have been reversed for interpretability.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 8

Effect of Sleep Quantity on Relationship Satisfaction

	Outcome		
	Relationship Satisfaction		
Predictor	*B*	*SE B*	ß
S-R Sleep Duration			
Intercept	-1.97***	0.27	0.00
Race	0.07	0.05	0.13
Gender	-0.12	0.09	-0.12
Age	0.01	0.00	0.17
Work Hours	0.01	0.00	-0.16
Condition	0.07	0.05	0.14
Number of Children	-0.01	0.02	-0.02
S-R Sleep Duration	-0.01	0.02	-0.03
R^2	0.04		
Act. Sleep Quantity			
Intercept	-1.63***	0.31	0.00
Race	0.06	0.05	0.12
Gender	-0.12	0.09	-0.15
Age	0.00	0.00	0.09
Work Hours	0.01	0.00	0.16
Condition	0.06	0.05	0.12
Number of Children	-0.02	0.02	-0.08
Act. Sleep Quantity	-0.00	0.00	-0.10
R^2	0.01		

Note. S-R Sleep Quantity = Self-Reported Sleep Quantity. Act. Sleep Duration = Actigraphic Sleep Duration. Sleep Duration and Actigraphic Sleep Duration (in hours). Race (1 = White, 0 = Other); Gender (0 = Female, 1 = Male) Condition (0 = Control, 1 = Intervention); Relationship Satisfaction (transformed scale: transformed scale: 1.0-2.24). Due to the reflected transformation of the relationship satisfaction measure, results have been reversed for interpretability.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 9

Effect of Sleep Quality on Relationship Satisfaction

	Outcome		
	Relationship Satisfaction		
Predictor	*B*	*SE B*	ß
Sleep Insufficiency			
Intercept	-1.99***	0.26	0.00
Race	0.07	0.05	0.13
Gender	-0.11	0.08	-0.11
Age	0.01	0.00	0.16
Work Hours	0.01	0.00	0.17
Condition	0.07	0.05	0.14
Number of Children	-0.00	0.02	-0.02
Sleep Insufficiency	-0.01	0.03	-0.02
R^2	0.04		
Insomnia Symptoms			
Intercept	-1.98***	0.24	0.00
Race	0.08	0.05	0.14
Gender	-0.11	0.08	-0.12
Age	0.01	0.00	0.18
Work Hours	0.01*	0.00	0.17
Condition	0.07	0.05	0.13
Number of Children	-0.00	0.02	-0.02
Insomnia Symptoms	-0.03	0.03	-0.08
R^2	0.04		
Act. WASO			
Intercept	-1.71***	0.27	0.00
Race	0.04	0.05	0.08
Gender	0.12	0.09	-0.15
Age	0.00	0.00	-0.10
Work Hours	0.01	0.00	0.14
Condition	0.06	0.05	0.12
Number of Children	-0.01	0.02	-0.06
Act. WASO	-0.00	0.00	-0.09
R^2	0.01		

Note. Actigraphic WASO = Actigraphic Wake After Sleep Onset. Actigraphic WASO (in minutes). Race (1 = White, 0 = Other); Gender (0 = Female, 1 = Male) Condition (0 = Control, 1 = Intervention); Sleep Insufficiency (scale: 1-5); Insomnia Symptoms (scale: 1-4); Relationship Satisfaction (transformed scale: transformed scale: 1.0-2.24). Due to the reflected transformation of the relationship satisfaction measure, results have been reversed for interpretability.
* $p < .05$. ** $p < .01$. *** $p < .001$.

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Appendix A: Psychological Job Demands

(From JCQ; Karasek et al., 1998)

The next set of statements will ask about your experience of the day-to-day functions of your job.

1. You do not have enough time to get your job done.
2. Your job requires very fast work.
3. Your job requires very hard work.

Note: Items were rated on a 1 to 5 scale. 1 = Strongly Disagree, 2 = Disagree, 3 = Neither, 4 = Agree, 5 = Strongly Agree.

Appendix B: Decision Authority

(From JCQ; Karasek et al., 1998)

The next set of statements will ask about your experience of the day-to-day functions of your job.

1. Your job allows you to make a lot of decisions on your own
2. On your job, you have very little freedom to decide how you do your work.
3. You have a lot of say about what happens on your job.

Note. Items were rated on a 1 to 5 scale. 1 = Strongly Disagree, 2 = Disagree, 3 = Neither, 4 = Agree, 5 = Strongly Agree.

Appendix C: Schedule Control

(From Thomas & Ganster, 1995)

The first few questions are going to ask about your perceived control over your work schedule. Please answer thinking about what you feel or believe is realistic for you, in your job.

1. How much choice do you have over when you take vacations or days off?
2. How much choice do you have over when you can take off a few hours?
3. How much choice do you have over when you begin and end each work day?
4. How much choice do you have over the total number of hours you work each week?
5. How much choice do you have over doing some of your work at home or at another location, instead of at your organization?
6. How much choice do you have over the number of personal phone calls you make or receive while you work?
7. How much choice do you have over the amount or times you take work home with you?
8. How much choice do you have over shifting to a part-time schedule (or full-time if currently part-time) while remaining in your current position if you wanted to do so?

Note. Items were rated on a 1 to 5 scale. 1 = Very little, 2 = Little, 3 = A moderate amount, 4 = Much, 5 = Very much. Items 5 and 7 were removed from the analyses based on the results from the CFA.

Appendix D: Self-Reported Sleep Quantity

(From PSQI; Buysse et al., 1989)

1. Over the past four weeks, what time did you usually turn the lights off and go to sleep? Please tell me the hour and minutes of the day, for example 8:30 pm.
2. Over the past four weeks, what time did you usually get out of bed? Please tell me the hour and minutes of the day, for example 8:30 am.

Appendix E: Self-Reported Sleep Insufficiency

(From Buxton et al., 2009; Buxton et al., 2012)

1. How often during the past four weeks did you get enough sleep to feel rested upon waking up? Would you say never, rarely, sometimes, often or very often?

Note. Items were rated on a 1 to 5 scale. 1 = Very Often, 2 = Often, 3 = Sometimes, 4 = Rarely, 5 = Never.

Appendix F: Self-Reported Insomnia Symptoms

(From PSQI; Buysse et al., 1989)

1. During the past four weeks, how often could you not get to sleep within 30 minutes? Would you say never, less than once a week, once or twice a week, or three or more times a week?
2. During the past four weeks, how often did you wake up in the middle of the night or early morning? Would you say never, less than once a week, once or twice a week, or three or more times a week?

Note. Items were rated on a scale 1 to 4 scale. 1 = Never, 2 = Less than once a week, 3 = Once or twice a week, 4 = Three or more times a week.

Appendix G: Spouse-Reported Relationship Strain

(From MIDUS; Grzywacz & Marks, 1999)

For the next questions, think about the past month and tell me how well each statement describes your spouse by saying not at all, a little, some, or a lot.

1. Do you feel your spouse/partner makes too many demands on you?
2. Does he/she argue with you?
3. Does he/she make you feel tense?
4. Does he/she criticize you?
5. Does he/she get on your nerves?

Note. Items were rated on a 1 to 4 scale. 1 = Not at all, 2 = A little, 3 = Some, 4 = A lot.

Appendix H: Relationship Satisfaction

(From Huston et al., 1986)

The next section is about your spouse/partner. I would like you to describe your level of satisfaction with your spouse/partner during the past month.
How satisfied are you with…

1. How understanding your spouse/partner is about your work situation?
2. How the two of you divide housework such as cooking, cleaning, yard work, and so on?
3. How the two of you divide the tasks of taking care of your child/children?

Note. Items were rated on a 1 to 5 scale. 1 = Extremely dissatisfied, 2 = Dissatisfied, 3 = Neither satisfied nor dissatisfied, 4 = Satisfied, 5 = Extremely Satisfied.

Appendix I: Control Variables

How would you describe your race? Please select all that apply.

0 = NONWHITE
1 = WHITE

What is your gender?

0 = FEMALE
1 = MALE

How old are you?

YEARS OLD

About how many hours do you work in a typical week in this job?

HOURS

Condition

0 = CONTROL
1 = INTERVENTION

How many children live in your home for 4 or more days a week?

NUMBER

Appendix J: Supplemental Analyses

Although not proposed in my initial thesis document, I requested work outcomes from the WFHN that would theoretically align with the nonwork outcomes, and explored supplemental analyses at the request of my committee. These work outcomes included organizational citizenship behaviors (OCBs), safety compliance, and job satisfaction (see Appendices K–M for measures). OCBs and safety compliance reflect behavioral outcomes in the work domain (i.e., measures of contextual and task performance), and job satisfaction reflects an attitudinal outcome in the work domain. These new outcomes were considered in a model identical to my proposed thesis model; measures of self-reported and actigraphic sleep quantity and sleep quality were assessed as predictors of work-related outcomes, and job demands and resources were considered as predictors, mediated by sleep quantity and quality, in predicting these work-related outcomes. Additionally, I tested moderating effects of work resources on the relationships among work demands, sleep quantity and quality, and work-related outcomes.

Similar data management and assumption checking procedures were performed. There was a range of 0-0.46% of missing data on the work-related outcome scales. All work outcomes were skewed, so they were transformed according to the recommendations outlined in Tabachnick and Fidell (2013). Specifically, the OCBs measure was moderately negatively skewed, the safety compliance measure was substantially negatively skewed, and job satisfaction was substantially negatively skewed. Therefore, a reflect and square root transformation was applied to the OCBs measure, and a reflect and logarithm transformation was applied to the safety compliance and job satisfaction measures. New transformed variables were created and used in all analyses.

Psychometric tests.

Confirmatory factor analyses. Similar to the home outcomes, OLS CFAs were performed on the work-related measures with at least four items.

Organizational Citizenship Behaviors. A single-factor CFA was performed on the four-item measure of OCBs. Initial model fit indices were moderate, but not sufficient; $\chi^2(2) = 30.17$, $p < .01$, CFA = .97, SRMR = .03. The factor loadings ranged from .50 to .78. I covaried item 1 ("To what extent do you help other employees with their work when they have been absent?") and item 2 (To what extent do you help your coworkers when they have too much to do?") according to the modification indices report, and based on theory, as these items reflected actually working for, or in place of, other coworkers, whereas the other items were related to answering questions for coworkers and working harder to help the employer succeed. After items 1 and 2 were covaried, the model fit statistics were significantly ($\Delta \chi^2 = 19.40$, $p < .01$) improved; $\chi^2(1) = 10.77$, $p < .01$, CFI = .99, RMSEA = .09, and SRMR = .01. The factor loadings after the modification remained sufficient (i.e., all were greater than .56).

Safety Compliance. A single-factor CFA was also performed on the four-item measure of safety compliance. The model fit statistics provided evidence of sufficient model fit; $\chi^2(2) = 30.58$, $p < .01$, CFI = .99, TLI = .98, and SRMR = .01. Further, all factor loadings were high (i.e., greater than .60).

Reliability. Cronbach's alpha reliability coefficients were computed for each of the work outcome variables. The reliability estimate for the organizational citizenship behavior scale was $\alpha = .74$; for the safety compliance scale was $\alpha = .91$; and for the job satisfaction scale was $\alpha = .83$. Overall, the work outcome measures had acceptable internal consistency reliability.

Descriptive and regression analyses. Descriptive statistics and correlations between variables are shown in Table 10. Psychological job demands were significantly and positively associated with OCBs and safety compliance, and significantly and negatively associated with job satisfaction. Decision authority was significantly and positively correlated with safety compliance and job satisfaction, and was not significantly correlated with OCBs. Schedule control was also significantly and positively correlated with safety compliance and job satisfaction, and was not significantly correlated with OCBs. Self-reported sleep quantity was significantly and negatively correlated with OCBs, and was not significantly correlated with safety compliance or job satisfaction. Sleep insufficiency was significantly and negatively correlated with job satisfaction, and was not significantly correlated with OCBs or safety compliance. Insomnia symptoms were not significantly correlated with any of the work outcomes. Actigraphic sleep duration was significantly and positively correlated with OCBs, and was not significantly correlated with safety compliance or job satisfaction. Actigraphic WASO was not significantly correlated with any of the work outcomes. Amongst work outcomes, OCBs, safety compliance, and job satisfaction were all significantly and negatively correlated with each other.

In addition, I ran OLS regression analyses to test the relationships amongst the sleep quantity and quality variables, and work-related behavioral and attitudinal outcome variables. Similarly, I predicted that sleep quantity and quality would have favorable effects on these work variables; I expected that 6-month sleep quantity and quality would be positively related to organizational citizenship behaviors, safety compliance, and job satisfaction at 12-months.

Sleep on organizational citizenship behaviors. As displayed in Table 11, self-reported sleep quantity at 6-months significantly and negatively predicted OCBs at 12-months (B = -0.01,

$t(1029) = -2.48$, $p = .01$), but 6-month actigraphic sleep duration did not ($B = 0.00$, $t(804) = 1.73$, $p = .08$). As shown in Table 12, 6-month sleep insufficiency ($B = 0.01$, $t(1037) = 1.36$, $p = 17$), insomnia symptoms ($B = 0.00$, $t(1036) = 0.36$, $p = .72$), and actigraphic WASO ($B = -0.00$, $t(804) = -0.93$, $p = .35$) were not significant predictors of OCBs at 12-months.

Sleep on safety compliance. As shown in Table 13, 6-month self-reported sleep quantity ($B = -0.00$, $t(1030) = -0.21$, $p = .83$) and actigraphic sleep duration ($B = -0.00$, $t(805) = -0.67$, $p = .50$) were not significant predictors of 12-month safety compliance. As depicted in Table 14, 6-month sleep insufficiency ($B = 0.00$, $t(1038) = 0.22$, $p = .83$), insomnia symptoms ($B = 0.01$, $t(1037) = 1.23$, $p = .22$), and actigraphic WASO ($B = -0.00$, $t(805) = -0.31$, $p = .75$) were not significant predictors of 12-month safety compliance.

Sleep on job satisfaction. As demonstrated in Table 15, 6-month self-reported sleep quantity ($B = 0.01$, $t(1030) = 1.77$, $p = .08$) and actigraphic sleep duration ($B = -0.00$, $t(805) = -0.66$, $p = .51$) were not significant predictors of 12-month job satisfaction. As displayed in Table 16, sleep insufficiency at 6-months ($B = -0.01$, $t(1038) = -2.47$, $p = .01$) was a significant predictor of job satisfaction at 12-months, but 6-month insomnia symptoms ($B = -0.00$, $t(1037) = -0.07$, $p = .95$) and actigraphic WASO ($B = 0.00$, $t(805) = 1.07$, $p = .28$) were not significant predictors of 12-month job satisfaction.

Taken together, self-reported sleep quantity at 6-months unexpectedly significantly predicted less OCBs at 12-months, and sleep insufficiency at 6-months significantly predicted lower job satisfaction at 12-months. No other measures of 6-month sleep quantity or quality predicted 12-month OCBs, safety compliance, or job satisfaction.

Mediations. Mediation analyses were conducted through the use of Sobel (1982) tests of mediation to assess whether measures of sleep quantity and sleep quality mediated the effects of

job demands and resources on work-related outcomes. Significant mediating effects were found; 6-month sleep insufficiency mediated the effect of baseline decision authority on 12-month job satisfaction (B = 1.98, SE = 0.00, $p < 0.05$), and 6-month self-reported sleep quantity mediated the effect of baseline schedule control on 12-month job satisfaction (B = 2.16, SE = 0.01, p = 0.03). Further, the mediating effect of 6-month self-reported sleep quantity in the relationship between baseline schedule control and 12-month organizational citizenship behaviors was marginally significant (B = -1.95, SE = 0.00, p = 0.05). No other mediating effects were detected. Taken together, these results demonstrate that more work resources (i.e., decision authority and schedule control) at baseline predicted greater job satisfaction 12-months later, and these effects are explained by the positive effects work resources had on measures of sleep quantity and quality (i.e., reduced insufficiency) 6-months later.

Moderations. Moderated regression analyses were performed to assess whether the work resources – decision authority and schedule control – moderated the relationships between psychological job demands and sleep, sleep and outcomes at home and work, and psychological job demands and outcomes at home and work. All moderated regression analyses were conducted in SAS version 9.4. All predictor variables and moderator variables were grand mean centered and interaction terms were computed. There were no interaction effects of either decision authority or schedule control with psychological job demands on sleep, work, or home outcomes. Thus, the relationships amongst the study variables did not depend on employees' work resources.

Appendix K: Organizational Citizenship Behaviors

(From Lambert, 2000)

The next set of questions will ask about your relationship to other workers at [name of workplace].

1. To what extent do you help other employees with their work when they have been absent?
2. To what extent do you help your coworkers when they have too much to do?
3. To what extent do you help coworkers with questions they have about their work?
4. To what extent are you willing to work harder in order to help your employer succeed?

Note. Items were rated on a 1 to 5 scale. 1 = Never, 2 = Rarely, 3 = Some of the Time, 4 = Most of the Time, 5 = All of the Time.

Appendix L: Safety Compliance

(From Neal, Griffin, & Hart, 2000)

1. You carry out your work in a safe manner.
2. You use all the necessary safety equipment to do your job.
3. You use the correct safety procedures for carrying out your job.
4. You ensure the highest levels of safety when you carry out your job.

Note. Items were rated on a 1 to 5 scale. 1 = Strongly Disagree, 2 = Disagree, 3 = Neither, 4 = Agree, 5 = Strongly Agree.

Appendix M: Job Satisfaction

(From Camman et al., 1979)

The next set of questions will ask about how satisfied you are with your job at [name of workplace].

1. In general, you like working at your job.
2. In general, you are satisfied with your job
3. You are generally satisfied with the kind of work you do in this job.

Note. Items were rated on a 1 to 5 scale. 1 = Strongly Disagree, 2 = Disagree, 3 = Neither, 4 = Agree, 5 = Strongly Agree.

Appendix N: Supplemental Analyses Tables

Table 10

Descriptive Statistics and Correlations Among Supplemental Work-Related Study Variables

Variable	*N*	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11
1. Race	1524	0.67	0.47											
2. Gender	1524	0.08	0.27	-0.14										
3. Age	1522	38.52	12.48	0.11	-0.05									
4. Work Hours	1519	36.84	6.84	0.03	0.06	0.07								
5. Condition	1524	0.48	0.50	0.02	-0.04	-0.04	-0.06							
6. Number of Children	1523	1.04	1.17	-0.11	-0.08	-0.08	-0.04	-0.03						
7. Psychological Job Demands (B)	1523	1.45	0.26	0.13*	-0.04	-0.03	0.01	0.06*	-0.02	0.63				
8. Decision Authority (B)	1511	3.45	0.76	0.16*	0.02	0.05*	0.10*	-0.02	-0.03	-0.12*	0.55			
9. Schedule Control (B)	1499	2.90	0.79	0.08*	0.00	0.05	0.07*	0.06*	0.00	-0.10*	0.36*	0.64		
10. S-R Sleep Quantity (6m)	1264	7.26	1.47	0.03	-0.06*	-0.01	-0.02	-0.04	0.10*	-0.03	0.08*	0.08*		
11. Act. Sleep Quantity (6m)	963	7.55	1.10	0.24*	-0.18*	-0.01	-0.09*	0.03	-0.11*	0.06	0.04	-0.04	0.20*	
12. Sleep Insufficiency(6m)	1273	2.99	0.94	-0.01	-0.02	-0.17*	0.00	0.00	0.10*	0.09*	-0.10*	-0.08*	0.21*	-0.02
13. Insomnia Symptoms (6m)	1272	2.84	0.81	0.14*	-0.06*	-0.03	0.01	0.00	-0.04	0.08*	0.01	-0.05	-0.04	0.11*
14. Act. WASO (6m)	963	50.76	19.30	-0.04	0.01	-0.03	-0.01	-0.01	-0.04	-0.05	-0.04	-0.06	0.14*	0.29*
15. OCBs (12m)	1082	1.40	0.21	0.05	-0.01	-0.04	0.02	0.04	-0.03	0.07*	0.01	0.02	-0.08*	0.07*
16. Safety Compliance (12m)	1083	0.17	0.14	0.04	-0.04	0.01	0.03	0.06*	0.04	0.10*	0.12*	0.11*	-0.01	-0.01
17. Job Satisfaction (12m)	1083	0.25	0.15	0.05	-0.03	0.20*	0.10*	-0.05	0.06*	-0.11*	0.24*	0.16*	0.05	-0.03

Note: S-R Sleep Quantity = Self-Reported Sleep Quantity Act. Sleep Quantity = Actigraphic Sleep Quantity. Act. WASO = Actigraphic Wake After Sleep Onset. S-R Relationship Strain = Spouse-Reported Relationship Strain. OCBs = Organizational Citizenship Behaviors. Sleep Duration and Act. Sleep Quantity (in hours); Act. WASO (in minutes). Race (1 = White, 0 = Other); Gender (0 = Female, 1 = Male); Condition (0 = Control, 1 = Intervention); Psychological Job Demands (transformed scale: 1.0-2.24); Decision Authority (scale: 1-5); Schedule Control (scale: 1-5); Sleep Insufficiency (scale: 1-5); Insomnia Symptoms (scale: 1-4); OCBs (transformed scale: 1.0-2.06); Safety Compliance (transformed scale: 0-0.57); Job Satisfaction (transformed scale: 0-0.70). Measures that have reflected transformations (i.e., Psychological Job Demands, OCBs, Safety Compliance, and Job Satisfaction) have been reversed for interpretability. Cronbach's alpha reliability coefficients are provided on the diagonals.

* $p < .05$.

Table 10 Continued

Descriptive Statistics and Correlations Among Supplemental Work-Related Study Variables

Variable	12	13	14	15	16	17
1. Race						
2. Gender						
3. Age						
4. Work Hours						
5. Condition						
6. Number of Children						
7. Psychological Job Demands (B)						
8. Decision Authority (B)						
9. Schedule Control (B)						
10. S-R Sleep Quantity (6m)						
11. Act. Sleep Quantity (6m)						
12. Sleep Insufficiency(6m)						
13. Insomnia Symptoms (6m)	0.21*					
14. Act. WASO (6m)	0.01	0.12*				
15. OCBs (12m)	0.05	0.03	-0.03	0.74		
16. Safety Compliance (12m)	0.01	0.05	-0.06	-0.27*	0.91	
17. Job Satisfaction (12m)	-0.09*	0.00	0.03	-0.14*	-0.28*	0.83

Note: S-R Sleep Quantity = Self-Reported Sleep Quantity Act. Sleep Quantity = Actigraphic Sleep Quantity. Act. WASO = Actigraphic Wake After Sleep Onset. S-R Relationship Strain = Spouse-Reported Relationship Strain. OCBs = Organizational Citizenship Behaviors. Sleep Duration and Act. Sleep Quantity (in hours); Act. WASO (in minutes). Race (1 = White, 0 = Other); Gender (0 = Female, 1 = Male Condition (0 = Control, 1 = Intervention); Psychological Job Demands (transformed scale: 1.0-2.24); Decision Authority (scale: 1-5); Schedule Control (scale: 1-5); Sleep Insufficiency (scale: 1-5); Insomnia Symptoms (scale: 1-4); OCBs (transformed scale: 1.0-2.06); Safety Compliance (transformed scale: 0-0.57); Job Satisfaction (transformed scale: 0-0.70). Measures that have reflected transformations (i.e., Psychological Job Demands, OCBs, Safety Compliance, and Job Satisfaction) have been reversed for interpretability. Cronbach's alpha reliability coefficients are provided on the diagonals.
* $p < .05$.

Table 11

Effect of Sleep Quantity on Organizational Citizenship Behaviors

	Outcome		
	OCBs		
Predictor	*B*	*SE B*	ß
S-R Sleep Duration			
Intercept	-1.34***	0.06	0.00
Race	0.03*	0.01	0.06
Gender	-0.01	0.02	-0.02
Age	0.00	0.00	-0.04
Work Hours	0.00	0.00	0.02
Condition	0.01	0.01	0.03
Number of Children	-0.00	0.01	-0.02
S-R Sleep Duration	-0.01*	0.00	-0.08
R^2	0.01		
Sleep Quantity			
Intercept	-1.50***	0.08	0.00
Race	0.02	0.02	0.04
Gender	0.01	0.03	0.01
Age	-0.00	0.00	-0.05
Work Hours	0.00	0.00	0.01
Condition	0.02	0.01	0.04
Number of Children	0.00	0.01	0.01
Act. Sleep Quantity	0.00	0.00	0.06
R^2	0.00		

Note. S-R Sleep Quantity = Self-Reported Sleep Quantity. Act. Sleep Duration = Actigraphic Sleep Duration. Sleep Duration and Actigraphic Sleep Duration (in hours). Race (1 = White, 0 = Other); Gender (0 = Female, 1 = Male) Condition (0 = Control, 1 = Intervention); OCBs (transformed scale: 1.0-2.06). Due to the reflected transformation of OCB measure, results have been reversed for interpretability.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 12

Effect of Sleep Quality on Organizational Citizenship Behaviors

	Outcome		
	OCBs		
Predictor	*B*	*SE B*	ß
Sleep Insufficiency			
Intercept	-1.45***	0.05	0.00
Race	0.03	0.01	0.06
Gender	-0.01	0.02	-0.01
Age	-0.00	0.00	-0.03
Work Hours	0.00	0.00	0.02
Condition	0.01	0.01	0.04
Number of Children	-0.00	0.01	-0.02
Sleep Insufficiency	0.01	0.01	0.04
R^2	0.00		
Insomnia Symptoms			
Intercept	-1.43***	0.05	0.00
Race	0.03	0.01	0.06
Gender	-0.01	0.02	-0.01
Age	-0.00	0.00	-0.04
Work Hours	0.00	0.00	0.02
Condition	0.01	0.01	0.03
Number of Children	-0.00	0.01	-0.02
Insomnia Symptoms	0.00	0.01	0.01
R^2	0.00		
Act. WASO			
Intercept	-1.38***	0.05	0.00
Race	0.02	0.02	0.06
Gender	0.00	0.03	0.00
Age	-0.00	0.00	-0.05
Work Hours	0.00	0.00	0.01
Condition	0.02	0.01	0.04
Number of Children	0.00	0.01	0.00
Act. WASO	-0.00	0.00	-0.03
R^2	0.00		

Note. Actigraphic WASO = Actigraphic Wake After Sleep Onset. OCBs = Organizational Citizenship Behaviors. Actigraphic WASO (in minutes). Race (1 = White, 0 = Other); Gender (0 = Female, 1 = Male) Condition (0 = Control, 1 = Intervention); Sleep Insufficiency (scale: 1-5); Insomnia Symptoms (scale: 1-4); OCBs (transformed scale: 1.0-2.06). Due to the reflected transformation of the OCB measure, results have been reversed for interpretability.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 13

Effect of Sleep Quantity on Safety Compliance

	Outcome		
	Safety Compliance		
Predictor	*B*	*SE B*	ß
S-R Sleep Quantity			
Intercept	-0.22***	0.04	0.00
Race	0.01	0.01	0.03
Gender	-0.01	0.02	-0.03
Age	0.00	0.00	0.01
Work Hours	0.00	0.00	0.04
Condition	0.02*	0.01	0.06
Number of Children	0.01	0.00	0.05
S-R Sleep Duration	-0.00	0.00	-0.01
R^2	0.00		
Act. Sleep Quantity			
Intercept	-0.19***	0.05	0.00
Race	0.01	0.01	0.03
Gender	-0.02	0.02	-0.04
Age	-0.00	0.00	-0.02
Work Hours	0.00	0.00	0.03
Condition	0.02*	0.01	0.09
Number of Children	0.00	0.00	0.04
Act. Sleep Quantity	-0.00	0.00	-0.03
R^2	0.00		

Note. S-R Sleep Quantity = Self-Reported Sleep Quantity. Act. Sleep Duration = Actigraphic Sleep Duration. Sleep Duration and Actigraphic Sleep Duration (in hours). Race (1 = White, 0 = Other); Gender (0 = Female, 1 = Male) Condition (0 = Control, 1 = Intervention); Safety Compliance (transformed scale: transformed scale: 0-0.57). Due to the reflected transformation of the safety compliance measure, results have been reversed for interpretability.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 14

Effect of Sleep Quantity on Safety Compliance

	Outcome		
	Safety Compliance		
Predictor	*B*	*SE B*	ß
Sleep Insufficiency			
Intercept	-0.23***	0.03	0
Race	0.01	0.01	0.03
Gender	-0.02	0.02	-0.03
Age	0.00	0.00	0.01
Work Hours	0.00	0.00	0.03
Condition	0.02*	0.01	0.06
Number of Children	0.01	0.00	0.05
Sleep Insufficiency	0.00	0.00	0.01
R^2	0.00		
Insomnia Symptoms			
Intercept	-0.24***	0.03	0
Race	0.01	0.01	0.03
Gender	-0.02	0.02	-0.03
Age	0.00	0.00	0.01
Work Hours	0.00	0.00	0.03
Condition	0.02*	0.01	0.06
Number of Children	0.01	0.00	0.05
Insomnia Symptoms	0.01	0.01	0.04
R^2	0.00		
Act. WASO			
Intercept	0.21***	0.04	0
Race	0.01	0.01	0.02
Gender	-0.02	0.02	-0.04
Age	-0.00	0.00	-0.02
Work Hours	0.00	0.00	0.03
Condition	0.02*	0.01	0.09
Number of Children	0.00	0.00	0.04
Act. WASO	-0.00	0.00	-0.01
R^2	0.00		

Note. Actigraphic WASO = Actigraphic Wake After Sleep Onset. Actigraphic WASO (in minutes). Race (1 = White, 0 = Other); Gender (0 = Female, 1 = Male) Condition (0 = Control, 1 = Intervention); Sleep Insufficiency (scale: 1-5); Insomnia Symptoms (scale: 1-4); Safety Compliance (transformed scale: transformed scale: 0-0.57). Due to the reflected transformation of the safety compliance measure, results have been reversed for interpretability.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 15

Effect of Sleep Quantity on Job Satisfaction

	Job Satisfaction		
Predictor	*B*	*SE B*	ß
Self-Reported Sleep Quantity			
Intercept	-0.48***	0.04	0.00
Race	0.01	0.01	0.04
Gender	-0.01	0.02	-0.02
Age	0.00***	0.00	0.19
Work Hours	0.00**	0.00	0.09
Condition	-0.01	0.01	-0.03
Number of Children	0.01**	0.00	0.09
S-R Sleep Duration	0.01	0.00	0.05
R^2	0.05		
Actigraphic Sleep Duration			
Intercept	-0.44***	0.06	0.00
Race	0.02	0.01	0.05
Gender	-0.00	0.02	-0.01
Age	0.00***	0.00	0.20
Work Hours	0.00***	0.00	0.13
Condition	-0.01	0.01	-0.02
Number of Children	0.01*	0.00	0.08
Act. Sleep Duration	-0.00	0.00	-0.02
R^2	0.06		

Note. S-R Sleep Quantity = Self-Reported Sleep Quantity. Act. Sleep Duration = Actigraphic Sleep Duration. Sleep Duration and Actigraphic Sleep Duration (in hours). Race (1 = White, 0 = Other); Gender (0 = Female, 1 = Male) Condition (0 = Control, 1 = Intervention); Job Satisfaction (transformed scale: 0-0.70). Due to the reflected transformation of the job satisfaction measure, results have been reversed for interpretability.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 16

Effect of Sleep Quality on Job Satisfaction

	Job Satisfaction		
Predictor	*B*	*SE B*	ß
Sleep Insufficiency			
Intercept	-0.39***	0.04	0.00
Race	0.01	0.01	0.04
Gender	-0.01	0.02	-0.02
Age	0.00***	0.00	0.18
Work Hours	0.00**	0.00	0.09
Condition	-0.01	0.01	-0.03
Number of Children	0.01**	0.00	0.09
Sleep Insufficiency	-0.01*	0.01	-0.08
R^2	0.06		
Insomnia Symptoms			
Intercept	-0.43***	0.04	0.00
Race	0.01	0.01	0.04
Gender	-0.01	0.02	-0.02
Age	0.00***	0.00	0.19
Work Hours	0.00**	0.00	0.09
Condition	-0.01	0.01	-0.03
Number of Children	0.01**	0.00	0.09
Insomnia Symptoms	-0.00	0.01	-0.00
R^2	0.05		
Actigraphic WASO			
Intercept	-0.49***	0.04	0.00
Race	0.01	0.01	0.04
Gender	-0.00	0.02	-0.00
Age	0.00***	0.00	0.20
Work Hours	0.00***	0.00	0.13
Condition	-0.01	0.01	-0.02
Number of Children	0.01*	0.00	0.08
Act. WASO	0.00	0.00	0.04
R^2	0.06		

Note. Actigraphic WASO = Actigraphic Wake After Sleep Onset. Actigraphic WASO (in minutes). Race (1 = White, 0 = Other); Gender (0 = Female, 1 = Male) Condition (0 = Control, 1 = Intervention); Sleep Insufficiency (scale: 1-5); Insomnia Symptoms (scale: 1-4); Job Satisfaction (transformed scale: 0-0.70). Due to the reflected transformation of the job satisfaction measure, results have been reversed for interpretability.
* $p < .05$. ** $p < .01$. *** $p < .001$.