July 2019

Understanding the Mechanisms Between Job Stress and Employee Sleep: A Daily Diary Study

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Understanding the Mechanisms Between Job Stress and Employee Sleep: A Daily Diary Study

by

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A dissertation submitted in partial fulfillment
of the requirements for the degree of
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Dedication

This thesis is dedicated to Dr. Marcus Arvan, my husband, best friend, and dearest colleague. If not for the tireless love, patience, and encouragement he has given me over the years, this dissertation would not exist. It is also dedicated to my family, including my parents, sisters, and in-laws. Thank you for believing in me, and inspiring me, always.

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Abstract

The present study investigated how three job stressors, workload, unfinished tasks, and mistreatment from coworkers and supervisors, manifest in sleep impairment. Using the transactional model of stress, allostatic load model, the cognitive activation theory of stress (CATS), and findings from the sleep medicine literature, each job stressor was predicted to have three distinct pathways to sleep quality: an affective path (anger or anxiety), a cognitive path (anticipatory stress or rumination), and a behavioral path (sleep hygiene behaviors). The proposed models argued for two-stage mediation, in which the cognitive and affective strains of job stressors impact sleep quality both directly and indirectly through the mediating role of sleep hygiene behaviors. Hypotheses were tested in a sample of 140 university staff employees in a daily diary study conducted over the course of two work weeks. Multilevel structural equation modeling supported direct paths between the three job stressors and theoretically appropriate cognitive and affective mediators, and a strong direct effect between sleep hygiene behaviors and sleep quality. However, direct relationships between cognitive and affective mediators and sleep hygiene behaviors were not supported. The mediating hypotheses also failed to receive support. Overall, the study highlights the value of studying theoretically appropriate mechanisms between unique job stressors and sleep impairment, and points to the importance of sleep hygiene behaviors to promote adequate sleep quality in nonclinical employee samples. Future research should attempt to elucidate the time frame in which these effects occur, and investigate potential moderators that increase or attenuate employees' likelihood of engaging in poor sleep hygiene behaviors as a response to job stress.

Chapter One:

Introduction

Sleep plays a critical role in physiological functioning, health and well-being. Indeed, sleep deprivation has been found to predict impaired cognitive and motor performance (Williamson & Feyer, 2000), obesity (Knutson, Spiegel, Penev, & Van Cauter, 2007), coronary heart disease (Ayas et al., 2003), and mortality (Gallicchio & Kalesan, 2009). Based on a review of nearly 1,300 studies, the American Academy of Sleep Medicine and Sleep Research Society recently came to the consensus that adults require at least 7 hours of sleep per night to support optimal health and functioning (Panel et al., 2015). However, more than one in every three American adults fall short of this recommendation (Centers for Disease Control and Prevention [CDC], 2017), leading some to describe insufficient sleep as an emerging public health crisis (Barnes & Drake, 2015).

In addition to its health implications for individuals, sleep impairment has critical consequences for organizations, including a higher frequency of occupational injuries (Kao, Spitzmueller, Cigularov, & Wu, 2016), poorer job performance, and greater healthcare costs (Hui & Grandner, 2015). Employees with insomnia symptoms are also more likely to report unpleasant experiences at work, such as difficulty concentrating, mood-related problems (e.g., impatience, boredom), and falling asleep at work (Swanson et al., 2011). Given these engagement, performance, and financial concerns, organizational scholars have taken an increasing interest in the issue of deficient employee sleep, and have begun exploring how the workplace influences the etiology of sleep impairment.

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It is accurate to characterize the scientific literature on job stress and sleep as being in its initial stages (e.g., Mullins, Cortina, Drake, & Dalal, 2014). Consequently, there are currently far more questions than answers regarding the specific job stressors and mechanisms that predict sleep impairment. One of the most significant unanswered questions in the literature concerns the mechanisms through which job stressors impair sleep. Research on the potential pathways through which job stressors influence employee sleep is extremely limited, and the few existing within-person studies often present contradictory findings (Sonnentag, Casper, & Finck, 2016; Fritz & Crain, 2016). The presently ill-defined processes linking job stress and sleep impairment has stymied work on potential interventions to improve employee sleep (Fritz & Crain, 2016). Similarly, there is little consensus on the kinds of daily job stressors that influence employee sleep, and only a limited number of stressors have been studied (Sonnentag et al., 2016).

The goal of the current study is to add clarity to the literature by testing a comprehensive framework through which stressful experiences on the job can manifest in insufficient and poor-quality sleep. The study will test various affective, cognitive, and behavioral mechanisms through which commonly-experienced work stressors, including workload, unfinished tasks, and mistreatment from supervisors and coworkers, manifest in sleep impairment. Rumination and anticipatory stress, two forms of perseverative cognition, will be examined as cognitive mechanisms, anxiety, and anger will be examined as affective mechanisms, and sleep hygiene behaviors will be examined as a behavioral mechanism through which work stressors impair sleep quality. The proposed study therefore aims to make several important contributions to the literature on job stress and sleep, including a better understanding of the types of job stressors that influence employee sleep, the mechanisms and time frames through which sleep impairment

occurs, and the role of a behavioral mechanism that may be particularly relevant for future intervention research: sleep hygiene behaviors.

This introduction begins by briefly defining sleep as it is conceptualized and operationalized in the current study. It next discusses the topic of work and sleep, with a particular emphasis on the job stress and sleep literature. The following section draws upon the transactional model of stress, the allostatic load model, and cognitive activation theory to argue that the three specific job stressors examined in this study (i.e., workload, unfinished tasks, and mistreatment from coworkers and supervisors) predict impaired sleep through distinct affective (anxiety and anger), cognitive (rumination and anticipatory stress), and behavioral (sleep hygiene) pathways. Finally, I provide an overview of the current study and discuss its contributions to the job stress and sleep literature.

Sleep

Sleep is an inherently multidimensional construct (Buysee, 2014). A common distinction used in the literature distinguishes sleep quantity from sleep quality (e.g., Barnes, 2012; Mullins et al., 2014). Sleep quantity refers to the total amount of sleep in a 24-hour period (Buysee, 2014). Sleep quality, on the other hand, involves feelings of being rested and alert upon waking and throughout the day, the absence of feeling tired upon waking or throughout the day, and few (or no) instances of awakening during the night (Harvey, Stinson, Whitaker, Moskovitz, & Virk, 2008). A recent meta-analysis from the job stress literature (Litwiller, Snyder, Taylor, & Steele, 2017) supports the distinction between sleep quality and sleep quantity by demonstrating their unique patterns with job stressors and other theoretical antecedents, correlates, and outcomes. Specifically, the authors found that sleep quality had stronger (negative) relationships with perceptual job stressors (e.g., workload) and employee outcomes (e.g., anxiety, depression,

fatigue, and engagement), whereas sleep quantity had stronger (negative) relationships with work and family hours. The sleep medicine literature has found that both forms of sleep impairment or sleep deficiency predict important health outcomes such as mortality, hypertension, coronary heart disease, diabetes, metabolic syndrome, and depression (see Buysee, 2014 for a review). Given that it has demonstrated stronger meta-analytic relationships with job stressors and strains, the present study focuses exclusively on sleep quality.

Work and Sleep

Although insufficient sleep has many environmental, physiological, biological, and psychological causes (Dollander, 2002), research has found that the most commonly-cited cause of sleep impairment is work (e.g., Ancoli-Israel, 1999). Broadly speaking, research on work and sleep has investigated four major topics: work schedules and sleep, working time and sleep, the impact of sleep on work outcomes (e.g., performance), and psychosocial job stress and sleep (Barling, Barnes, Carleton, & Wagner, 2016; Linton et al., 2015). The interplay between work schedules and sleep has received the most attention, followed by the relationship between working time and sleep (Barling et al., 2016). There are also more studies on how sleep impacts work outcomes than there are studies on how work experiences impact sleep (Linton et al., 2015). Thus, within the general literature on work and sleep, the interplay between psychosocial job stress and sleep outcomes is the most understudied topic.

As mentioned previously, the most well-established work-related risk factor for sleep impairment is shift work, which involves working in non-traditional (i.e., nighttime) or rotating schedules (Barnes & Drake, 2015; Drake, Roehrs, Richardson, Walsh, & Roth, 2004). However, the scheduling of work alone cannot account for the high prevalence of sleep deficiency reported among working adults. To illustrate, Luckhaupt, Tak, and Calvert (2010) analyzed the

prevalence of short sleep duration (6 hours of sleep or less per night) in a nationally

representative survey of U.S. employees across industries and found that industries with the

highest prevalence of shift work did not have employees with the highest prevalence of short

sleep duration. The authors also found that sleep deprivation for employees across all industries

had increased over the past two decades, affecting roughly 30% of the employed population,

despite a slight decrease in weekly working hours over that period of time. These trends held

even after controlling for long working hours. Luckhaupt and colleagues' (2010) study has two

important implications for the topic of work and sleep. First, although shift work and long

working hours are important risk factors, there are other pathways through which work can

impair sleep. Second, the high prevalence of sleep impairment across industries demonstrates

that virtually any employee is at risk for deficient sleep. Even in the industry with the lowest

prevalence of short sleep duration, insufficient sleep still affected roughly 1 in every 4

employees. Given these results, the authors highlighted the need for future research investigating

the job characteristics (e.g., stressors) and aspects of the work-nonwork interface (e.g., access to

work-related emails at home) that predict short sleep duration both within and across industries

(Luckhaupt et al., 2010).

Job Stress and Sleep

Occupational stress researchers have long recognized that stressful experiences on the job

can predict sleep impairment as one of many physical strain symptoms (e.g., Spector & Jex,

1998; Nixon, Mazzola, Bauer, Krueger, & Spector, 2011). However, a finer-grained interest in

sleep impairment as a focal outcome of job stress has only emerged quite recently (Sonnentag et

al., 2016). Specifically, in the past decade or so, occupational stress researchers have investigated

the linkages between common workplace stressors and employee sleep. Although much of the

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evidence in this incipient literature comes from cross-sectional findings (e.g., Niedhammer et al., 2009; Hietapakka et al., 2013), a growing number of longitudinal and within-person studies have found that certain job stressors predict both acute and long-term sleep impairment. For instance, chronic low job control was found to predict impaired sleep in a longitudinal study (De Lange et al., 2009), and daily workplace social exclusion was found to predict more fragmented sleep at night in a within-person, daily diary study (Pereira, Meier, & Elfering, 2013).

A meta-analysis of cross-sectional studies by Nixon, Mazzola, Bauer, Krueger, and Spector (2011) reported weighted average correlations between a number of common job stressors and sleep disturbances, including interpersonal conflict ($\bar{r}_w = .22$), organizational constraints ($\bar{r}_w = .17$), workload ($\bar{r}_w = .14$), and a lack of control ($\bar{r}_w = .13$). A more recent meta-analysis by Litwiller and colleagues (2017) found similar effect sizes between workload and sleep quality ($\rho = -.16$), and between perceived control and sleep quality ($\rho = -.19$). Most of the studies included in Litwiller and colleagues' (2017) meta-analysis were also cross-sectional in design. Although these meta-analyses support the link between certain job stressors and sleep impairment, they cannot address the nature of the relationship between these variables. For example, it is possible that sleep-deprived employees experience more stressors because of their impaired mood and performance (i.e., reverse causality), or that chronically sleep-deprived employees simply perceive their work environments more negatively due to negative mood (i.e., the third variable problem).

There is also some meta-analytic evidence on the kinds of job stressors that predict sleep disturbances longitudinally. Specifically, Linton and colleagues (2015) conducted a meta-analysis of 24 prospective or randomized longitudinal studies on job stress and sleep. The strongest evidence was found for a longitudinal predictive relationship between high work

demands and impaired sleep (summary OR = 1.38, k= 6). There was also moderate support for a longitudinal association between effort-reward imbalance and impaired sleep (summary OR= 1.51, k=3). Finally, the authors found moderate support for a longitudinal association between bullying and impaired sleep (based on $k = 3$). However, they did not include the results of another large-scale longitudinal study (Hansen, Hogh, Garde, & Persson, 2014) that did not find a significant association between bullying and subsequent sleep impairment. Overall, meta-analytic evidence indicates that high job demands are associated with an increase in sleep impairment over time, and there is preliminary evidence that injustice perceptions are associated with an increase in subsequent sleep difficulties as well. The results of these longitudinal studies provide important insight into the chronic stressors that can increase an individual's susceptibility to developing sleep problems over time. However, they cannot elucidate the pathways between job stressors and sleep, and they are often difficult to interpret without within-person explanations (e.g., why would high demands predict sleep disturbances one year later unless those demands were experienced on an ongoing basis?).

Task-related Versus Social Stressors. Some scholars have proposed frameworks linking specific types of job stressors to impaired sleep. For example, Mullins and colleagues (2014) draw upon the job demands-control model (JDC; Karasek, 1979) to argue that task-related stressors such as time pressure, workload, and a lack of perceived control, should predict poorer sleep quality and quantity. The JDC model is a heuristic model arguing that employee health and well-being will be the most compromised in "high strain jobs," which are those characterized by high demands (e.g., time pressure, workload, task complexity) and low levels of job control. As evinced by primary studies (e.g., De Lange et al., 2009), reviews (e.g., Mullins et al., 2014), and several meta-analyses (Linton et al., 2015; Litwiller et al., 2017) most existing

research on job stress and sleep has utilized the job demands-control (JDC) model (Karasek, 1979).

A number of longitudinal studies support the idea that task-related stressors (as delineated by the JDC model) predict deficient sleep. For instance, Åkerstedt, Nordin, Alfredsson, Westerholm, and Kecklund (2012) found that increases in work demands were associated with increases in sleep impairment. Similarly, De Lange et al. (2009) found that low job control was associated with an increase in poor sleep quality one year later. Although these longitudinal studies support the idea that task-related stressors are associated with increases in sleep difficulties over time, it is important to note that studies employing within-person, day- or week-level designs are best suited to test and establish predictive relationships between specific job stressors and sleep. Cross-sectional studies can only document cooccurrence, and between-personal longitudinal studies are optimal to rule out some alternative explanations (Sonnentag et al., 2016).

A review of the few within-person studies examining the linkages between task-related stressors and sleep reveals equivocal support for Mullins and colleagues' (2014) hypothesis. One daily diary study established a predictive relationship between workload and impaired sleep quality (Radstaak, Geurts, Beckers, Brosschot, & Kompier, 2014). Another week-level study reported that time pressure experienced over the work week significantly related to impaired sleep over the weekend (Syrek, Weigelt, Peifer, & Antoni, 2017). However, two other day-level studies did not find significant predictive relationships between time pressure and sleep impairment (Pereira, Semmer, & Elfering, 2014) or between workload and sleep impairment (Jones & Fletcher, 1996). Further complicating this pattern of results is the fact that another task-related stressor, unfinished tasks, has been found to significantly predict sleep impairment.

Specifically, two week-level studies (Syrek & Antoni, 2014; Syrek et al., 2017) found that unfinished tasks at the end of the work week predict impaired sleep over the weekend.

A small number of within-person studies have examined other types of stressors in relation to employee sleep. Three studies have found that social stressors (e.g., social exclusion, interpersonal conflict) predict impaired sleep (Periera et al., 2013; Periera, Gross, & Elfering, 2016; Pereira & Elfering, 2014). One of these studies (Periera & Elfering, 2014) also found that illegitimate tasks, or having to perform tasks that employees perceive to be either unreasonable or unnecessary, predicted sleep impairment at night. Sonnentag and colleagues (2016) interpreted these varied findings by suggesting that stressors that present a threat to the self (i.e., social stressors, illegitimate tasks) may have a stronger influence on impaired sleep than task-related stressors, at least at the day- and week-level. Given the limited number of within-person studies, however, more research is necessary in order to draw firmer conclusions about the specific kinds of job stressors that predict sleep impairment.

Mediators Between Job Stress and Sleep. Mediators in the job stress and sleep process are understudied and poorly understood (Sonnentag et al., 2016; Fritz & Crain, 2016). To my knowledge, only a handful of within-person studies have explicitly studied mediating processes between job stress and impaired sleep. These studies have focused exclusively on two cognitive mediators: work-related worries and work-related rumination. Worries and rumination are two related but distinct forms of perseverative thought or cognition (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Worries are future-oriented and focus on anticipated threats, whereas rumination is more past-oriented and focuses on concerns of self-worth (Nolen-Hoeksema et al., 2008). They also have distinct motivational properties: the conscious motive underlying worries is to anticipate and prepare for future threats, whereas the conscious motive underlying

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rumination is to gain insight into the meaning of past negative events (Nolen-Hoeksema et al., 2008).

Support for these cognitions as mediators in the job stress-sleep impairment process is equivocal. For example, Cropley, Dijk, and Stanley (2006) found that rumination did not mediate the relationships between high job strain (i.e., high work demands and low job control) during the day and sleep quality at night, even though high job strain predicted subsequent rumination, and both rumination and high job strain predicted poorer sleep quality at night. Importantly, however, Cropley and colleagues' (2006) rumination measure included one item assessing worries (e.g., "Did you think about future work?"), so it is unclear whether one or both forms of perseverative cognition influenced these findings. Similar results were detected by Pereira and colleagues (2013), who found that after-work worries did not mediate the relationship between daily social exclusion and sleep fragmentation (an indicator of poor sleep quality), even though social exclusion predicted after-work worries, and both social exclusion and after-work worries significantly predicted poorer sleep fragmentation at night.

Conversely, support for the mediating role of perseverative cognition between job stressors and sleep impairment was found in a week-level study by Syrek and colleagues (2017). Specifically, the authors found that rumination over the weekend mediated the relationship between unfinished tasks at the end of the previous work week and sleep impairment over the weekend. However, since rumination and impaired sleep quality were measured simultaneously (i.e., on Monday morning), and respondents had to summarize their sleep quality and rumination over 2.5 days, the results are arguably more vulnerable to recall bias. Finally, Radstaak and colleagues (2014) found that perseverative cognition, which was measured as combination of both rumination and worries, mediated the relationship between "distressing shifts" during the

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day and sleep onset latency (an indicator of poor sleep quality) that evening. However, it is difficult to classify "distressing shifts" as a job stressor, since the events that made the shifts distressing are uncertain, and this construct conflates a strain (i.e., distress) with a stressor (i.e., events that are interpreted as distressing). The authors also found daily workload predicted poorer sleep quality, but did not relate to perseverative cognition at night.

There are several key implications from these findings. First, there is evidence that a variety of job stressors experienced during the day predict perseverative cognition (i.e., rumination and worries) experienced at night, and the evidence is slightly more consistent for social stressors than task-related stressors. Additional support for the connection between job stressors and perseverative cognition was found in a daily diary study by Wang and colleagues (2013), which established a predictive relationship between customer mistreatment experienced during the day and rumination at night. Second, there appears to be a connection between perseverative cognition and impaired sleep. Despite these apparently supportive conditions, however, the mediating role of perseverative cognition in the job stressor-sleep impairment process has not been adequately established.

To my knowledge, no within-person studies have examined other kinds of mediators in the job stress and sleep impairment process. However, scholars have argued that affective arousal (e.g., anger, anxiety) may play a key role in the relationships between job stressors and deficient sleep (e.g., Fritz & Crain, 2016). In support of this idea, several within-person studies have found that job stressors such as workload (Ilies et al., 2007) and customer mistreatment (Wang et al., 2013) predict subsequent negative affect at the day-level. Additionally, one within-person study outside of the occupational stress literature (Brissette & Cohen, 2002) provides particularly compelling support for this hypothesis. Specifically, using a sample of community

volunteers, the authors found that negative affect partially mediated the relationship between daily interpersonal conflict (from work or nonwork sources) and impaired sleep.

Another potential mediator between stressful experiences on the job and deficient sleep is sleep hygiene. Sleep hygiene refers to a set of behavioral practices and environmental factors that predict quality sleep (Yang, Lin, Hsu, & Cheng, 2010). Sleep hygiene behaviors include general health practices (e.g., drinking alcohol within two hours of bedtime) as well as sleep-related practices (e.g., activities such as smartphone use before bedtime; Yang et al., 2010; Fritz & Crain, 2016). Epidemiological and experimental studies have demonstrated a link between sleep hygiene and sleep outcomes in clinical populations (for a review, see Irish, Kline, Gunn, Buysse, & Hall, 2015). However, the extent to which these findings apply to the general nonclinical population remains largely unknown (Irish et al., 2015). At present, there is only indirect evidence supporting the hypothesis that sleep hygiene behaviors serve as a pathway between stressful experiences at work and employee sleep. For example, Lanaj, Johnson, and Barnes (2014) conducted a daily diary study and found that late night work-related smartphone use negatively predicted sleep quantity at night. Similarly, a cross-sectional study by Barber and Jenkins (2014) found that using technology for work purposes at home (e.g., checking work email) was related to poorer sleep quality.

Limitations to the Job Stress and Sleep Literature. As illustrated by the preceding review, the literature on job stress and sleep contains incomplete and often equivocal findings. First, although the number of studies utilizing within-person, episodic approaches is on the rise, mediators in the job stress and sleep impairment process remain poorly understood. Several within-person studies on potential cognitive mediators, particularly rumination and worries, have produced inconsistent results (e.g., Cropley et al., 2006; Syrek et al., 2017). This issue has been

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compounded by the inconsistent conceptualization and operationalization of these two distinct types of perseverative cognitions. Specifically, whereas some studies clearly test either work-related worries (Pereira et al., 2013) or rumination (Syrek et al., 2017), other studies (Cropley et al., 2006; Radstaak et al., 2014) have used measures of perseverative cognition that combine both worries and rumination. In addition to the ambiguous findings on cognitive mediators, affective mediators remain virtually untested, even though affective arousal is believed to be an important mechanism through which job stressors predict sleep impairment (Fritz & Crain, 2016). Researchers also have not yet examined cognitive and affective mediators simultaneously, even though both likely play a role in sleep impairment (Fritz & Crain, 2016). Finally, potential behavioral mechanisms remain underexplored, particularly sleep hygiene behaviors.

A second issue is that there is little clarity on the types of job stressors that predict impaired sleep at the within-person level. Although social stressors experienced during the workday generally appear to have a negative impact on sleep, it is unclear why certain task-related stressors consistently impact sleep within persons (e.g., unfinished tasks) whereas other task-related stressors have a less consistent effect (e.g., workload, time pressure). One possible explanation for the disparate findings is that few studies have investigated multiple kinds of stressors simultaneously using identical designs, time lags, and samples (Sonnentag et al., 2016). It is difficult to disentangle this issue from the issue of poorly-understood mediators in the job stress-sleep process. Specifically, certain stressors experienced during the workday may be more likely than others to elicit specific cognitive and affective experiences that predict impaired sleep. More research that incorporates multiple types of stressors and multiple, theoretically appropriate mediators is needed to help resolve the contradictory findings on the relationships between specific kinds of job stressors and sleep.

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Theoretical Overview and Hypothesis Development

Support for the proposed model is drawn from several major theoretical perspectives, including the transactional model of stress, the allostatic load model, and cognitive activation theory. In the sections below, the theoretical foundation and empirical evidence for the study hypotheses will be reviewed.

Rumination, Anticipatory Stress, Anxiety, and Anger as Outcomes of Job Stressors

According to the transactional model of stress (Lazarus & Folkman, 1984), stress arises from the appraisal that specific environmental demands are about to task individual resources and thereby threaten one's well-being (Holroyd & Lazarus, 1982). Appraisal is a cognitive process consisting of two stages. In the primary appraisal stage, individuals evaluate whether a situation is stressful or not. Situations may be deemed as stressful in one of three ways: harm/loss has already occurred, harm/loss is anticipated (i.e., a threat appraisal), or the situation offers potential for growth or gain (i.e., a challenge appraisal). Once the situation has been deemed as stressful, individuals proceed to the secondary appraisal stage, in which they evaluate whether or not something can be done about the stressor, and if so, what (i.e., an assessment of coping strategies). Finally, individuals proceed to the coping phase. In its broadest sense, coping captures the myriad ways in which people actually respond to stress (Skinner, Edge, Altman, & Sherwood, 2003). Coping strategies may be targeted at altering the stressful situation or one's response to it (Folkman & Lazarus, 1980). Finally, the interdependent process of appraisal and coping predict an individual's adaptational outcomes, which include both short-term outcomes (e.g., negative mood, anxiety, somatic symptoms) as well as long-term outcomes (e.g., depression; Hart & Cooper, 2001).

Work-related rumination and anticipatory stress, the cognitive processes in the proposed study, can be understood as distinct coping strategies in response to different types of job stressors. To explain how and why these cognitive processes should emerge as coping responses to different stressors, it is important to clarify their distinction. As previously discussed, rumination is more past-oriented, focused on concerns of self-worth, and driven by the motive to gain insight into the meaning of past negative events (Nolen-Hoeksema et al., 2008). Anticipatory stress is a more descriptive term used by some stress researchers to describe the "worries" construct (e.g., Pieper, Brosschot, van der Leeden, & Thayer, 2007). Anticipatory stress (i.e., worry) is the converse of rumination, as it is future-oriented and driven by the motive to anticipate and prepare for future threats (Nolen-Hoeksema et al., 2008).

There is some debate about whether these perseverative cognitions are voluntary or involuntary. On the one hand, rumination and anticipatory stress/worries have been described as intrusive or relatively difficult to control (e.g., Borkovec, Robinson, Pruzinsky, & DePree, 1983). However, there is also evidence that perseverative cognitions involve conscious or deliberative processes (e.g., Cann et al., 2011). According to the original transactional model of stress, the question of whether rumination and anticipatory stress/worries constitute voluntary or involuntary responses to stressors would determine whether they should be considered coping strategies, as Lazarus and Folkman (1984) argued that coping must involve effortful responses. However, it is problematic to define coping strategies or actions as only those processes that are "effortful" or "voluntary." As noted by Skinner and colleagues (2003), "most types of [coping] action are available to many different levels of volition and the majority of stress responses (even in adults) are automatized to some degree. Even adaptive coping strategies, such as problem solving…may become overlearned and automatic responses to stress." (pp. 231). Accordingly, it

is appropriate to conceptualize both forms of perseverative cognition as coping strategies that involve both deliberative and intrusive/uncontrollable elements.

There is support from daily diary studies that social stressors with the potential to threaten self-worth, such as mistreatment, predict subsequent rumination (e.g., Wang et al., 2013). However, as evinced by the earlier discussion of the job stress and sleep literature, occupational stress scholars have not yet adequately addressed how rumination might differ from future-oriented worries, or adequately discriminated between the kind of stressors that might predict rumination versus those that might predict future-oriented worries (Sonnentag et al., 2016; Fritz & Crain, 2016). For example, it is unclear why rumination at night has been studied as a consequence of high job demands during the day (e.g., Cropley et al., 2006), given that experiencing high workload or time pressure does not entail significant implications for one's self-concept. Similarly, although experiencing social exclusion at work has been found to predict work-related worries (Pereira et al., 2013), it is unclear why rumination was not also included as an outcome in this study, given that individuals should (theoretically) be inclined to cognitively revisit an incident like social exclusion that has clear implications for their self-worth.

The present study addresses these concerns by including a diverse set of stressors that should theoretically correspond to distinct kinds of cognitive processes. Specifically, high workload and unfinished tasks at the end the workday should predict anticipatory stress, which involves a future-oriented preoccupation with the demands of the next workday. If an individual experiences high workload and a high degree of unfinished tasks at the end of one workday, he or she will likely anticipate that tomorrow will involve a similar or greater degree of demandingness. Mistreatment from coworkers and supervisors, on the other hand, should predict rumination after work. Since low-quality interpersonal treatment can threaten one's sense of self-

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worth and belongingness, individuals may become cognitively preoccupied with an incident of mistreatment in an attempt to understand its meaning and implications. Accordingly, I present the following hypotheses:

Hypothesis 1: Workload experienced during the workday will positively relate to anticipatory stress that evening.

Hypothesis 2: Unfinished tasks experienced during the workday will positively relate to anticipatory stress that evening.

Hypothesis 3: Mistreatment from supervisors and coworkers during the workday will positively relate to rumination that evening.

In addition to job stressors predicting rumination and anticipatory stress, the transactional model of stress supports the idea that distinct job stressors will predict anxiety and anger. The transactional model stipulates that the appraisal process involves a causal pathway to the emotions that capture the nature of the stress experience (Lazarus, 2001). Furthermore, Lazarus (1991) extended his original transactional model of stress to argue that certain appraisal patterns elicit distinct emotions. This expanded model outlined 16 unique appraisal patterns that should correspond to the experience of 16 distinct emotions, including anger and anxiety. According to this elaborated model, anger is theorized to occur when an individual judges that another party has demeaned, threatened, or damaged his or her personal identity by committing a concrete slight or offense. Anxiety, on the other hand, is theorized to occur when an individual is facing an uncertain threat. Although the event that elicits anxiety may be concrete (e.g., an upcoming exam), the event represents an uncertain threat because it lacks a discernible source of blame, and there is no clear path to remove the threat or harm it poses (Lazarus, 1991). Investigating these discrete emotional responses to stressful experiences, as opposed to grouping negative

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emotions together, can provide a more refined understanding of the stress process (Lazarus & Cohen-Charash, 2001) and elucidate whether discrete emotional reactions result in different behavioral consequences (Weiss & Cropanzano, 1996).

Organizational scholars have used Lazarus' (1991) extended model to argue that certain kinds of job stressors should result in discrete affective consequences. For example, Rodell and Judge (2009) argue that stressors such as workload and time pressure should result in anxiety given the uncertainty surrounding whether one can successfully address them (e.g., whether or not one can finish their work on time, or produce work at the desired level of quality). In support of this idea, the authors found that daily stressors such as workload, time pressure, and job complexity significantly related to anxiety. Similarly, Porath and Pearson (2012) argue that workplace mistreatment should elicit anger because it involves a clear perpetrator and the belief that the responsible party committed an interpersonal offense or injury. To my knowledge, no daily diary studies have examined anger alone as an affective consequence of workplace mistreatment. However, a number of studies have supported the idea that workplace mistreatment relates to the experience of anger (e.g., Porath & Pearson, 2012; Bunk & Magley, 2013).

In sum, previous theoretical and empirical work suggests that workload and unfinished tasks should result in anxiety, as both stressors involve situations in which there is no clear source of blame (i.e., they may arise from a variety of internal and/or external causes) and uncertainty about whether, and how, they can be successfully addressed. Conversely, previous theoretical work suggests that mistreatment from supervisors and coworkers should result in anger because instances of mistreatment involve a responsible outside party (i.e., the perpetrator) and the perception that the offending party has threatened or harmed one's identity or values.

Lastly, it is important to note that emotional reactions to job stressors can manifest in affective experiences that persist throughout the day. For example, a daily diary study by Zhan, Wang, and Shi (2016) found that negative customer treatment during the morning predicted negative affective experiences after work. This is consistent with affective events theory (Weiss & Cropanzano, 1996), which argues that work-related events can elicit emotional episodes and affective "after shocks" that alter an individual's normal affective pattern. Accordingly, I present the following hypotheses:

Hypothesis 4: Workload experienced during the workday will positively relate to anxiety that evening.

Hypothesis 5: Unfinished tasks experienced during the workday will positively relate to anxiety that evening.

Hypothesis 6: Mistreatment from supervisors and coworkers experienced during the workday will positively relate to anger that evening.

Poor Sleep Hygiene Behaviors as an Outcome of Cognitive and Affective Processes

According to the transactional model of stress, the cognitive and behavioral efforts that people engage in to manage stressors (i.e., coping strategies) are continually unfolding and influencing one another (Lazarus, 1999). By extension, this model supports the idea that cognitive coping efforts such as rumination and anticipatory stress might predict behavioral coping efforts such poorer sleep hygiene behaviors. In their review of rumination, Nolen-Hoeksema et al. (2008) note that individuals may attempt to avoid unwanted ruminative thoughts by engaging in maladaptive avoidance behaviors such as binge eating and drinking. As such, poor sleep hygiene behaviors, which include excessive eating prior to bedtime, drinking alcohol prior to bedtime, and late-night technology use, can be viewed as maladaptive coping behaviors

that individuals may engage in as distraction from work-related rumination and anticipatory stress. Support for the link between post-work negative cognitive processes and behaviors that negatively impact sleep was found in a recent study by Cropley, Michalianou, Pravettoni, and Millward (2012), who found that individuals high on after-work rumination had unhealthier eating patterns. Accordingly, I present the following hypotheses:

Hypothesis 7: Anticipatory stress will negatively relate to sleep hygiene behaviors.

Hypothesis 8: Rumination will negatively relate to sleep hygiene behaviors.

There is also a theoretical and empirical foundation for the idea that affective states characterized by anxiety and anger predict poorer sleep hygiene behaviors. The transactional model stipulates that the interplay between appraisal, coping, and adaptational outcomes such as negative affect is dynamic and continually unfolding (Hart & Cooper, 2001). As such, maladaptive coping behaviors (including poor sleep hygiene behaviors) may be used to reduce anxiety and anger. In support of this idea, research on mood regulation has found that one strategy individuals engage in to improve negative moods involves "passive mood management" behaviors such as TV watching, eating, and caffeine use (Thayer, Newman, & McClain, 1994). Similarly, research has found that negative emotions and tension reduction expectancies predict drinking alcohol as a coping strategy (Cooper, Frone, & Russell, 1995). When they occur within close proximity to bedtime, all of these passive mood management behaviors can be characterized as poor sleep hygiene behaviors (e.g., Irish et al., 2015; Yang et al., 2010). I therefore present the following hypothesis:

Hypothesis 9. Anxiety will negatively relate to sleep hygiene behaviors.

Hypothesis 10. Anger will negatively relate to sleep hygiene behaviors.

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Impaired Sleep as an Outcome of Cognitive, Affective, and Behavior-Based Arousal

Importantly, this study proposes that the effects of anticipatory work stress, rumination, anxiety, and anger will be mediated by sleep hygiene behaviors, but that there will still be significant indirect effects between job stressors and sleep impairment via anticipatory work stress, rumination, anxiety, and anger after accounting for their indirect paths through sleep hygiene behaviors. This is because the maladaptive coping behaviors explanation does not fully account for the processes through which cognitive- and affective-based arousal can impact sleep. Two theories originating from the stress physiology literature, CATS and the allostatic load model, provide support for the idea that cognitive and affective arousal associated with job stress can predict sleep impairment through distinct and direct psychological and physiological mechanisms.

The cognitive activation theory of stress (CATS; Ursin & Eriksen, 2004) can be used to explain how anticipatory work stress and rumination directly predict sleep impairment independently of sleep hygiene. Indeed, CATS offers a particularly insightful explanation of the direct link between work-related perseverative cognition (i.e., rumination and worry) and negative health outcomes such as disturbed sleep (Meurs & Perrewé, 2011; Brosschot, Pieper, & Thayer, 2005). Specifically, CATS argues that perseverative cognitions about a stressful situation prolong the experience of stress, and that this sustained physiological activation is the critical factor in impaired health, including sleep disturbances. In support of the idea that cognitions predict sustained physiological arousal, one experimental study by Hall and colleagues (2004) found that individuals who were assigned to give a speech the next day experienced stress-related changes in heart rate variability (i.e., increased parasympathetic

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activity and decreased sympathetic activity) while sleeping. Moreover, these changes in heart rate variability were associated with poorer sleep quality.

The allostatic load model is similar to the CATS model in emphasizing the importance of the appraisal process and physiological stress responses. However, it takes a more specific interest in the immediate (primary) and intermediate (secondary) psychological and physiological mechanisms through which stressor exposure predicts disease endpoints (e.g., depression, CVD) and mortality (Ganster & Rosen, 2013). Unlike CATS, which emphasizes that sustained activation, as opposed to momentary arousal, is the key determinant of whether stressor exposure results in health impairment, the allostatic load model views even brief, temporary experiences of psychological (e.g., anxiety) and physiological (e.g., cortisol) arousal as contributing to cumulative "wear and tear" on the body, which ultimately results in health decrements such as sleep difficulties and clinical sleep disorders (Meurs & Perrewé, 2011; Ganster & Rosen, 2013). As such, the allostatic load model supports a direct pathway between end-of-workday anxiety and anger and sleep impairment that night. The relationship between momentary negative emotions during the day and subsequent sleep impairment at night has been found in studies of individuals with insomnia (e.g., Talbot et al., 2012) and individuals with no history of sleep disturbances (Brissette & Cohen, 2002).

Lastly, given the diverse, multifaceted nature of sleep hygiene behaviors (e.g., late-night food consumption, alcohol consumption, irregular sleeping patterns, smartphone use), there are a wide range of potential mechanisms through which specific sleep hygiene behaviors impact sleep (see also Irish et al.'s (2015) review). For example, there are several pathways through which the use of technological devices (e.g., smart phones, computers) before bedtime can potentially impair sleep. First, the stimulating nature of many of these technologies may inhibit the

naturally-occurring withdrawal of the sympathetic nervous system activity, thereby prolonging the onset of sleep (Gradisar et al., 2013). Second, the use of these technological devices may simply borrow from time that would be spent sleeping (Van den Bulk, 2004). Third, many of these devices emit short-wavelength blue light. Blue light is known to interfere with the natural production of melatonin (e.g., West et al., 2010), a hormone that regulates the circadian cycle and plays an important role in influencing the onset, quality, and quantity of sleep (Ferracioli-Oda, Qawasmi, & Bloch, 2013).

Accordingly, I present the following hypotheses:

Hypothesis 11. Sleep hygiene behaviors will positively relate to sleep quality.

Hypothesis 12a. The relationship between workload and sleep hygiene behaviors will be mediated by anticipatory stress and anxiety.

Hypothesis 12b. The relationships between anticipatory stress and anxiety (as outcomes of workload) and sleep quality will be mediated by sleep hygiene behaviors.

Hypothesis 12c. The relationships between anticipatory stress and anxiety (as outcomes of workload) and sleep quality will still be significant after controlling for the mediating role of sleep hygiene behaviors.

Hypothesis 13a. The relationship between unfinished tasks and sleep hygiene behaviors will be mediated by anticipatory stress and anxiety.

Hypothesis 13b. The relationships between anticipatory stress and anxiety (as outcomes of unfinished tasks) and sleep quality will be mediated by sleep hygiene behaviors.

Hypothesis 13c. The relationships between anticipatory stress and anxiety (as outcomes of unfinished tasks) and sleep quality will still be significant after controlling for the mediating role of sleep hygiene behaviors.

Hypothesis 14a. The relationship between mistreatment from coworkers and supervisors and sleep hygiene behaviors will be mediated by rumination and anger.

Hypothesis 14b. The relationships between rumination and anger (as outcomes of mistreatment from supervisors and coworkers) and sleep quality will be mediated by sleep hygiene behaviors.

Hypothesis 14c. The relationships between rumination and anger (as outcomes of mistreatment from supervisors and coworkers) and sleep quality will still be significant after controlling for the mediating role of sleep hygiene behaviors.

The hypotheses that will be tested in the present study are summarized in *Table 1. Figure 1* presents a visual depiction of Hypotheses 12a-c, *Figure* 2 depicts Hypotheses 13a-c, and *Figure 3* depicts Hypotheses 14a-c.

The Current Study

The current study tests whether several common job stressors –workload, unfinished tasks, and mistreatment from supervisors and coworkers –predict sleep impairment via affective (anxiety and anger), cognitive (rumination and anticipatory stress), and behavioral (sleep hygiene) mechanisms. The proposed study therefore makes several important contributions to the job stress and sleep literature. First, it takes a comprehensive approach in investigating five potential cognitive, affective, and behavioral pathways between job stressors and sleep impairment, thus meeting Fritz and Crain's (2016) call for future research to incorporate multiple simultaneous pathways through which job stress may impact sleep. By distinguishing and investigating two forms of perseverative cognition (i.e., work-related worries and rumination) as distinct outcomes of certain stressors, the proposed study aims to take a more nuanced approach in investigating the cognitions that may arise from distinct workplace experiences, and ultimately

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contribute to sleep impairment. Further, by incorporating previously-untested affective mediators (i.e., anxiety and anger), the current study aims to expand our knowledge of the pathways through which job stressors influence employee sleep. It will investigate these mechanisms using a within-person, daily diary design in which working adults are surveyed multiple times a day (i.e., before work, directly after work, and before bedtime) over the course of two working weeks. Thus, the current study will utilize a design that is appropriate to test predictive relationships and mediators between job stressors and sleep.

Second, the proposed study is the first (to my knowledge) to investigate the role of sleep hygiene behaviors in the relationship between job stress and sleep. The inclusion of sleep hygiene as a potential mechanism through which job stressors predict subsequent sleep impairment represents an important contribution to the occupational stress literature. Unlike many mediators commonly examined in the occupational stress literature, and even within the current study (e.g., rumination, anxiety), sleep hygiene involves a set of uniquely tangible and targetable behaviors. In other words, it is arguably easier for individuals to control whether they drink alcohol or look at their smartphones shortly before bedtime than it is to control their thoughts about the upcoming work day. Sleep hygiene behaviors are therefore a potentially promising target for future occupational stress interventions, provided that their role in the job stress process can be established in a nonclinical, employee sample (Fritz & Crain, 2016; Sonnentag et al., 2016). To my knowledge, this study will be the first to undertake such an effort.

Third, the current study aims to provide more clarity regarding the specific stressors that predict sleep impairment. As previously discussed, the few existing within-person studies present equivocal findings on the relationships between task-related stressors and sleep impairment. By investigating several kinds of stressors that correspond uniquely to multiple mediators, this study

aims to elucidate whether three common job stressors predict impaired sleep, and if so, the pathways through which the sleep impairment process occurs. Additionally, this study aims to extend our knowledge of the kinds of job stressors that predict subsequent sleep impairment. No published studies (to my knowledge) have examined whether mistreatment from supervisors or coworkers predicts sleep impairment at the daily level. Investigating and establishing daily mistreatment from coworkers and supervisors as a predictor of subsequently impaired sleep is an important contribution, as a comprehensive understanding of the workplace experiences that negatively impact sleep is necessary to develop and effectively implement interventions (Barnes, 2012).

Table 1. Hypotheses and Statistical Analyses

#	Hypothesis	Analysis	Effect Type
1	Workload experienced during the workday will positively relate to anticipatory stress that evening.	Multilevel SEM	Additive
2	Unfinished tasks experienced during the workday will positively relate to anticipatory stress that evening.	Multilevel SEM	Additive
3	Mistreatment from supervisors and coworkers during the workday will positively relate to rumination that evening.	Multilevel SEM	Additive
4	Workload experienced during the workday will positively relate to anxiety that afternoon.	Multilevel SEM	Additive
5	Unfinished tasks experienced during the workday will positively relate to anxiety that afternoon.	Multilevel SEM	Additive
6	Mistreatment from supervisors and coworkers experienced during the workday will positively relate to anger that afternoon.	Multilevel SEM	Additive
7	Anticipatory stress in the evening will negatively relate to sleep hygiene behaviors that evening.	Multilevel SEM	Additive
8	Rumination in the evening will negatively relate to sleep hygiene behaviors that evening.	Multilevel SEM	Additive
9	Anxiety in the afternoon will negatively relate to sleep hygiene behaviors that evening.	Multilevel SEM	Additive
10	Anger in the afternoon will negatively relate to sleep hygiene behaviors in the evening.	Multilevel SEM	Additive
11	Sleep hygiene behaviors in the evening will positively relate to sleep quality.	Multilevel SEM	Additive
12a	The relationship between workload and sleep hygiene behaviors will be mediated by anticipatory stress and anxiety.	Multilevel SEM	Mediating
12b	The relationships between anticipatory stress and anxiety (as outcomes of workload) and sleep quality will be mediated by sleep hygiene behaviors.	Multilevel SEM	Mediating
12c	The relationships between anticipatory stress and anxiety (as outcomes of workload) and sleep quality will still be significant after controlling for the mediating role of sleep hygiene behaviors.	Multilevel SEM	Mediating
13a	The relationship between unfinished tasks and sleep hygiene behaviors will be mediated by anticipatory stress and anxiety.	Multilevel SEM	Mediating
13b	The relationships between anticipatory stress and anxiety (as outcomes of unfinished tasks) and sleep quality will be mediated by sleep hygiene behaviors.	Multilevel SEM	Mediating

Table 1. (Continued)

| 13c	The relationships between anticipatory stress and anxiety (as outcomes of unfinished tasks) and sleep quality will still be significant after controlling for the mediating role of sleep hygiene behaviors.	Multilevel SEM	Mediating
14a	The relationship between mistreatment from coworkers and supervisors and sleep hygiene behaviors will be mediated by rumination and anger.	Multilevel SEM	Mediating
14b	The relationships between rumination and anger (as outcomes of mistreatment from coworkers and supervisors) and sleep quality will be mediated by sleep hygiene behaviors.	Multilevel SEM	Mediating
14c	The relationships between rumination and anger (as outcomes of mistreatment from coworkers and supervisors) and sleep quality will still be significant after controlling for the mediating role of sleep hygiene behaviors.	Multilevel SEM	Mediating
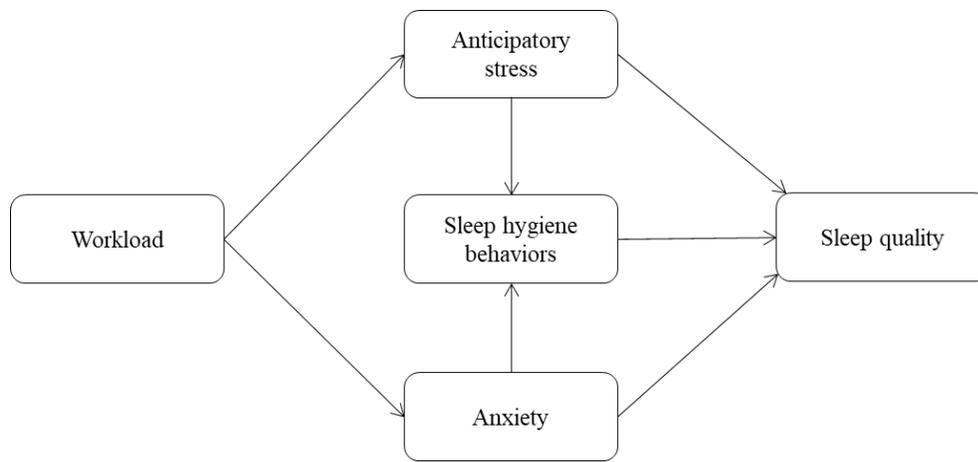
Figure 1. *Hypotheses 12a-12c.*
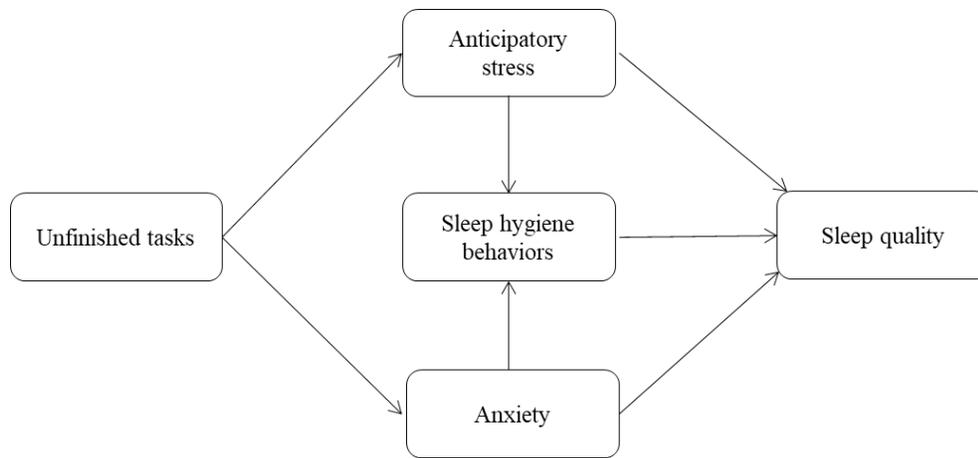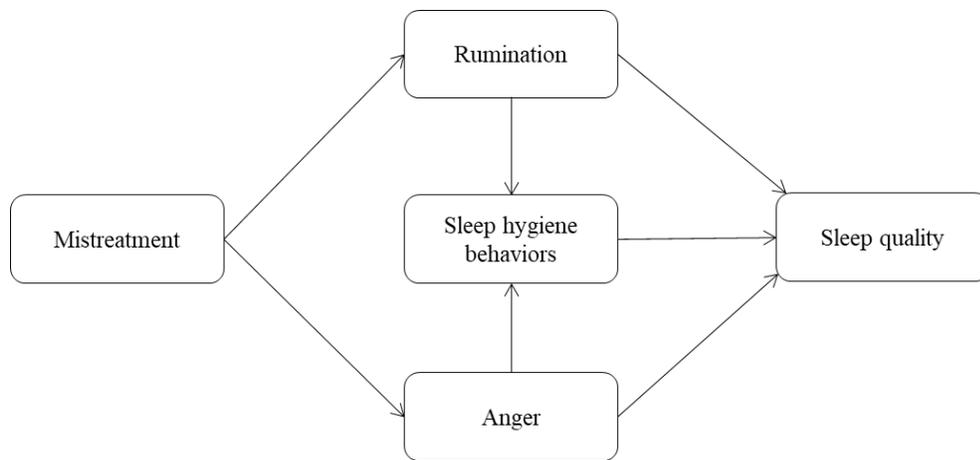
Figure 2. *Hypotheses 13a-13c.*

Figure 3. *Hypotheses 14a-14c.*

Chapter Two:

Method

Participants

Participants were 140 full-time staff employees at the University of South Florida's Tampa campus. This sample size was determined after conducting a power analysis based on several recent daily diary studies on sleep quality and quantity (Brown, 2017; Hülsheger et al., 2014; Crain, 2015). Using an effect size of d= .3, which is considered a small effect size, an alpha of .05. and the average ICC values reported for sleep quality across these studies (ICC= .29), results of the power analysis indicated that 130 participants would be necessary to ensure a power level slightly above the recommended .80 value.

Participants were recruited via emails sent to their publicly available email addresses. In the state of Florida, the work email addresses associated with all state university employees are considered public records and are available upon a public records request. Participants were recruited to participate in this study via emails sent through a password-protected email account sponsored by Gmail. From this account, the primary researcher responded to participants' inquiries about the study, sent them the baseline survey (containing informed consent) if they were interested in participating, and scheduled the initial training session. In order to be eligible to participate in the study, participants had to be at least 18 years of age, a full-time staff employee on the USF Tampa campus, fluent and literate in English, and have access to the Internet at home and work.

Although all 140 participants were retained for hypothesis testing, seven did not complete the baseline survey. Thus, demographic information is based on 133 out of 140 participants. Participants were 20.3% male and 79.7% female. Participants had an average age of 38.9 years ($SD= 11.2$) and worked an average of 42.1 hours ($SD= 4.9$). The sample was predominantly Caucasian (73.7%), with 10.5% identifying as Hispanic, 9.8% as African American, 3.8% as multiethnic or "other," and 2.3% as Asian American. A majority of the sample was married or cohabitating (62.4%) and did not have children (54.9%). The sample was highly educated, with 36.8% of participants having their Bachelor's degree, 39.1% having their Master's degree (39.1%), and 5.3% having a doctoral or professional degree. Only 1.5% of participants only obtained a high school diploma; the remaining participants had either completed some college (9.8%) or obtained their Associate's degree (7.5%). Participants had an average job tenure of 3.7 years ($SD= 4.3$). Participants held a variety of jobs, most of which involved administrative responsibilities. Sample job titles included "support specialist," "program specialist," and "accounting specialist."

In terms of technology use at home, most participants reported that they "never," "rarely," or "sometimes" used various communication technologies at home for work-related purposes (for email or the Internet, 58.7%; for computers or laptops, 69.2%; for cellphones or smartphones, 56.4%; and for tablets, 91%).

Procedure

The study procedure had two phases. The first phase was the training phase. After corresponding with potential participants and informing them about the nature of the study, the research team scheduled a training session with each participant. As soon as the training session was scheduled, the research team sent participants a link to the baseline survey. Participants

received a 30-minute training session on Monday, the dedicated start day, in a location of their choosing on the USF Tampa campus. At the training session, participants received detailed information on the study's procedures, including when they would receive the surveys, how to complete them, and how compensation would be awarded. Informed consent was obtained after explaining the study's procedures. Immediately following the training session, participants were sent an email with a link to the baseline survey, which was hosted by Qualtrics, and instructed to complete it within 24 hours.

The second phase was the daily diary phase, which occurred over two weeks (10 consecutive work days). This phase began on the same day of the training session (i.e., Monday). Participants received an after-work survey the same day as their training session (i.e., Monday), and an evening survey that night. They then received three daily surveys each day of the proceeding work week (Tuesday through Friday). Participants did not complete the three typical daily surveys on the weekend following the first week of data collection. They only completed a shorter survey on Saturday morning, and a shorter survey on Sunday night. Following the weekend, the three daily surveys were sent during each day of the second work week (Monday through Friday), with one exception: on the Friday of the second work week, participants did not complete an evening survey. Thus, the after-work survey completed on the Friday of the second work week marked the end of data collection for a given participant.

The daily surveys were sent in the morning before work (6:30 AM), immediately following work (5 PM), and shortly before bedtime (9 PM). Participants were instructed to complete all three surveys—i.e., the before work, after work, and bedtime surveys—within a two-hour window after they were initially sent. The three windows are as follows: 6:30-8:30 AM, 5 PM-7 PM, and 9 PM-11 PM. The daily surveys were hosted by Qualtrics, an online

survey host that allows participants to complete surveys on their smartphones, tablets, or computers. The surveys were programmed in Qualtrics so that daily surveys were automatically sent to participants' email addresses at the appropriate times.

Participants received $55.00 in Amazon gift cards for completing the baseline survey and all surveys during the 10 work days (compensation was prorated such that participants received $5 per day for each of the 10 days they completed all surveys sent to them, and $5 for completing the baseline survey). Compensation was awarded within 1-2 weeks after data collection was completed for a given participant.

Measures

Table 2 shows the measures that were completed in each of the three daily surveys sent during the work week (Monday-Friday). Table 3 shows the measures completed on the weekend.

Baseline Survey

Demographics. Information on demographic variables, including age, gender, job title, job tenure, and work hours, was collected in the baseline survey. Also, participants were asked to report their work-related technology use at home using four items from Park, Jex, and Fritz (2011). Specifically, participants were asked to indicate how frequently they use four different communication technologies (e.g., email, computers/laptops) for work purposes while at home. Response options ranged from 1 ("Almost never") to 5 ("Very often"). Appendix A contains the demographic items assessed in the baseline survey.

Daily Surveys

In the sections below, I review all the measures that were included in the daily surveys. Appendix B contains the specific measures that were included in the morning weekday surveys, Appendix C contains the measures that were included in the after-work weekday surveys, and

Appendix D contains the measures in the evening weekday surveys. Finally, the measures assessed in the Saturday morning survey are presented in Appendix E, and the measures in the Sunday evening survey are presented in Appendix F.

Workload. Workload was measured with four items from Spector and Jex's (1998) workload scale. The items were slightly modified so that participants could indicate the extent to which each statement applied to their experiences that day at work. A sample item is "Today, my job required me to work very hard." Response options ranged from 1 ("Not at all") to 5 ("Extremely"). Daily reliabilities ranged from α= .82-.94.

Unfinished Tasks. Unfinished tasks was measured with a slightly modified version of the six-item scale by Syrek et al. (2017). The items were originally developed for a week-level study, but were modified to assess a day-level time frame. Participants were asked to indicate the extent to which they agree or disagree with each statement. A sample item is "I have not finished important tasks that I had planned to do today." Response options ranged from 1 ("Strongly disagree") to 5 ("Strongly agree"). Daily reliabilities ranged from α= .89-.94.

Mistreatment from Supervisors and Coworkers. Mistreatment from supervisors and coworkers was measured with five items from the Straightforward Incivility Scale (SIS; Leiter & Day, 2013). The original SIS is composed of 15 items. However, given the need for brevity in the daily surveys, five items were selected to represent the broader incivility construct. Participants were asked how many times someone at work (e.g., a supervisor, coworker) did each behavior that workday. A sample item is "Behaved without consideration for you." Response options were "0", "1", "2", and "More than two." Daily reliabilities ranged from α= .56-.85.

Anticipatory Work Stress. Anticipatory work stress was measured with a four-item scale developed for this study. Participants were asked to indicate how often each statement

applied to their experiences that evening (in the evening survey) or the previous evening (in the morning survey). A sample item is "Tonight, I couldn't stop thinking about what I needed to do tomorrow at work." Response options ranged from 1 ("Not at all") to 5 ("Extremely"). Daily reliabilities ranged from α= .91-.96.

Rumination. Rumination was measured with three modified items from the Ruminative Response Scale (RRS; Genet & Siemer, 2012; Nolen-Hoeksema & Morrow, 1991). Participants were asked to indicate how often each statement applied to their experiences that evening (in the evening survey) or the previous evening (in the morning survey). An example is "I continued to think about an unpleasant situation at work, wish it had gone differently." Response options ranged from 1 ("Not at all") to 5 ("Extremely"). Daily reliabilities ranged from α= .91-.98.

Anxiety. State anxiety was measured with the six-item Anxiety/Tension subscale from the Profile of Mood States- Short Form (POMS-SF; Shacham, 1983). Participants were asked to indicate the extent to which they are currently experiencing each of six descriptors. An example descriptor is "Nervous." Response options ranged from 1 ("Not at all") to 5 ("Extremely"). Daily reliabilities ranged from α= .87-.94.

Anger. Anger was measured with the seven-item Anger/Hostility subscale from the POMS-SF (Shacham, 1983). Participants were asked to indicate the extent to which they are currently experiencing each of seven descriptors. An example descriptor is "Annoyed." Response options ranged from 1 ("Not at all") to 5 ("Extremely"). Daily reliabilities ranged from α= .76-.94.

Sleep Hygiene Behaviors. Sleep hygiene behaviors were assessed with 12 items from the Sleep Hygiene Practices Scale (SHPS; Lin, Cheng, Yang, & Hsu, 2007) and two self-developed items. The nine-item arousal-related behavior subscale and three items from the eating

and drinking behaviors subscale of the SHPS were used. A sample item from the arousal-related behavior subscale is "Did sleep-irrelevant activities in bed (e.g., watching TV, reading)." The original SHPS was published in 2007 and does not assess the late-night use of contemporary technological devices, which is now recognized as poor sleep hygiene (e.g., Sonnentag et al., 2016). Accordingly, two self-developed items were used to assess late-night technology use (e.g., using a smartphone during the hour prior to bedtime). Participants indicated whether they engaged in each of the 14 behaviors the previous evening using a Yes/No response. This variable was scored such that higher values indicate better sleep hygiene behaviors. Daily reliabilities ranged from α= .30-.51. Importantly, however, this scale is formative, and coefficient alpha is not an appropriate index of its reliability.

Sleep Quality. Sleep quality was measured with one item from the Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). The item is: "How do you evaluate [last] night's sleep?" Sleep quality for the previous evening was assessed in the morning survey. Response options ranged from 1 ("Very bad") to 4 ("Very good"). This one-item measure has been used in other daily diary studies on job stress and sleep (e.g., Sonnentag et al., 2008; Hülsheger et al., 2014).

Data Analysis

Given that within-person processes between work stressors and sleep are of central interest in this study, hypothesis testing was conducted via multilevel structural equation modeling (MSEM), with days (Level 1) nested within individuals (Level 2). Multilevel modeling techniques are preferred when data are clustered within individuals, as they provide improved estimations of within-person effects by accounting for dependencies among the data (Raudenbush & Bryk, 2002).

A series of multilevel structural equation models (MSEMs) was estimated in Mplus version 7.4 (Muthén & Muthén, 1998-2012) in order to test the study hypotheses. The latent approach used in MSEM is preferable to traditional multilevel modeling techniques because it allows for the separate modeling of within- and between- components as latent and orthogonal components (Preacher, Zyphur, & Zhang, 2010). MSEM is especially advantageous when there are linkages between within-person, Level 1 variables, which is the case in the present study, since traditional multilevel modeling techniques can result in biased or conflated estimates of indirect effects (Preacher et al., 2010). Such models are referred to as "1-1-1 multilevel mediation models" because all predictors, mediators, and outcomes are measured at Level 1.

Given the unique cognitive and affective mediators associated with each job stressor, a separate model was estimated for each stressor. Additionally, in order to reduce complexity, a separate model was estimated for each mediator (i.e., anxiety or anger; anticipatory stress or rumination). Therefore, a total of six MSEMs were performed (for three distinct stressors with two distinct mediators each). All slopes were allowed to randomly vary across individuals. Consistent with the recommendations of Nezlek (2012), we included all 140 participants in the MSEM analyses because all had completed at least two daily surveys. In terms of missing data, 1049 observations across 140 individuals were used for the MSEM analyses. Thus, each participant completed an average of 7.5 observations out of 10 possible observations.

SPSS was used for data screening and cleaning, to analyze the psychometric properties of the study measures, and to perform correlational analyses. Before calculating within-person correlations, all Level 1 predictor variables were group mean centered (i.e., centered around the mean of each individual), which controls for between-person differences (Enders & Tofighi, 2007). However, group mean centering was not performed on the data used in the MSEM

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analyses because the decomposition of variance in MSEM implicitly involves latent group-mean

centering of latent Level 1 variables (Muthén & Muthén, 1998-2012).

Table 2. Timeline of Daily Survey Measures (Monday-Friday)

Before work (6:30 AM)	After work (5 PM)	At bedtime (9 PM)
- Sleep hygiene behaviors - Sleep quality	- Workload - Unfinished tasks - Mistreatment - Anxiety - Anger	- Anticipatory work stress - Rumination

Table 3. Timeline of Weekend Survey Measures

Saturday upon waking (9 AM)	Sunday before bedtime (9 PM)
- Sleep hygiene behaviors - Sleep quality	- Anticipatory work stress

Chapter Three:

Results

Descriptive statistics and study intercorrelations can be found in Tables 4 and 5, respectively. Unconditional models were performed on each study variable in order to calculate the Intraclass Coefficient [ICC(1)], which indicates the proportion of between-cluster or between-person variability in a given variable. A small ICC(1) value indicates weak between-person effects, such that considerable variability exists within persons (Bliese, 1998). ICC(1)s in the current study ranged between .24 and .60, indicating the presence of both within-person and between-person variability. Mistreatment (ICC(1) = .24) and sleep quality (ICC(1) = .25) had the highest proportions of within-person variability among the study variables, whereas unfinished tasks (ICC(1) = .60) had the highest proportion of between-person variability.

As can be seen in Table 5, all within-person correlations between the three stressors (workload, unfinished tasks, and mistreatment) and the four cognitive and affective mediators (anticipatory stress, rumination, anger, and anxiety) significantly related to one another. The patterns were in expected directions, however, such that the effect sizes between workload (unfinished tasks) were the largest for anticipatory stress and anxiety, whereas the effect sizes for mistreatment were largest for rumination and anger. Of the four cognitive and affective mediators, only anxiety (r_w= -.08, $p<$. 05) and rumination (r_w= -.09, $p<$. 01) negatively related to sleep hygiene behaviors; the correlations were not significant for anger or anticipatory stress. Of the three stressors, only workload had a significant negative relationship with sleep hygiene behaviors (r_w= -.11, $p<$. 01). Of the three stressors and four cognitive and affective mediators,

only anticipatory stress had a significant negative relationship with sleep quality (r_w= -.08, p<. 05). Finally, sleep hygiene behaviors positively predicted the quality of sleep that evening (r_w= -.08, p<. 05).

Hypotheses 1-3 proposed relationships between specific stressors and cognitive mediators. Hypothesis 1 stated that workload experienced during the workday would positively relate to anticipatory stress that evening. The results supported this hypothesis, with workload significantly predicting anticipatory stress in the evening (β = .14, p < .01; see Table 7 for detailed results). Hypothesis 2 stated that unfinished tasks experienced during the workday would positively relate to anticipatory stress that evening. The results supported this hypothesis (β = .14, p < .01; see Table 9). Finally, Hypothesis 3 stated that mistreatment from supervisors and coworkers during the workday would positively relate to rumination that evening. As can be seen in Table 11, this hypothesis was supported (β = .99, p < .01).

Hypotheses 4-6 proposed relationships between specific stressors and affective mediators. Hypothesis 4 stated that workload experienced during the workday would positively relate to anxiety that afternoon. As can be seen in Table 6, this hypothesis was supported (β = .18, p < .01). Hypothesis 5 stated that unfinished tasks experienced during the workday would positively relate to anxiety that afternoon. The results supported this hypothesis, with unfinished tasks significantly predicting afternoon anxiety (β = .14, p < .01; see Table 8). Hypothesis 6 stated that mistreatment from supervisors and coworkers experienced during the workday would positively relate to anger that afternoon. This hypothesis was also supported (β = .85, p < .01; see Table 10 for details).

Hypotheses 7-8 proposed relationships between cognitive mediators and sleep hygiene behaviors. Hypothesis 7 stated that anticipatory stress in the evening would negatively relate to

sleep hygiene behaviors that evening. This did not receive support in the model with workload and anticipatory stress (β = -.01, *ns*; see Table 7) or in the model with unfinished tasks and anticipatory stress (β = -.-01, *ns*; see Table 9). Hypothesis 8 stated that rumination in the evening would negatively relate to sleep hygiene behaviors that evening. This hypothesis did not receive support in the model with mistreatment and rumination (β = -.01, *ns*; see Table 11).

Hypotheses 9-10 proposed relationships between affective mediators and sleep hygiene behaviors. Hypothesis 9 stated that anxiety in the afternoon would negatively relate to sleep hygiene behaviors that evening. This hypothesis was not supported in the model with workload and anxiety (β = -.01, *ns*; see Table 6), or in the model with unfinished tasks and anxiety (β = -.01, *ns*; see Table 8). Hypothesis 10 stated that anger in the afternoon would negatively relate to sleep hygiene behaviors in the evening. This model was not supported in the model with mistreatment and anger (β = .02, *ns;* see Table 10).

Hypothesis 11 stated that sleep hygiene behaviors in the evening would positively relate to sleep quality. Since all models proposed a direct relationship between sleep hygiene behaviors and sleep quality, this hypothesis was tested across all six proposed models (i.e., across two models for each of the three job stressors, each with a distinct cognitive or affective mediator). This hypothesis received support in across all six models, including the model with workload and anxiety (β = 1.61, *p* < .01; see Table 6), workload and anticipatory stress (β = 1.61, *p* < .01; see Table 7), unfinished tasks and anxiety (β = 1.65, *p* < .01; see Table 8), unfinished tasks and anticipatory stress (β = 1.66, *p* < .01; see Table 9), mistreatment and anger (β = 1.65, *p* < .01; see Table 10), and mistreatment and rumination (β = 1.76, *p* < .01; see Table 11).

Hypothesis 12a stated that the relationship between workload and sleep hygiene behaviors would be mediated by anticipatory stress and anxiety. This was tested across two

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different models, since models were run separately for workload, anticipatory stress, sleep hygiene behaviors, and sleep quality, and for workload, anxiety, sleep hygiene behaviors, and sleep quality. This hypothesis was not supported in the model with anxiety (see Table 6) or anticipatory stress (see Table 7).

Hypothesis 12b stated that the relationships between anticipatory stress and anxiety (as outcomes of workload) and sleep quality would be mediated by sleep hygiene behaviors. This was not supported for anxiety (β = -.02, *ns;* see Table 6) or for anticipatory stress (β = -.01, *ns*; see Table 7).

Hypothesis 12c stated that the relationships between anticipatory stress and anxiety (as outcomes of workload) and sleep quality would still be significant after controlling for the mediating role of sleep hygiene behaviors. This model failed to receive support in the models examining anxiety (β = -.01, *ns*; see Table 6) or anticipatory stress (β = -.08, *ns*; see Table 7).

Hypothesis 13a stated that the relationship between unfinished tasks and sleep hygiene behaviors would be mediated by anticipatory stress and anxiety. This hypothesis was not supported in the model with anxiety (β = .00, *ns*; see Table 8) or anticipatory stress (β = .00, *ns;* see Table 9).

Hypothesis 13b stated that relationships between anticipatory stress and anxiety (as outcomes of unfinished tasks) and sleep quality would be mediated by sleep hygiene behaviors. This hypothesis was not supported for the model with anxiety (β = -.02, *ns*) or anticipatory stress (β = -.01, *ns*). Results are in Tables 8 and 9, respectively.

Hypothesis 13c stated that relationships between anticipatory stress and anxiety (as outcomes of unfinished tasks) and sleep quality would still be significant after controlling for the

mediating role of sleep hygiene behaviors. This hypothesis was not supported in the models examining anxiety (β = -.02, *ns;* see Table 8) or anticipatory stress (β = -.07, *ns*; see Table 9).

Hypothesis 14a stated that the relationship between mistreatment from coworkers and supervisors and sleep hygiene behaviors would be mediated by rumination and anger. This hypothesis was not supported for mistreatment and anger (β = .01, *ns;* see Table 10 for details) or for mistreatment and rumination (β = .00, *ns;* see Table 11).

Hypothesis 14b stated that the relationships between rumination and anger (as outcomes of mistreatment from coworkers and supervisors) and sleep quality would be mediated by sleep hygiene behaviors. This hypothesis was not supported for anger (β = .03, *ns;* see Table 10) or rumination (β = -.02, *ns;* see Table 11).

Hypothesis 14c stated that the relationships between rumination and anger (as outcomes of mistreatment from coworkers and supervisors) and sleep quality would still be significant after controlling for the mediating role of sleep hygiene behaviors. This hypothesis was not supported for anger (β = .06, *ns;* see Table 10) or rumination (β = .06, *ns;* see Table 11).

Table 4. Descriptive Statistics for Study Variables

Variables	Mean	SD_b	SD_w	Reliability*	ICC(1)
Workload	2.13	0.80	0.65	0.90	0.54
Unfinished tasks	2.11	0.84	0.61	0.93	0.60
Mistreatment	0.10	0.14	0.19	0.71	0.24
Anxiety	1.48	0.53	0.46	0.91	0.50
Anger	1.25	0.33	0.41	0.88	0.31
Anticipatory stress	1.60	0.59	0.58	0.94	0.40
Rumination	1.45	0.60	0.63	0.95	0.31
Sleep hygiene behaviors	1.70	0.11	0.09	0.44	0.51
Sleep quality	2.72	0.39	0.55	-	0.25

Notes. N ranges from 1111 to 1241 observations. SD_b= standard deviation between; SD_w= standard deviation within; ICC(1) = intraclass correlation coefficient. Reliabilities were calculated individually for each day and averaged across days.

Table 5. Intercorrelations Between Study Variables

	1	2	3	4	5	6	7	8	9
1. Workload	(0.54)	.74**	.24**	.54**	.37**	.59**	.37**	-.28**	-.14
2. Unfinished tasks	.47**	(0.60)	.24**	.59**	.37**	.61**	.45**	-.36**	-.07
3. Mistreatment	.15**	.06*	(0.24)	.37**	.56**	.24**	.32**	-.16	.01
4. Anxiety	.30**	.26**	.26**	(0.50)	.66**	.65**	.55**	-.33**	-.26**
5. Anger	.25**	.15**	.35**	.53**	(0.31)	.43**	.49**	-.26**	-.26**
6. Anticipatory stress	.17**	.20**	.10**	.38**	.26**	(0.40)	.74**	-.34**	-.24**
7. Rumination	.10**	.04**	.20**	.38**	.41**	.42**	(0.31)	-.37**	-.22*
8. Sleep hygiene behaviors	-.11**	-.05	-.01	-.08*	.00	-.06	-.09**	(0.51)	.38**
9. Sleep quality	.02	-.02	.01	-.04	.01	-.08*	.03	.26**	(0.25)

Notes. * $p < .05$; ** $p < .01$. N ranges from 1111 to 1241 observations across 138 to 140 participants. Values on the diagonal are ICC(1) values. Values below the diagonal represent within-person correlations, whereas values above the diagonal are between-person correlations calculated using between person-level means for daily variables.

Table 6. Workload Predicting Sleep Quality Through Anxiety and Sleep Hygiene Behaviors

Parameter	Coefficient	SE	95% Confidence Intervals	
Within-Person Effects				
Random Effects				
Workload → Anxiety				
Intercept	0.18**	0.03	0.13	0.23
Variance	0.04**	0.02	0.01	0.07
Anxiety → Sleep hygiene behaviors				
Intercept	-0.01	0.01	-0.03	0.00
Variance	0.00	0.00	0.00	0.00
Sleep hygiene behaviors → Sleep quality				
Intercept	1.61**	0.24	1.14	2.09
Variance	1.28*	0.61	0.09	2.47
Anxiety → Sleep quality				
Intercept	-0.01	0.07	-0.15	0.12
Variance	0.03	0.04	-0.06	0.11
Indirect Effects				
Workload → Sleep hygiene behaviors	0.00	0.02	-0.01	0.00
Anxiety → Sleep quality	-0.02	0.02	-0.06	0.01

*Note. * p < .05; ** p < .01*

Table 7. Workload Predicting Sleep Quality Through Anticipatory Stress and Sleep Hygiene Behaviors

Parameter	Coefficient	SE	95% Confidence Intervals	
Within-Person Effects				
Random Effects				
Workload → Anticipatory stress				
Intercept	0.14**	0.05	0.03	0.24
Variance	0.05	0.03	0.00	0.10
Anticipatory stress → Sleep hygiene behaviors				
Intercept	-0.01	0.02	-0.03	0.00
Variance	0.00	0.03	-0.06	0.06
Sleep hygiene behaviors → Sleep quality				
Intercept	1.61**	0.49	0.71	2.61
Variance	1.11	1.84	-2.50	4.72
Anticipatory stress → Sleep quality				
Intercept	-0.08	0.24	-0.56	0.40
Variance	0.01	0.33	-0.64	0.66
Indirect Effects				
Workload → Sleep hygiene behaviors	0.00	0.00	-0.01	0.01
Anticipatory stress → Sleep quality	-0.01	0.04	-0.08	0.06

*Note. * $p < .05$; ** $p < .01$

Table 8. Unfinished Tasks Predicting Sleep Quality Through Anxiety and Sleep Hygiene Behaviors

Parameter	Coefficient	SE	95% Confidence Intervals	
Within-Person Effects				
Random Effects				
Unfinished tasks → Anxiety				
Intercept	0.14**	0.03	0.08	0.21
Variance	0.05**	0.01	0.02	0.07
Anxiety → Sleep hygiene behaviors				
Intercept	-0.01	0.01	-0.03	0.01
Variance	0.00	0.00	0.00	0.00
Sleep hygiene behaviors → Sleep quality				
Intercept	1.65**	0.24	1.19	2.11
Variance	1.25*	0.56	0.16	2.34
Anxiety → Sleep quality				
Intercept	-0.02	0.06	-0.14	0.10
Variance	0.02	0.03	-0.04	0.08
Indirect Effects				
Unfinished tasks → Sleep hygiene behaviors	0.00	0.00	-0.01	0.00
Anxiety → Sleep quality	-0.02	0.02	-0.05	0.02

Note. * $p < .05$; ** $p < .01$

Table 9. Unfinished Tasks Predicting Sleep Quality Through Anticipatory Stress and Sleep Hygiene Behaviors

Parameter	Coefficient	SE	95% Confidence Intervals	
Within-Person Effects				
Random Effects				
Workload → Anticipatory stress				
Intercept	0.16**	0.04	0.08	0.27
Variance	0.06	0.02	0.02	0.11
Anticipatory stress → Sleep hygiene behaviors				
Intercept	-0.01	0.04	-0.08	0.08
Variance	0.00	0.01	-0.02	0.02
Sleep hygiene behaviors → Sleep quality				
Intercept	1.66**	0.63	0.41	2.90
Variance	1.02	0.85	-0.64	2.69
Anticipatory stress → Sleep quality				
Intercept	-0.07	0.15	-0.36	0.22
Variance	0.01	0.13	-0.25	0.27
Indirect Effects				
Workload → Sleep hygiene behaviors	0.00	0.01	-0.01	0.01
Anticipatory stress → Sleep quality	-0.01	0.06	-0.12	0.10

Note. * $p < .05$; ** $p < .01$

Table 10. Mistreatment Predicting Sleep Quality Through Anger and Sleep Hygiene Behaviors

Parameter	Coefficient	SE	95% Confidence Intervals	
Within-Person Effects				
Random Effects				
Mistreatment → Anger				
Intercept	0.85**	0.15	0.55	1.15
Variance	0.78**	0.30	0.20	1.37
Anger → Sleep hygiene behaviors				
Intercept	0.02	0.01	-0.01	0.04
Variance	0.00	0.00	0.00	0.00
Sleep hygiene behaviors → Sleep quality				
Intercept	1.65**	0.23	1.20	2.09
Variance	1.10*	0.51	0.10	2.11
Anger → Sleep quality				
Intercept	0.06	0.08	-0.10	0.22
Variance	0.01	0.03	-0.04	0.06
Indirect Effects				
Mistreatment → Sleep hygiene behaviors	0.01	0.01	-0.01	0.03
Anger → Sleep quality	0.03	0.02	-0.01	0.06

Note. * $p < .05$; ** $p < .01$

Table 11. Mistreatment Predicting Sleep Quality Through Rumination and Sleep Hygiene Behaviors

Parameter	Coefficient	SE	95% Confidence Intervals	
Within-Person Effects				
Random Effects				
Mistreatment → Rumination				
Intercept	0.99**	0.27	0.46	1.52
Variance	1.71	0.96	-0.18	3.59
Rumination → Sleep hygiene behaviors				
Intercept	-0.01	0.01	-0.03	0.00
Variance	0.00	0.00	0.00	0.00
Sleep hygiene behaviors → Sleep quality				
Intercept	1.76**	0.24	1.30	2.22
Variance	1.20*	0.51	0.20	2.20
Rumination → Sleep quality				
Intercept	0.06	0.06	-0.05	0.17
Variance	0.00	0.01	-0.01	0.02
Indirect Effects				
Mistreatment → Sleep hygiene behaviors	0.00	0.01	-0.01	0.01
Rumination → Sleep quality	-0.02	0.01	-0.08	0.06

Note. * $p < .05$; ** $p < .01$

Chapter Four:

Discussion

The goal of the current study was to investigate the relationship between several common job stressors, theoretically relevant cognitive and affective mediators, sleep hygiene behaviors, and sleep quality. I tested my hypotheses using a daily diary design of 140 full-time employees sampled across two work weeks. Overall, the results largely supported the additive hypotheses proposed in the current study, including the linkages between specific job stressors and cognitive and affective mediators, and between sleep hygiene behaviors and sleep quality. However, the additive hypotheses proposed between the four cognitive and affective mediators and sleep hygiene behaviors were not supported by the study results.

The indirect effects proposed in this study were twofold. First, I proposed that stressors would influence sleep hygiene behaviors through the mediating roles of cognitive and affective mediators. Second, I proposed that cognitive and affective mediators would influence sleep quality through the mediating roles of sleep hygiene behaviors. Based on MSEM analyses, neither of these two types of indirect effects were supported in the present study. Thus, the proposed mediation sequence, which argued that the influence of job stressors on sleep quality would be mediated in two stages—first by cognitive and affective mediators, and second by sleep hygiene behaviors—was not supported.

I will begin by reviewing each hypothesis in specific detail. Next, I will discuss results from a series of alternative models that were conducted in order to investigate whether other pathways and relationships exist between the study variables, given the lack of significant

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indirect effects in the study's proposed models. I will follow with a discussion of the theoretical and practical implications of this study. Finally, I will review the limitations of this study and directions for future research before providing an overall conclusion.

Direct Relationships Between Job Stressors and Cognitive Mediators

The present study argued that distinct types of job stressors should have unique implications for employees' well-being, and therefore result in distinct types of cognitive strains that reflect the unique nature of the stressors. Consistent with Lazarus and Folkman's (1984) transactional model of stress, I argued that anticipatory stress, a future-oriented form of perseverative cognition that focuses on anticipating and preparing for threats, should result from the stressors of workload (Hypothesis 1) and unfinished tasks (Hypothesis 2). Similarly, I argued that rumination, past-oriented form of perseverative cognition that focuses on the implications of a negative event for one's self-worth and well-being, should result from the stressor of mistreatment from one's coworkers or supervisors (Hypothesis 3). In all models tested, these additive direct relationships were found in the expected directions. The results suggest that researchers may benefit from considering distinctions between different forms of perseverative cognition as a response to job stressors.

Direct Relationships Between Job Stressors and Affective Mediators

The present study also proposed a number of specific relationships between distinct emotions and job stressors based on the transactional model of stress. Anxiety was proposed to result from workload (Hypothesis 4) and unfinished tasks (Hypothesis 5), given that it is a response to a threat involving ambiguity or uncertainty (i.e., one is unsure of deal with the amount of work they have to, or whether their work output will be high-quality enough, given the limited amount of time they have to complete their tasks). In contrast, anger was proposed to

result as a response to mistreatment from one's coworkers and supervisors (Hypothesis 6), given that anger is viewed an emotional response to being demeaned, threatened, or damaged by another individual (Lazarus, 1991). These additives hypotheses were supported across all models tested, further supporting the use of theoretically relevant emotional responses to distinct job stressors.

Direct and Indirect Relationships Between Cognitive and Affective Mediators and Sleep Hygiene Behaviors

This study proposed that perseverative cognitions (anticipatory stress and rumination) and negative emotions (anxiety and anger) would negatively predict sleep hygiene behaviors (Hypotheses 7-10). I further proposed that these job stressors would negatively predict sleep hygiene behaviors through these variables. Specifically, anxiety and anticipatory stress were proposed to mediate the negative relationships between workload (Hypothesis 12a) and sleep hygiene behaviors, and between unfinished tasks and sleep hygiene behaviors (Hypothesis 13a), and anger and rumination were proposed to mediate the negative relationships between mistreatment and sleep hygiene behaviors (Hypothesis 14a), These hypotheses were argued based on the transactional model of stress, which stipulates that coping efforts are continually unfolding and influencing one another. Thus, poor sleep hygiene behaviors at night were argued to be a form of maladaptive coping that individuals might engage in to minimize the cognitive and mood-related consequences associated with a stressful workday.

Although the within-person correlations between sleep hygiene behaviors and anger (r_w= -.08, $p<.05$) and rumination (r_w= -.09, $p<.01$) were both significant, all MSEMs conducted failed to support the direct hypotheses between sleep hygiene behaviors and the four affective and cognitive variables. The MSEM results also failed to support the indirect hypotheses. Thus, the

study results indicate that daily workload, unfinished tasks, and mistreatment do not predict poorer sleep hygiene behaviors at night through the specific affective and cognitive pathways studied herein.

Direct Relationship Between Sleep Hygiene Behaviors and Sleep Quality

Based on a wealth of evidence in the sleep medicine literature (e.g., Irish et al., 2015), the present study proposed that sleep hygiene behaviors at night would positively predict sleep quality (Hypothesis 11). Further, the present study expanded a popular measure of sleep hygiene behaviors to include late-night technology use, which has been recognized as an important, albeit less frequently-studied, component of sleep hygiene. This hypothesis was tested across six separate MSEM models, and received support in each one. Furthermore, whereas the other direct pathways supported in this study (e.g., between job stressors and cognitive and affective mediators) had relatively small beta weights, the pathways between sleep hygiene behaviors and sleep quality had notably larger effect sizes. This study thus adds to the accruing evidence on the critical relationship between sleep hygiene behaviors and sleep.

Direct and Indirect Relationships Between Cognitive and Affective Mediators and Sleep Quality

Using the transactional model of stress, and the notion that poorer sleep hygiene behaviors might represent maladaptive coping efforts to address negative emotions and intrusive thoughts, the present study argued that anticipatory stress and anxiety, as outcomes of workload and unfinished tasks, respectively, would negatively predict sleep quality through the mediating role of sleep hygiene behaviors (Hypotheses 12b and 13b). Further, based on allostatic load theory and the cognitive activation theory of stress (CATS), both of which emphasize the health-related consequences of momentary and prolonged affective and cognitive arousal, the present

study argued that anxiety, anger, anticipatory stress, and rumination would predict sleep quality independently of sleep hygiene behaviors (Hypotheses 12c, 13c, and 14c, respectively).

The MSEM analyses did not support any of the mediating hypotheses between the four cognitive and affective variables and sleep quality. In terms of direct effects, the direct relationships between sleep quality and the four cognitive and affective variables (after controlling for the mediating role of sleep hygiene behaviors) were nonsignificant across all six MSEM models. The within-person correlations largely support this pattern of results, with only anticipatory stress demonstrating a significant negative relationship with sleep quality (r_w= -.08, p<.05).

Alternative Models

All of the indirect effects proposed in the current study follow a three-stage mediation model, with a job stressor predicting a cognitive or affective mediator, which in turn predicts sleep hygiene behaviors, which in turn predict sleep quality. There are two possible explanations for the lack of significant indirect effects. First, it is possible that the proposed models indeed misspecified the relationships between the study variables. Second, it is possible that the current study lacked the statistical power to test this complex mediation sequence. A series of alternative models were conducted to investigate these possibilities. Specifically, nine alternative models were run that assessed the relationships between sleep quality and each of the three job stressors with only one (cognitive, affective, or behavioral) mediator. For instance, simple two-stage mediation models were run for (a) mistreatment, rumination, and sleep quality, (b) mistreatment, anger, and sleep quality, and (c) mistreatment, sleep hygiene behaviors, and sleep quality.

Of the nine alternative models, only two supported significant indirect effects: the model with workload, anticipatory stress, and sleep quality, and the model with workload, sleep

hygiene behaviors, and sleep quality. The results of these MSEM analyses can be seen in Tables

12 and 13, respectively. In the model with workload, anticipatory stress, and sleep quality, all

direct effects and indirect effects were significant at the $p < .1$ level. In the model with workload,

sleep hygiene behaviors, and sleep quality, all direct and indirect effects were significant at $p<$

.01. Thus, it appears that daily workload in particular may impact on sleep quality through two

independent pathways: anticipatory stress and sleep hygiene behaviors. However, for daily

mistreatment and unfinished tasks, none of the three affective, cognitive, or behavioral mediators

related to poorer sleep quality.

Theoretical Implications

The present study drew upon the transactional model of stress to argue that daily

workload and unfinished tasks should predict employee anxiety and anticipatory stress, and that

daily mistreatment should predict employee anger and rumination. These hypotheses were based

on the notion that specific appraisals of various job stressors should create distinct pathways

through which the stress process occurs. The results were consistent with this idea, suggesting

the value of a more nuanced, theory-based approach when investigating the negative thoughts

and emotions that might arise in response to job stress. This study's investigation of anticipatory

stress is an important contribution, as the distinction between past-oriented and future-oriented

perseverative cognition has generally received little attention in the job stress literature. The

pattern of results between the job stressors and four cognitive and affective mediators were

consistent with expectations, thus highlighting the value of investigating more specific mediators

that align with the unique nature of the stressor (as opposed to broader variables, such as

negative emotions).

This study also provides valuable insight on the relationships between various coping efforts that employees might engage in to address or resolve their negative reactions to job stress. The results suggest that daily job stressors do predict unique cognitive forms of maladaptive coping that persist through the evening (i.e., anticipatory stress and rumination). However, the results indicate that employees do not consistently respond to daily job stressors or cognitive and affective strains by engaging in poor sleep hygiene behaviors. That said, however, within-person correlational analyses found that sleep hygiene behaviors significantly related to workload, anxiety, and rumination, although these correlations were smaller in magnitude than the other interrelationships between job stressors and cognitive and affective strains. Thus, the lack of significant effects found in the MSEM analyses between job stressors, cognitive and affective mediators, and sleep hygiene behaviors, may simply reflect the fact that coping is a complex, idiosyncratic process (Schwartzer & Knoll, 2003), and that certain employees are less likely to engage in behaviors such as late-night alcohol use, eating, or technology use.

Practical Implications

The present study has a number of important practical implications. First, it is the first (to my knowledge) to investigate the relationship between sleep hygiene behaviors and sleep in a nonclinical sample of full-time employees. Further, it expanded previous operationalizations of sleep hygiene behaviors to include late-night technology use across a variety of communication technologies. MSEM results across six proposed and nine alternative models consistently confirmed the importance of daily sleep hygiene behaviors in predicting employees' sleep quality. Thus, managers and practitioners who wish to promote and protect employee sleep should educate their employees on the importance of good sleep hygiene, including refraining from arousing behaviors late at night such as exercise, eating, drinking, and technology use. An

advantage of targeting sleep hygiene behaviors in wellness interventions is that they are concrete, easily identifiable behaviors. Thus, providing education on and developing monitoring tools for sleep hygiene behaviors may serve as a relatively low-cost intervention for employers who seek to improve employee health and well-being and reduce the deleterious outcomes associated with employee sleep impairment.

Second, the results of this study point to the importance of controlling and managing employees' workload. Daily workload was the only job stressor that significantly related to daily sleep hygiene behaviors (based on correlational analyses), and supplementary analyses indicated that workload significantly (negatively) predicted sleep quality through both anticipatory stress and sleep hygiene behaviors. Thus, it appears that a heavy daily workload predicts cognitive and behavioral strains that persist through the evening, which in turn predict sleep impairment. That said, however, arguments cannot be made about the relative severity of workload versus the other stressors examined in this study in terms of impairing employee sleep. For instance, the lack of significant indirect effects between mistreatment and sleep quality could simply reflect the fact that experiencing mistreatment from coworkers or supervisors has a relatively low base rate. However, managers should be aware of employees' daily workload, aim to minimize it when it becomes unusually high, and/or ensure that employees have the adequate tools necessary to perform their tasks.

Limitations and Suggestions for Future Research

The present study is not without limitations. The first limitation pertains to the particular time frame used. This study was conducted at the daily level over the course of 12 days. As previously mentioned, mistreatment from coworkers and supervisors appeared to have a relatively low base rate in the current study. A different pattern of results might have emerged if

a longer time frame had been employed, since it would have allowed more opportunities for mistreatment episodes to occur.

The time frame used also may have affected the relationships observed with unfinished tasks. Although the direct relationships proposed between unfinished tasks and anxiety and anticipatory stress were significant, unfinished tasks generally had smaller relationships with the four cognitive and affective mediators than the other two job stressors. Previous research on unfinished tasks has been conducted at the weekly level (e.g., Syrek et al., 2017), which may be more appropriate level of analysis to study its effects. For instance, given the types of demands placed on workers (e.g., the rise of "knowledge" work; Foray & Lundvall, 1996), perhaps it is less likely for employees' various tasks to have specified start and end dates on a day-to-day basis. In other words, a weekly time frame (i.e., assessing employees at the end of the work week) might be a more appropriate benchmark for employees to judge whether or not they have unfinished tasks, and experience strains as a result. Future research should therefore explore whether these findings replicate across longer time frames and with varying time lags. Further, for mistreatment specifically, these results could be replicated with a sample drawn from an occupation that tends to experience more mistreatment than average (e.g., nurses; Quine, 2001).

A second limitation is that the present study treated sleep hygiene behaviors as a singular construct. This is consistent with previous research in the sleep medicine literature, which has treated sleep hygiene behaviors as a single construct with multiple components or dimensions (e.g., LeBourgeois, Giannotti, Cortesi, Wolfson, & Harsh, 2005). However, it is possible that significant direct and indirect effects might have emerged in the present study if sleep hygiene was separated into its distinct facets. For example, late-night technology use might be more common than other forms of poor sleep hygiene, such as late-night eating or alcohol use.

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Therefore, if the facet of late-night technology use was examined separately, it is possible that significant direct effects might have been found with anxiety and anticipatory stress, and significant indirect effects might have been found with workload and unfinished tasks. Given that there is currently no theoretical or empirical basis to parse apart sleep hygiene behaviors, the present study did not investigate these possibilities. However, it remains an important question for future research. Indeed, it is important for future research to focus on further conceptual and measurement refinement of the sleep hygiene behaviors construct. Established measures should be expanded to include late-night technology use, for instance, and edited for potential construct contamination.

A third limitation of the present study is that it could not definitively confirm the time frame in which the stressors and strains occurred. Of particular concern is whether employees continued to work from their own home in the evenings. The particular sample in the present study was chosen to minimize this possibility, since working after-hours work is technically prohibited among full-time USF staff employees. However, employees may have worked from home regardless of this policy. It therefore possible that poorer sleep hygiene behaviors (in the form of late-night technology use) captured some variance from job stressors themselves (i.e., heavy workload and unfinished tasks), as opposed to maladaptive coping responses to those stressors. The present study did not control for this possibility, but it is an important question for future research.

Finally, the present study did not explore potential moderators in the relationship between job stressors, cognitive and affective mediators, sleep hygiene behaviors, and sleep. One potential moderator could be nonwork recovery experiences, which includes the dimensions of relaxation (e.g., meditation, yoga), mastery (e.g., learning a new hobby), and psychological

detachment (i.e., mentally disengaging from work during nonwork time; Sonnentag & Fritz, 2007). A recent cross-sectional study by Demsky, Fritz, Hammer, and Black (2019) provides preliminary support for this idea, finding support for a moderated mediation model in which incivility predicted insomnia symptoms via rumination, and this relationship was weakest among employees who engaged in a high amount of recovery experiences. Trait neuroticism might also be a promising moderator to explore, as these individuals are more likely to experience stressors, have more negative appraisals of stressors, and engage in less effective coping strategies (Gunthert, Cohen, & Armeli, 1999), and therefore may be especially likely to engage in the kinds of maladaptive coping techniques that comprise poor sleep hygiene behaviors.

Conclusion

The present study drew upon the transactional model of stress, allostatic load theory, and CATS to investigate whether several prominent job stressors impact employee sleep quality through unique cognitive, affective, and behavioral pathways. The results confirm the importance of examining theoretically appropriate cognitive and affective strains that arise from distinct job stressors. Further, the results indicate that sleep hygiene behaviors, including late-night technology use, play a critical role in impacting employee sleep. However, the proposed three-stage mediation sequence between job stressors, cognitive and affective mediators, sleep hygiene behaviors, and sleep quality was generally not supported. The results suggest that scholars should continue to explore other potential pathways between exposure to daily workload, unfinished tasks, and mistreatment and sleep quality.

Table 12. Alternative Model with Workload Predicting Sleep Quality Through Anticipatory Stress

Parameter	Coefficient	SE	95% Confidence Intervals	
Within-Person Effects				
Random Effects				
Workload → Anticipatory stress				
Intercept	0.15*	0.06	0.46	0.21
Variance	0.05*	0.02	-0.18	3.59
Anticipatory stress→ Sleep quality				
Intercept	-0.08[+]	0.00	-0.17	0.00
Variance	0.01	0.01	-0.02	0.03
Indirect Effects				
Anticipatory stress → Sleep quality	-0.01[+]	0.01	-0.02	0.00

Note. $^+ p <.1$, $* p < .05$; $** p < .01$.

Table 13. Alternative Model with Workload Predicting Sleep Quality Through Sleep Hygiene Behaviors

Parameter	Coefficient	SE	95% Confidence Intervals	
Within-Person Effects				
Random Effects				
Workload → Sleep hygiene behaviors				
Intercept	-0.02**	0.01	-0.03	-0.01
Variance	0.00	0.00	0.00	0.00
Sleep hygiene behaviors→ Sleep quality				
Intercept	1.71**	0.23	1.27	2.16
Variance	1.14*	0.51	0.14	2.14
Indirect Effects				
Anticipatory stress → Sleep quality	-0.03**	0.01	-0.05	-0.02

Note. * $p < .05$; ** $p < .01$.

References

Ancoli-Israel, S., & Roth, T. (1999). Characteristics of insomnia in the United States: Results of the 1991 National Sleep Foundation Survey. *Sleep*, *22*(2), S34.

Åkerstedt, T., Nordin, M., Alfredsson, L., Westerholm, P., & Kecklund, G. (2012). Predicting changes in sleep complaints from baseline values and changes in work demands, work control, and work preoccupation–the WOLF-project. *Sleep Medicine*, *13*(1), 73-80.

Ayas, N. T., White, D. P., Manson, J. E., Stampfer, M. J., Speizer, F. E., Malhotra, A., & Hu, F. B. (2003). A prospective study of sleep duration and coronary heart disease in women. *Archives of Internal Medicine*, *163*(2), 205-209.

Baker, F., Denniston, M., Zabora, J., Polland, A., & Dudley, W. N. (2002). A POMS short form for cancer patients: Psychometric and structural evaluation. *Psycho-Oncology*, *11*(4), 273-281.

Barber, L. K., & Jenkins, J. S. (2014). Creating technological boundaries to protect bedtime: Examining work–home boundary management, psychological detachment and sleep. *Stress and Health*, *30*(3), 259-264.

Barling, J., Barnes, C.M., Carleton, E.L., & Wagner, D.T. (2016). Work and sleep: Looking back, and moving forward. In C. Barnes, D. Wagner, & J. Barling (Eds.), *Work and sleep: Research insights for the workplace* (pp. 3-10). Oxford, UK: Oxford University Press.

Barnes, C. M. (2012). Working in our sleep: Sleep and self-regulation in organizations. *Organizational Psychology Review*, *2*(3), 234-257.

Barnes, C. M., & Drake, C. L. (2015). Prioritizing sleep health: Public health policy recommendations. *Perspectives on Psychological Science*, *10*(6), 733-737.

Bliese, P. D. (1998). Group size, ICC values, and group-level correlations: A simulation. *Organizational Research Methods, 1*(4), 355-373.

Borkovec, T. D., Robinson, E., Pruzinsky, T., & DePree, J. A. (1983). Preliminary exploration of worry: Some characteristics and processes. *Behaviour Research and Therapy*, *21*(1), 9-16.

Brissette, I., & Cohen, S. (2002). The contribution of individual differences in hostility to the associations between daily interpersonal conflict, affect, and sleep. *Personality and Social Psychology Bulletin*, *28*(9), 1265-1274.

Brosschot, J. F., Pieper, S., & Thayer, J. F. (2005). Expanding stress theory: Prolonged activation and perseverative cognition. *Psychoneuroendocrinology, 30*, 1043–1049.

Brown, J. W. (2017). *The effect of justice and injustice on sleep quality* (Order No. 10269595). Available from ProQuest Dissertations & Theses A&I; ProQuest Dissertations & Theses Global. (1892810416). Retrieved from https://search.proquest.com/docview/1892810416?accountid=14745

Bunk, J. A., & Magley, V. J. (2013). The role of appraisals and emotions in understanding experiences of workplace incivility. *Journal of Occupational Health Psychology*, *18*(1), 87-105.

Buysse, D. J. (2014). Sleep health: Can we define it? Does it matter?. *Sleep*, *37*(1), 9-17.

Cann, A., Calhoun, L. G., Tedeschi, R. G., Triplett, K. N., Vishnevsky, T., & Lindstrom,

   C. M. (2011). Assessing posttraumatic cognitive processes: The event related rumination

   inventory. *Anxiety, Stress, & Coping*, *24*(2), 137-156.

Centers for Disease Control and Prevention (2017). *Short sleep duration among US*

   adults. Retrieved from https://www.cdc.gov/sleep/data_statistics.html

Cooper, M. L., Frone, M. R., Russell, M., & Mudar, P. (1995). Drinking to regulate

   positive and negative emotions: A motivational model of alcohol use. *Journal of*

   Personality and Social Psychology, 69(5), 990-1005.

Crain, T. L. (2015). *Investigating relationships among work, family, and sleep: Cross-*

   sectional, daily, and intervention effects (Order No. 3712219). Available from ProQuest

   Dissertations & Theses A&I; ProQuest Dissertations & Theses Global. (1707355198).

   Retrieved from https://search.proquest.com/docview/1707355198?accountid=14745

Cropley, M., Dijk, D. J., & Stanley, N. (2006). Job strain, work rumination, and sleep in

   school teachers. *European Journal of Work and Organizational Psychology*, *15*(2), 181-

   196.

Cropley, M., Michalianou, G., Pravettoni, G., & Millward, L. J. (2012). The relation of

   post-work ruminative thinking with eating behaviour. *Stress and Health, 28*(1), 23-30.

Curran, S. L., Andrykowski, M. A., & Studts, J. L. (1995). Short form of the Profile of

   Mood States (POMS-SF): Psychometric information. *Psychological Assessment*, *7*(1),

   80-83.

De Lange, A. H., Kompier, M. A., Taris, T. W., Geurts, S. A., Beckers, D. G., Houtman, I. L., & Bongers, P. M. (2009). A hard day's night: a longitudinal study on the relationships among job demands and job control, sleep quality and fatigue. *Journal of Sleep Research, 18*(3), 374-383.

Demsky, C. A., Fritz, C., Hammer, L. B., & Black, A. E. (2019). Workplace incivility and employee sleep: The role of rumination and recovery experiences. *Journal of Occupational Health Psychology, 24*(2), 228-240.

Dollander, M. (2002). Etiology of adult insomnia. *L'Encephale*, *28*(6 Pt 1), 493-502.

Drake, C. L., Roehrs, T., Richardson, G., Walsh, J. K., & Roth, T. (2004). Shift work sleep disorder: Prevalence and consequences beyond that of symptomatic day workers. *Sleep*, *27*(8), 1453-1462.

Enders, C. K., & Tofighi, D. (2007). Centering predictor variables in cross-sectional multilevel models: A new look at an old issue. *Psychological Methods, 12*(2), 121-138.

Ferracioli-Oda, E., Qawasmi, A., & Bloch, M. H. (2013). Meta-analysis: Melatonin for the treatment of primary sleep disorders. *PloS One*, *8*(5), e63773.

Foray, D., & Lundvall, B.A. (1996). The knowledge-based economy: From the economics of knowledge to the learning economy. In *OECD, Employment and growth in the knowledge-based economy* (pp. 11–32). Paris: OECD,

Fritz, C. & Crain, T. L. (2016). Recovery from work and employee sleep: Understanding the role of experiences and activities outside of work. In C. Barnes, D. Wagner, & J. Barling (Eds.), *Work and sleep: Research insights for the workplace* (pp.55-76). Oxford, UK: Oxford University Press.

Gallicchio, L., & Kalesan, B. (2009). Sleep duration and mortality: A systematic review and meta-analysis. *Journal of Sleep Research*, *18*(2), 148-158.

Ganster, D. C., & Rosen, C. C. (2013). Work stress and employee health: A multidisciplinary review. *Journal of Management, 39*(5), 1085-1122.

Genet, J. J., & Siemer, M. (2012). Rumination moderates the effects of daily events on negative mood: Results from a diary study. *Emotion*, *12*(6), 1329-1339.

Gunthert, K. C., Cohen, L. H., & Armeli, S. (1999). The role of neuroticism in daily stress and coping. *Journal of Personality and Social Psychology, 77*(5), 1087-1100.

Gradisar, M., Wolfson, A. R., Harvey, A. G., Hale, L., Rosenberg, R., & Czeisler, C. A. (2013). The sleep and technology use of Americans: Findings from the National Sleep Foundation's 2011 Sleep in America poll. *Journal of Clinical Sleep Medicine*, *9*(12), 1291-1299.

Hall, M., Vasko, R., Buysse, D., Ombao, H., Chen, Q., Cashmere, J. D., ... & Thayer, J. F. (2004). Acute stress affects heart rate variability during sleep. *Psychosomatic Medicine*, *66*(1), 56-62.

Hansen, Å. M., Hogh, A., Garde, A. H., & Persson, R. (2014). Workplace bullying and sleep difficulties: A 2-year follow-up study. *International Archives of Occupational and Environmental Health*, *87*(3), 285-294.

Hart, P. M., & Cooper, C. L. (2001). Occupational stress: Toward a more integrated framework. In N. Anderson, D. S. Ones, H. K. Sinangil, & C. Viswesvaran (Eds.), *Handbook of Industrial, Work, and Organizational Psychology* (Vol. 2, pp. 93–114). Thousand Oaks, CA: Sage.

Harvey, A. G., Stinson, K., Whitaker, K. L., Moskovitz, D., & Virk, H. (2008). The

    subjective meaning of sleep quality: A comparison of individuals with and without

    insomnia. *Sleep*, *31*(3), 383-393.

Hietapakka, L., Elovainio, M., Heponiemi, T., Presseau, J., Eccles, M., Aalto, A.-M., . . .

    Sinervo, T. (2013). Do nurses who work in a fair organization sleep and perform better

    and why? Testing potential psychosocial mediators of organizational justice. *Journal of*

    Occupational Health Psychology, *18*(4), 481-491.

Hui, S. K. A., & Grandner, M. A. (2015). Trouble sleeping associated with lower work

    performance and greater healthcare costs: Longitudinal data from Kansas State Employee

    Wellness Program. *Journal of Occupational and Environmental Medicine, 57*(10), 1031-

    1038.

Hülsheger, U. R., Lang, J. W., Depenbrock, F., Fehrmann, C., Zijlstra, F. R., & Alberts,

    H. J. (2014). The power of presence: The role of mindfulness at work for daily levels and

    change trajectories of psychological detachment and sleep quality. *Journal of Applied*

    Psychology, *99*(6), 1113-1128.

Ilies, R., Schwind, K. M., Wagner, D. T., Johnson, M. D., DeRue, D. S., & Ilgen, D. R.

    (2007). When can employees have a family life? The effects of daily workload and affect

    on work-family conflict and social behaviors at home. *Journal of Applied*

    Psychology, *92*(5), 1368- 1379.

Irish, L. A., Kline, C. E., Gunn, H. E., Buysse, D. J., & Hall, M. H. (2015). The role of

    sleep hygiene in promoting public health: A review of empirical evidence. *Sleep*

    Medicine Reviews, 22, 23-36.

Jones, F., & Fletcher, B. C. (1996). Taking work home: A study of daily fluctuations in

      work stressors, effects on moods and impacts on marital partners. *Journal of*

      Occupational and Organizational Psychology, *69*(1), 89-106.

Kao, K. Y., Spitzmueller, C., Cigularov, K., & Wu, H. (2016). Linking insomnia to

      workplace injuries: A moderated mediation model of supervisor safety priority and safety

      behavior. *Journal of Occupational Health Psychology, 21*(1), 91-104.

Karasek Jr, R. A. (1979). Job demands, job decision latitude, and mental strain:

      Implications for job redesign. *Administrative Science Quarterly*, *24*(2), 285-308.

Knutson, K. L., Spiegel, K., Penev, P., & Van Cauter, E. (2007). The metabolic

      consequences of sleep deprivation. *Sleep Medicine Reviews*, *11*(3), 163-178.

Lanaj, K., Johnson, R. E., & Barnes, C. M. (2014). Beginning the workday yet already

      depleted? Consequences of late-night smartphone use and sleep. *Organizational Behavior*

      and Human Decision Processes, *124*(1), 11-23.

Lazarus, R.S., & Folkman, S. (1984). *Stress, Coping, and Adaptation*. New York, NY:

      Springer.

Lazarus, R. S. (1991). Progress on a cognitive-motivational-relational theory of emotion.

      American Psychologist, *46*(8), 819-834.

Lazarus, R.S. (1999). *Stress and Emotion: A New Synthesis*. New York, NY: Springer.

Lazarus, R. S., & Cohen-Charash, Y. (2001). Discrete emotions in organizational life. In

      R. L. Payne & G. L. Cooper (Eds.), *Emotions at work: Theory, research and applications*

      for management (pp. 45–81). Chichester, England: Wiley & Sons.

LeBourgeois, M. K., Giannotti, F., Cortesi, F., Wolfson, A. R., & Harsh, J. (2005). The

relationship between reported sleep quality and sleep hygiene in Italian and American

adolescents. *Pediatrics, 115*(1 0), 257-265.

Leiter, M. P., & Day, A. (2013). *Straightforward Incivility Scale Manual*. Technical

Document: Centre for Organizational Research, Acadia University.

Lin, S. C., Cheng, C. P., Yang, C. M., & Hsu, S. C. (2007). Psychometric properties of

the Sleep Hygiene Practice Scale. *Sleep, 30,* A262.

Linton, S. J., Kecklund, G., Franklin, K. A., Leissner, L. C., Sivertsen, B., Lindberg, E.,

... & Björkelund, C. (2015). The effect of the work environment on future sleep

disturbances: A systematic review. *Sleep Medicine Reviews*, *23*, 10-19.

Litwiller, B., Snyder, L. A., Taylor, W. D., & Steele, L. M. (2017). The relationship

between sleep and work: A meta-analysis. *Journal of Applied Psychology*, *102*(4), 682-

699.

Luckhaupt, S. E., Tak, S., & Calvert, G. M. (2010). The prevalence of short sleep

duration by industry and occupation in the National Health Interview Survey. *Sleep

33*(3), 149-159.

Meurs, J. A., & Perrewé, P. L. (2011). Cognitive activation theory of stress: An

integrative theoretical approach to work stress. *Journal of Management, 37*(4), 1043-

1068.

Mullins, H. M., Cortina, J. M., Drake, C. L., & Dalal, R. S. (2014). Sleepiness at work: A

review and framework of how the physiology of sleepiness impacts the

workplace. *Journal of Applied Psychology*, *99*(6), 1096-1112.

Muthén, L. K., & Muthén, B. O. (1998-2012). *Mplus User's Guide*. Seventh Edition. Los

    Angeles, CA: Muthén & Muthén.

National Institutes of Health (2011). *National Institutes of Health Sleep Disorders*

    Research Plan. Bethesda, MD: National Institutes of Health.

Nezlek, J. B. (2012). Multilevel modeling analyses of diary-style data. In M. R. Mehl &

    T. S. Conner (Eds.), *Handbook of research methods for studying daily life* (pp. 357-383).

    New York, NY: Guilford Press.

Niedhammer, I., David, S., Degioanni, S., Drummond, A., Philip, P., Acquarone, D., …

    Vital, N. (2009). Workplace bullying and sleep disturbances: Findings from a large scale

    cross-sectional survey in the French working population. *Sleep*, *32*(1), 1211–1219.

Nixon, A. E., Mazzola, J. J., Bauer, J., Krueger, J. R., & Spector, P. E. (2011). Can work

    make you sick? A meta-analysis of the relationships between job stressors and physical

    symptoms. *Work & Stress*, *25*(1), 1-22.

Nolen-Hoeksema, S., & Morrow, J. (1991). A prospective study of depression and

    posttraumatic stress symptoms after a natural disaster: the 1989 Loma Prieta

    Earthquake. *Journal of Personality and Social Psychology*, *61*(1), 115-121.

Nolen-Hoeksema, S., Wisco, B. E., & Lyubomirsky, S. (2008). Rethinking rumination.

    Perspectives on Psychological Science, 3(5), 400-424.

Panel, C. C., Watson, N. F., Badr, M. S., Belenky, G., Bliwise, D. L., Buxton, O. M., ...

    & Kushida, C. (2015). Joint consensus statement of the American Academy of Sleep

    Medicine and Sleep Research Society on the recommended amount of sleep for a healthy

    adult: Methodology and discussion. *Sleep, 38*(8), 1161-1183.

Park, Y., Fritz, C., & Jex, S. M. (2011). Relationships between work-home segmentation

and psychological detachment from work: The role of communication technology use at

home. *Journal of Occupational Health Psychology*, *16*(4), 457-467.

Pereira, D., & Elfering, A. (2014). Social stressors at work and sleep during weekends:

The mediating role of psychological detachment. *Journal of Occupational Health*

Psychology, *19*(1), 85-95.

Pereira, D., Gross, S., & Elfering, A. (2016). Social stressors at work, sleep, and

recovery. *Applied Psychophysiology and Biofeedback*, *41*(1), 93-101.

Pereira, D., Meier, L. L., & Elfering, A. (2013). Short-term effects of social exclusion at

work and worries on sleep. *Stress and Health, 29*(3), 240-252.

Pereira, D., Semmer, N. K., & Elfering, A. (2014). Illegitimate tasks and sleep quality:

An ambulatory study. *Stress and Health*, *30*(3), 209-221.

Pieper, S., Brosschot, J. F., van der Leeden, R., & Thayer, J. F. (2007). Cardiac effects of

momentary assessed worry episodes and stressful events. *Psychosomatic Medicine*, *69*(9),

901-909.

Porath, C. L., & Pearson, C. M. (2012). Emotional and behavioral responses to workplace

incivility and the impact of hierarchical status. *Journal of Applied Social*

Psychology, *42*(S1), E326- E357.

Preacher, K. J., Zyphur, M. J., & Zhang, Z. (2010). A general multilevel SEM framework

for assessing multilevel mediation. *Psychological Methods, 15*(3), 209-233.

Quine, L. (2001). Workplace bullying in nurses. *Journal of Health Psychology, 6*(1), 73-

84.

Radstaak, M., Geurts, S. A., Beckers, D. G., Brosschot, J. F., & Kompier, M. A. (2014). Work stressors, perseverative cognition and objective sleep quality: A longitudinal study among Dutch Helicopter Emergency Medical Service (HEMS) pilots. *Journal of Occupational Health*, *56*(6), 469-477.

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical Linear Models*. Thousand Oaks, CA: Sage.

Rodell, J. B., & Judge, T. A. (2009). Can "good" stressors spark "bad" behaviors? The mediating role of emotions in links of challenge and hindrance stressors with citizenship and counterproductive behaviors. *Journal of Applied Psychology*, *94*(6), 1438-1451.

Schwartzer, R., & Knoll, N. (2003). Positive coping: Mastering demands and searching for meaning. In S. J. Lopez & C. R. Snyder (Eds.), *Positive psychological assessment: A handbook of models and measures* (pp. 393–409). Washington, DC: American Psychological Association.

Skinner, E. A., Edge, K., Altman, J., & Sherwood, H. (2003). Searching for the structure of coping: A review and critique of category systems for classifying ways of coping. *Psychological Bulletin*, *129*(2), 216-269.

Sonnentag, S., Binnewies, C., & Mojza, E. J. (2008). " Did you have a nice evening?" A day-level study on recovery experiences, sleep, and affect. *Journal of Applied Psychology, 93*(3), 674-684.

Sonnentag, S., Casper, A., & Pinck, A. S. (2016). Job stress and sleep. In C. Barnes, D. Wagner, & J. Barling (Eds.), *Work and sleep: Research insights for the workplace* (pp. 77-100). Oxford, UK: Oxford University Press.

Sonnentag, S., & Fritz, C. (2007). The Recovery Experience Questionnaire: development and validation of a measure for assessing recuperation and unwinding from work. *Journal of Occupational Health Psychology, 12*(3), 204-221.

Spector, P. E., & Jex, S. M. (1998). Development of four self-report measures of job stressors and strain: Interpersonal Conflict at Work Scale, Organizational Constraints Scale, Quantitative Workload Inventory, and Physical Symptoms Inventory. *Journal of Occupational Health Psychology, 3*(4), 356-357.

Swami, V., Furnham, A., Smyth, N., Weis, L., Lay, A., & Clow, A. (2016). Putting the stress on conspiracy theories: Examining associations between psychological stress, anxiety, and belief in conspiracy theories. *Personality and Individual Differences*, *99*, 72-76.

Swanson, L. M., Arnedt, J., Rosekind, M. R., Belenky, G., Balkin, T. J., & Drake, C. (2011). Sleep disorders and work performance: Findings from the 2008 National Sleep Foundation Sleep in America poll. *Journal of Sleep Research*, *20*(3), 487-494.

Syrek, C. J., & Antoni, C. H. (2014). Unfinished tasks foster rumination and impair sleeping—Particularly if leaders have high performance expectations. *Journal of Occupational Health Psychology*, *19*(4), 490-499.

Syrek, C. J., Weigelt, O., Peifer, C., & Antoni, C. H. (2017). Zeigarnik's sleepless nights: How unfinished tasks at the end of the week impair employee sleep on the weekend through rumination. *Journal of Occupational Health Psychology, 22*(2), 225-238.

Talbot, L. S., Stone, S., Gruber, J., Hairston, I. S., Eidelman, P., & Harvey, A. G. (2012). A test of the bidirectional association between sleep and mood in bipolar disorder and insomnia. *Journal of Abnormal Psychology*, *121*(1), 39-50.

Thayer, R. E., Newman, J. R., & McClain, T. M. (1994). Self-regulation of mood:
Strategies for changing a bad mood, raising energy, and reducing tension. *Journal of Personality and Social Psychology, 67*(5), 910-215.

Ursin, H., & Eriksen, H. R. (2004). The cognitive activation theory of stress. *Psychoneuroendocrinology*, *29*(5), 567-592.

Van den Bulck, J. (2004). Television viewing, computer game playing, and Internet use and self-reported time to bed and time out of bed in secondary-school children. *Sleep*, *27*(1), 101-104.

Wang, M., Liu, S., Liao, H., Gong, Y., Kammeyer-Mueller, J., & Shi, J. (2013). Can't get it out of my mind: Employee rumination after customer mistreatment and negative mood in the next morning. *Journal of Applied Psychology*, *98*(6), 989-1004.

Weiss, H. M., & Cropanzano, R. (1996). Affective events theory: A theoretical discussion of the structure, causes and consequences of affective experiences at work. In B. M. Staw & L. L. Cummings (Eds.), *Research in organizational behavior* (Vol. 18, pp. 1-74). Greenwich, CT: Elsevier Science/JAI Press

West, K. E., Jablonski, M. R., Warfield, B., Cecil, K. S., James, M., Ayers, M. A., ... & Hanifin, J. P. (2011). Blue light from light-emitting diodes elicits a dose-dependent suppression of melatonin in humans. *Journal of Applied Physiology*, *110*(3), 619-626.

Williamson, A. M., & Feyer, A. M. (2000). Moderate sleep deprivation produces impairments in cognitive and motor performance equivalent to legally prescribed levels of alcohol intoxication. *Occupational and Environmental Medicine*, *57*(10), 649-655.

Yang, C. M., Lin, S. C., Hsu, S. C., & Cheng, C. P. (2010). Maladaptive sleep hygiene

    practices in good sleepers and patients with insomnia. *Journal of Health Psychology,*

    15(1), 147-155.

Zhan, Y., Wang, M., & Shi, J. (2016). Interpersonal process of emotional labor: The role

    of negative and positive customer treatment. *Personnel Psychology*, *69*(3), 525-557.

Appendices

USF
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SOUTH FLORIDA

Informed Consent to Participate in Research Involving Minimal Risk

Pro # __00031826_____

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You are being asked to take part in a research study. Research studies include only people who choose to take part. This document is called an informed consent form. Please read this information carefully and take your time making your decision. Ask the researcher or study staff to discuss this consent form with you, please ask him/her to explain any words or information you do not clearly understand. The nature of the study, risks, inconveniences, discomforts, and other important information about the study are listed below.

We are asking you to take part in a research study called:

Daily Work Experiences and Well-Being

The person who is in charge of this research study is Maryana Arvan**.** This person is called the Principal Investigator. However, other research staff may be involved and can act on behalf of the person in charge. She is being guided in this research by Dr. Paul Spector.

The research will be conducted at the University of South Florida Tampa campus. You will also be asked to complete surveys when you are at home.

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Purpose of the study

The purpose of the study is to better understand the interplay between employees' daily work experiences, after-work experiences, and health and well-being.

Why are you being asked to take part?

We are asking you to take part in this research study because you are a full-time staff employee with a traditional working schedule at the University of South Florida Tampa campus. You are also being asked to take part because you are fluent and literate in English, and have access to the Internet at home and at work.

Study Procedures:

If you take part in this study, you will be asked to:

- Take part in an initial 10-15 minute training session in a place on the USF Tampa campus that is most convenient to you. This place may be your office, our lab, or somewhere else.

- Complete an initial online survey that is approximately 10-15 minutes long. This survey will be sent to you on Monday, the same day you finish your initial training session. You may complete this survey either at work or at home.
- Complete three daily online surveys Monday-Friday for the next two work weeks. The first survey will be sent at 6:30 AM, the second survey will be sent at 5 PM, and the third survey will be sent at 9 PM. You may complete this survey either at work or at home. These surveys will be approximately three-five minutes long.
- Complete one online survey on Saturday morning. The survey will be sent at 9 AM, and you will complete this survey at home. This survey will be approximately two minutes long.
- Complete one online survey on Sunday evening. The survey will be sent at 9 PM, and you will complete this survey at home. This survey will be approximately two minutes long.
- Wear an ActiGraph device on your wrist continuously over a 12-day period, beginning the Monday you receive your training session and ending the next Friday. The ActiGraph will record your sleep and physical activity. You will be asked to schedule a time and location with the research team on the last day of data collection (i.e., the second Friday) so they can come and collect the ActiGraph device from you.

Total Number of Participants

About 140 individuals will take part in this study at the University of South Florida Tampa campus.

Alternatives / Voluntary Participation / Withdrawal

You do not have to participate in this research study.

You should only take part in this study if you want to volunteer. You should not feel that there is any pressure to take part in the study. You are free to participate in this research or withdraw at any time. There will be no penalty or loss of benefits you are entitled to receive if you stop taking part in this study. Your decision to participate or not to participate will not affect your job status, employment record, employee evaluations, or advancement opportunities.

Benefits

We are unsure if you will receive any benefits by taking part in this research study.

Risks or Discomfort

This research is considered to be minimal risk. That means that the risks associated with this study are the same as what you face every day. There are no known additional risks to those who take part in this study.

Compensation

You will be compensated up to $55 in gift cards if you complete the baseline survey and all the daily surveys sent to you over the two work weeks. The specific guidelines for compensation are as follows:

- You will receive $5 for completing the baseline survey by the end of the following day after your training session (Tuesday at midnight).
- You will receive $5 for each work day (Monday-Friday) that you complete all three daily surveys sent to you over two work weeks. The surveys will be sent at 6:30 AM, 5 PM, and 9 PM. In order to receive compensation for each work day, you must complete all surveys within two hours after they are sent. You can earn up to $50 in gift cards this way ($5 for each work day over 10 work days).
- Completing or failing to complete the Saturday morning or Sunday evening survey will not affect your compensation.

If you withdraw for any reason from the study before completion, you will be paid $5 for completing the baseline survey and $5 for each subsequent work day in which you completed all the daily surveys.

Costs

It will not cost you anything to take part in the study.

Privacy and Confidentiality

We will keep your study records private and confidential. Certain people may need to see your study records. Anyone who looks at your records must keep them confidential. These individuals include:

- The research team, including the Principal Investigator, study coordinator, and all other research staff. Certain government and university people who need to know more about the study, and individuals who provide oversight to ensure that we are doing the study in the right way.

- Any agency of the federal, state, or local government that regulates this research. [

- The USF Institutional Review Board (IRB) and related staff who have oversight responsibilities for this study, including staff in USF Research Integrity and Compliance.

We may publish what we learn from this study. If we do, we will not include your name. We will not publish anything that would let people know who you are.

You can get the answers to your questions, concerns, or complaints

If you have any questions, concerns or complaints about this study, or experience an unanticipated problem, call Maryana Arvan at (480) 789-9075.

If you have questions about your rights as a participant in this study, or have complaints, concerns or issues you want to discuss with someone outside the research, call the USF IRB at (813) 974-5638 or contact by email at RSCH-IRB@usf.edu.

Statement of Person Obtaining Informed Consent

I have carefully explained to the person taking part in the study what he or she can expect from their participation. I confirm that this research subject speaks the language that was used to explain this research and is receiving an informed consent form in their primary language. This research subject has provided legally effective informed consent.

_____ _____
Signature of Person obtaining Informed Consent   Date

_____
Printed Name of Person Obtaining Informed Consent

Appendix B: Baseline Survey Measures

Technology Use at Home Control Question (Park, Jex, & Fritz, 2011)
Response options range from 1 ("Almost never") to 5 ("Very often")

How often do you use the following communication technologies for work-related purposes at home during nonwork hours?
1. Email/the Internet
2. Computers/laptops
3. Cell phones
4. Tablets

Demographics
1. Gender: ___ Male ___ Female
2. Age: ___
3. Ethnicity:
___ Caucasian/White
___ Native American
___ Latino/Hispanic
___ African American
___ Asian
___ Other (please specify): _____
4. Marital status:
    ___ Single
    ___ Married
    ___ Divorced / separated
    ___ Live-in partner / Domestic partnership
10. What is your current job title? _____
11. How many hours do you work per week? ___
12. When did you begin working for your current company? (Month/ Year) _ _ / _ _ _ _
13. When did you begin working in your current position? (Month/ Year) _ _ / _ _ _ _

Appendix C: Morning Survey Measures (Monday – Friday)

Sleep Hygiene (Lin et al., 2007)- arousal-related behaviors subscale
Response options are 1 ("Yes") or 0 ("No")

1. Did sleep-irrelevant activities in bed (e.g., watching TV, reading)
2. Worried about not being able to fall asleep in bed.
3. Had an unpleasant conversation prior to sleep.
4. Did not have enough time to relax prior to sleep.
5. Fell asleep with the TV or music on.
6. Pondered about unresolved matters while lying in bed.
7. Checked the time in the middle of the night.
8. Worried about night time sleep during the day.
9. Vigorously exercised during the two hours prior to sleep.
10. Spent at least 5 minutes on my smartphone, tablet, or laptop during the hour prior to sleep.*
11. Watched TV during the hour prior to sleep*.
12. Drank alcohol within two hours of bedtime.
13. Drank a lot of non-alcoholic liquid during the hour prior to sleep.
14. Ate a lot during the hour prior to sleep.

*Self-developed.

Sleep Quality (Pittsburgh Sleep Quality Index; Buysse, Reynolds, Monk, Berman, & Kupfer, 1989)
Response options range from 1 ("Very bad") to 4 ("Very good").

1. How do you evaluate this night's sleep?

Appendix D: After-Work Survey Measures (Monday-Friday)

Workload: Spector & Jex (1998).
Response options range from 1 ("Not at all") to 5 ("Extremely")

Please indicate the extent to which the following statements apply to your experiences at work today.

1. Today my job required me to work very fast
2. Today my job required me to work very hard
3. Today my job left me with little time to get things done
4. Today I had to do more work than I can do well

Unfinished Tasks (Sverke et al., 2017)
Response options range from 1 ("Strongly disagree") to 5 ("Strongly agree")

Please indicate the extent to which you agree or disagree with the following statements.
1. I have not finished important tasks that I had planned to do today.
2. I have not finished a large amount of due tasks today.
3. I have not completed today's urgent tasks.
4. I have not even started with important tasks I wanted to fulfill today.
5. I need to carry many of today's due tasks into tomorrow.
6. I have not started working on urgent tasks that were due today.

Mistreatment: Leiter, M. P. & Day, A. (2013). *Straightforward Incivility Scale Manual*.
Technical Document: Centre for Organizational Research, Acadia University.
Response options: 0, 1, 2, more than 2

How many times has someone at work (supervisor, coworker or subordinate) done the following?

1. behaved without consideration for you
2. ignored you
3. excluded you
4. spoke rudely to you
5. behaved rudely to you

Anxiety/Tension (POMS-SF; Shacham, 1983)
Response options are 1 ="Not at all", 2= "A little", 3= "Moderately," 4= "Quite a bit", and 5= "Extremely"

Below is a list of words that describes feelings people have. Please indicate the response that best describes how you feel **right now.**

1. Tense
2. On edge
3. Uneasy
4. Restless
5. Nervous

6. Anxious

Anger/Hostility (POMS-SF; Shacham, 1983)
Response options are 1 ="Not at all", 2= "A little", 3= "Moderately," 4= "Quite a bit", and 5= "Extremely"

Below is a list of words that describes feelings people have. Please indicate the response that best describes how you feel **right now.**
1. Angry
2. Peeved
3. Grouchy
4. Annoyed
5. Resentful
6. Bitter
7. Furious

Appendix E: Evening Survey Measures (Monday-Friday)

Anticipatory Stress (self-developed)
Response options range from 1 ("Not at all") to 5 ("Extremely")

Please indicate the extent to which each of the following statements applies to your experiences **tonight.**
1. Last night, I couldn't stop thinking about what I need to do today.
2. Last night, I kept thinking about what was going to happen today.
3. Last night, I couldn't get today out of my head.
4. Last night, it was hard to think about anything other than what would happen today.

Rumination: (Genet & Siemer, 2012; Nolen-Hoeksema & Morrow, 1991)
Response options range from 1 ("Not at all") to 5 ("Extremely")

Please indicate the extent to which the following experiences were true for you **tonight**.
1. I could not stop thinking about unpleasant situations at work over and over.
2. I couldn't stop thinking about how I was feeling about an unpleasant situation at work.
3. I continued to think about an unpleasant situation at work, wishing it had gone differently.

Appendix F: Saturday Morning Survey Measures

Sleep Hygiene (Lin et al., 2007)- arousal-related behaviors subscale
Response options are 1 ("Yes") or 0 ("No")

Please indicate whether you did any of the following behaviors last night.
1. Did sleep-irrelevant activities in bed (e.g., watching TV, reading)
2. Worried about not being able to fall asleep in bed.
3. Had an unpleasant conversation prior to sleep.
4. Did not have enough time to relax prior to sleep.
5. Fell asleep with the TV or music on.
6. Pondered about unresolved matters while lying in bed.
7. Checked the time in the middle of the night.
8. Worried about night time sleep during the day.
9. Vigorously exercised during the two hours prior to sleep.
10. Spent at least 5 minutes on my smartphone, tablet, or laptop during the hour prior to sleep.*
11. Watched TV during the hour prior to sleep*.
12. Drank alcohol within two hours of bedtime.
13. Drank a lot of nonalcoholic liquid during the hour prior to sleep.
14. Ate a lot during the hour prior to sleep.

*Self-developed.

Sleep Quality (Pittsburgh Sleep Quality Index; Buysse, Reynolds, Monk, Berman, & Kupfer, 1989)
Response options range from 1 ("Very bad") to 4 ("Very good").

1. How do you evaluate this night's sleep?

Appendix G: Sunday Evening Survey Measures

Anticipatory Stress (self-developed)
Response options range from 1 ("Not at all") to 5 ("Extremely")

Please indicate the extent to which each of the following statements applies to your experiences **tonight.**
1. Tonight, I couldn't stop thinking about what I need to do tomorrow.
2. Tonight, I kept thinking about what was going to happen tomorrow.
3. Tonight, I couldn't get tomorrow out of my head.
4. Tonight, it was hard to think about anything other than what would happen tomorrow.

Appendix H: Institutional Review Board Approval Letter

USF RESEARCH INTEGRITY AND COMPLIANCE
Institutional Review Boards, FWA No. 00001669
UNIVERSITY OF
SOUTH FLORIDA
12901 Bruce B. Downs Blvd., MDC035 • Tampa, FL 33612-4799
(813) 974-5638 • FAX (813) 974-7091

September 20, 2017

Maryana Arvan, M.A.
Psychology
4202 East Fowler Ave.
Tampa, FL 33620

RE: **Expedited Approval for Initial Review**
IRB#:   Pro00031826
Title: Daily Work Experiences and Well-Being

Study Approval Period: 9/20/2017 to 9/20/2018

Dear Ms. Arvan:

On 9/20/2017, the Institutional Review Board (IRB) reviewed and **APPROVED** the above
application and all documents contained within, including those outlined below.

Approved Item(s):
Protocol Document(s):
Study Protocol- Version 1- 9.16.17.docx

Consent/Assent Document(s)*:
Informed Consent- Version 1- 9.16.17.docx.pdf

*Please use only the official IRB stamped informed consent/assent document(s) found under the
"Attachments" tab. Please note, these consent/assent documents are valid until the consent
document is amended and approved.

It was the determination of the IRB that your study qualified for expedited review which
includes activities that (1) present no more than minimal risk to human subjects, and (2) involve
only procedures listed in one or more of the categories outlined below. The IRB may review
research through the expedited review procedure authorized by 45CFR46.110. The research
proposed in this study is categorized under the following expedited review category:

(6) Collection of data from voice, video, digital, or image recordings made for research purposes.

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

As the principal investigator of this study, it is your responsibility to conduct this study in accordance with IRB policies and procedures and as approved by the IRB. Any changes to the approved research must be submitted to the IRB for review and approval via an amendment. Additionally, all unanticipated problems must be reported to the USF IRB within five (5) calendar days.

We appreciate your dedication to the ethical conduct of human subject research at the University of South Florida and your continued commitment to human research protections. If you have any questions regarding this matter, please call 813-974-5638.

Sincerely,

John A. Schinka, Ph.D.

John Schinka, Ph.D., Chairperson
USF Institutional Review Board