UNDERSTANDING TIME USE, STRESS, AND RECOVERY

AMONG MEDICAL RESIDENTS

By

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ABSTRACT

The medical resident population is especially likely to experience burnout and other negative health-related consequences due to the workplace stressors they encounter. A primary purpose of the present study was to provide insight into the stress and recovery challenges faced by medical residents in a typical hospital environment. Thirty-eight participants provided rich quantitative and qualitative data regarding their daily work and non-work time usage, recovery practices, and needs. Results showed that medical residents report (on average) longer working hours, less leisure time, and shorter amounts of sleep when compared with the average working American. A detailed assessment of time usage showed that medical residents do not participate in many resource replenishing activities while at work, and when out of work, tend to participate in more passive than active forms of recovery. The present results provide rich information that can aid in the creation of a more occupation-specific model of workplace stress and recovery practices for medical residents and workers in other occupations.

DEDICATION

To the three women who have been with me every step of the way, my step-mother, Kathie Herrmann, Fran Creegan, and my grandmother, Margaret Bailey, who always knew that I would “go all the way, baby!”

Lastly, I dedicate this to those closest to me, who have supported me, listened, and been my continued sources of replenishment during this process. Thank you all for being the best form of recovery I could ever hope for.

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LIST OF ABBREVIATIONS

ACGME, Accreditation Council for Graduate Medical Education

PGY, Post Graduate Year

SIG, Stress in General Scale

QWI, Quantitative Workload Inventory

REQ, Recovery Experiences Questionnaire

NFRRS, Need for Resource Recovery Scale

FAS, Fatigue Assessment Scale

SQS, Sleep Quality Scale

OLBI, Oldenburg Burnout Inventory

PANAS-X, Positive and Negative Affectivity

CHAPTER I

INTRODUCTION

According to the U.S. Department of Labor, the average American works a mean of 7.5 hours per day (approximately 31% of a 24 hour day). Also on an average day, a mean of 5.18 hours are spent in leisure activities, such as watching television, socializing, or exercising, and an additional 8.67 hours are spent sleeping (American Time Use Survey, 2010). These types of leisure activities are necessary to regain lost emotional resources and experience recovery.

When almost a third of an average person's day is spent at work, it is necessary to understand the dynamics of that work experience, including one's exposure to stressors in the work environment and one's ability to cope with and recover from such stressors on a day-to-day basis. Long work hours (Major, Klein, & Ehrhart, 2002) and high productivity demands (Geurts & Demerouti, 2003) have been associated with poorer overall wellbeing and decreased wellbeing over time (Sonnentag, Binnewies, & Mojza, 2010).

What links all of these daily segments of time use together is the understanding that chronic or uninterrupted exposure to stressors, including high levels of work demands or workload, is associated with a decrease in workers' abilities to psychologically detach from work during "off-work" time (Sonnentag & Bayer, 2005). This, in turn, is associated with a variety of physiological and psychological consequences, including heightened negative affectivity at bedtime, which can then affect sleep quality, and prevent workers from recovering before

additional stressors are experienced (Morin, Rodrigue, & Ivers, 2003; Sonnentag & Bayer, 2005). Over time, a person's inability to detach from work and engage in effective recovery processes may create a situation in which severe burnout is the likely result (e.g., Sonnentag, 2005). Such a condition is very serious and could, in its full-blown form, render an individual extremely ineffective on the job and in a very poor state of psychological and physical wellbeing.

As work environments go, one of the most consistently stress-inducing is a hospital setting. Indeed, those who work as healthcare providers in these settings may be particularly at risk for significant effects of what is described here as a type of ongoing stress→failed detachment→non-recovery cycle. The early years as a physician in internship or residency programs are considered to be among the most stressful working periods, making physicians at this career stage particularly vulnerable to chronic stress conditions, such as emotional exhaustion and potentially burnout (e.g., Hillhouse, Adler, & Walters, 2000). Perhaps more importantly, lack of attention to recovery issues at this stage of professional development may have the unfortunate consequence of establishing habitually poor lifestyle routines for physicians that can potentially jeopardize their health and wellbeing long after residency is finished.

In contrast to typical working adults, medical residents can average an 80-hour workweek, and at times may approach 24 continuous hours working (ACGME, 2011). These work conditions (i.e., generally stressful environment, long work hours, inability to physically and psychologically detach from work) contribute to medical residents being a high-risk population for burnout and other negative health-related consequences of failure to adequately recover from one's efforts to manage daily stress. Thus, a primary purpose of the present study was to provide insight into the stress and recovery challenges faced by these residents in a typical hospital environment.

The following sections provide a high-level explanation of stress and recovery processes, including discussion of specific stressors that are particularly relevant to medical residents.

Stress Processes Associated with Work

Several different models have been proposed to describe the influence of stressors on a person's health and wellbeing. Although the recovery process was operationalized initially by Meijman and Mulder (1998) in terms of an Effort-Recovery Model, which implicitly includes a stress component, other models/theories of stress are also helpful in explaining how stress can develop within a work environment and create a need for recovery within workers who must respond to such stress on a daily basis. The present study is based on both the Conservation of Resources theory (Hobfoll, 1989) and the Effort-Recovery model (Meijman & Mulder), which provide perhaps the most comprehensive basis for understanding the complexities of intrapersonal stress and recovery processes.

Conservation of Resources (COR) Theory. The COR model of stress assumes that work demands can deplete an individual's resources, which are needed to respond effectively to sources of stress. Resources are defined as "those objects, personal characteristics, conditions, or energies that are valued by the individual or that serve as a means for attainment of these objects, personal characteristics, conditions, or energies" (Hobfoll, 1989, p. 516). According to the COR model, people actively work to keep from losing resources, create a surplus when they can, and attempt to actively gain new resources whenever possible (Hahn, Binnewies, Sonnentag, & Mojza, 2011; Hobfoll). Hobfoll asserts that this creates a natural cycle for the individual in which resources are depleted, restored, depleted, and so on.

Among the many tenets of COR theory are two especially important principles relevant to the present study. First, resource loss is more detrimental (at least psychologically) to the individual than resource gain (Hobfoll, 2001). Second, individuals have to invest some resources to protect other resources from being lost in the future, to recover resources that are already lost, and to gain new resources for the future. Because of this investment requirement, individuals with more resources are more able to gain new resources to offset future loss and less likely to be impacted so strongly by resource-threatening scenarios than individuals with fewer resources. In a similar fashion, individuals with fewer available resources are more susceptible to current and future resource loss (Hobfoll). Both the perceived threat of resource loss and the actual loss of one's valued resources can engender the feeling of stress within an individual.

Hobfoll (1989) identifies four different types of resources. The first is *objects*, which are valued because of their rarity or expensive in these resources' physical nature. An example often used to describe this type of resource is one's home. The home provides a functional purpose in that it is one's shelter. However, the size, location, and furnishings associated with the house may increase its value in both a monetary and societal way. The second type of resource is what is referred to as *conditions*. Examples of conditions are marriage, education level, tenure, and seniority. These conditions are considered because of individuals seeking out to obtain these conditions. By assessing how much these conditions mean to an individual can provide insight in the levels of stress associated with the loss of these particular resources. The third type of resource is *personal characteristics*. According to Hobfoll, "investigations of various personal resources suggest that many personal traits and skills aid stress resistance" (p. 517). The last type of resource is *energies*, which are often manifested in things like time and money. This type of resource has more of a fundamental value rather than having the ability to aid in the

development of new resources. Resources falling within each of these four categories can have either instrumental or symbolic value to an individual. Resources with instrumental value mean that these resources have practical value, whereas symbolic values mean that these resources help individual's define "who they are" (Brotheridge & Lee, 2002).

An individual will experience feelings of stress if resource loss occurs, or if there is even a threat for loss (Hobfoll, 1989). These feelings of stress related to resource depletion have also been linked to burnout, with research showing that sustained emotional exhaustion caused by a chronic depletion of emotional resources could lead to feelings of depersonalization (a core component of burnout) as an attempt to protect oneself from any future loss (Brotheridge & Lee, 2002). The COR model relates to the recovery process in that it assumes that people will consciously and subconsciously spend as much time as possible during the day engaged in resource-building activities that will help them prepare for or prevent future resource loss (Zijlstra & Cropley, 2006).

In the present study, COR theory is relevant because it helps to explain how a depletion or threat of depletion in resources serves as a catalyst for stressful experiences (and development of recovery needs). For the present study, depletion in resources is considered a negative by-product of experiencing workplace stress, which is exacerbated by a lack of recovery. Recovery, in itself, is a regaining of lost resources, and the building of new, to help maintain a homeostatic level of stress.

Effort-Recovery (E-R) Model. The basis for the Effort-Recovery model has three main parts: work demands, work potential, and decision latitude (Meijman & Mulder, 1998). Work demands are characterized as the level of task demands and the workplace environmental factors

that surround the demands. Work potential is characterized as the employee's work abilities and workplace effort. Lastly, decision latitude is a person's ability to make work-related decisions. These three parts of the E-R model determine how the employee proceeds during the workday, which results in two types of outcomes: (1) the tangible product of the workplace effort which is evaluated in some way, and (2) the physiological and psychological reaction to the quantitative workload.

Within the E-R model, physiological and psychological effects to the workload are characterized as being negative in nature. However, these negative effects have the potential to be reversible. When the exposure to the workload goes away, the physical and psychological systems will return to the baseline (normal) level. The baseline level is determined by how the individual is in these states during "off-work" times when he/she is not exposed to workload. When the system does return to the baseline level it is assumed that the individual has successfully recovered from the adverse load reaction (Meijman & Mulder, 1998; Sonnentag & Zijlstra, 2006). However, if there is a continued depletion of resources without active recovery practices an employee can experience was has been termed a *need for recovery,* which can be experienced as feelings of fatigue, and overall poorer wellbeing. A need for recovery is essentially a precursor effect, or warning, to an individual's actual need for recovery from stress. This lack of resource recovery can lead to a cycle of stress when recovery is incomplete (Cunningham, 2008).

The E-R model was identified as the primary foundation for the recovery process elements of the present research. Among medical residents, effort and recovery practices are critically important to better understand. Members of this population have to meet high levels of workload along with long work hours, and in concurrence with the E-R model, are therefore

need more recovery. It is expected, however, that due to typical work demands and lifestyle practices, members of this population are not participating in sufficient recovery activities to offset their potentially significant resource losses.

Specific Workplace Stressors

Apart from general theories that attempt to explain the stress process, modern work organizations are characterized by the presence or absence of specific stressors or stress-inducing stimuli. Modern organizations in particular are often characterized by high levels of job demands. Such demands may lead to performance gains, encouraging organizations to sustain such demands (Sonnentag et al., 2010). In part, this perceived performance benefit is likely a result of increased productivity tied to a common response to high workload as a challenge to be overcome. This is especially likely when high workload is, "experienced as time pressure and is often dealt with by working faster or working longer hours" (Major et al., 2002, p. 395). Unfortunately not everyone perceives stressors such as workload the same way; some would see it as threatening more than challenging (Fuller, Stanton, Fisher, Spitzmüller, Russell, & Smith, 2003). Also, workers lacking the resources needed to respond to sustained high levels of workload are likely to experience significant problems.

Specifically, high work demands have also been associated with poorer overall wellbeing and decreased wellbeing over time (Sonnentag et al., 2010). Compared to other common work stressors, workload has been perceived as more stressful than feelings of role ambiguity or role conflict (Sonnentag & Kruel, 2006). An increased productivity demand has been shown to have a negative effect on health and wellbeing, because it limits the employee's opportunity for recovery during "off-work" time (Geurts, Kompier, Roxburgh, & Houtman, 2003).

Research has also shown that when an employee has a high demand or high intensity work day it is more difficult for them to "unwind" after work, which results in higher difficulty in achieving a recovery state (Sonnentag & Bayer, 2005; Sonnentag & Kruel, 2007). Sonnentag and Bayer found that when employees were presented with a high workload, they were less able to psychologically detach from work. This is a paradoxical relationship due to the fact that when there is a high workplace demand, the need for recovery from those demands increases. However, recovery is less likely to actually be achieved on such days because employees cannot detach themselves from work. The net result is that an inability to regain lost resources leads to a higher likelihood of losing even more resources responding to stressors during the next work period.

The association between high workload and poor employee wellbeing may be due in part to the fact that employees facing high work demands must expend more of their limited resources when responding to these demands. In keeping with the previously mentioned stress and recovery theories, the chronic and continued exhaustion of these resources can increase the employee's risk for emotional exhaustion, burnout, and other chronic stress conditions. Employees experiencing these and other forms of negative psychological wellbeing have also been shown to perform work at a reduced level and report an increased number of other health problems (e.g., Taris et al., 2005).

It is also important to point out, that the effects of long hours (Major et al., 2002) and high productivity demands at work (Geurts & Demerouti, 2003) can transcend the work environment, contributing to work-family conflict and general marital discord (e.g., Story & Repetti, 2006) and related cross-domain stressors and to more general feelings of psychological distress. Such spillover from work to non-work environments is especially problematic when

one realizes that the presence of stressors and strains in a person's non-work environment is likely to have a negative effect on that person's ability to recover. In other words, continuing to cope with work stressors during off-work time prevents an individual from having the opportunity to effectively recover and regain expended resources. Along these lines, Fritz, Sonnentag, Spector, and McInroe (2010) found that "off-work" hassles (such as arguments with a spouse) negatively affected an individual's ability to successfully recover. It was suggested that managing hassles uses self-regulatory resources that have the potential to already be depleted due to stress experienced at work.

The Recovery Process

Recovery is a process closely linked to one's experiences with stress that originates in all of a person's daily life role domains. It is perhaps described most clearly by Meijman and Mulder (1998):

> In the practice of the study of workload, the short-term reactions include all the responses at a physiological, behavioral and subjective level that can be related to the load process. These reactions are in principle reversible. When the exposure to load ceases, the respective psychobiological systems will stabilize again at a specific baseline level within a certain period of time. This process is called recovery. (p. 8)

Periods of recovery afford people the opportunity to regain lost resources. Sonnentag and Zijlstra (2006) provide an example of this in terms of participating in a physical activity, such as running: "When people get tired, they want to stop running, and take a rest. Also, mentally demanding activities can make people long to have a break, implying a need to stop thinking about the task at hand" (p. 331). This feeling of "needing to take a break" is the body's method of alerting the individual that it is time to slow down so that the depleted resources can be regained and the psychological systems can return to the baseline level. A lack of recovery

results in a continued depletion of resources, which can lead to feelings of emotional exhaustion, and the possible development of a chronic stress condition (Brotheridge & Lee, 2002; Taris, Le Blanc, Schaufeli, & Schreurs, 2005).

Recovery is most likely to be experienced by a person when no workplace demands are being placed on that individual (Meijman & Mulder, 1998). This type of recovery typically takes place during "off-work" times when the person is both physically and psychologically away (i.e., detached) from the work environment. During such times the individual has the option of making choices from among a wide variety of behaviors and activities that can contribute to recovery via passive or active mechanisms (Sonnentag, 2001; Sonnentag & Jelden, 2009).

Active forms of recovery can be participation in sports, exercise, or volunteer activities, while passive forms of recovery include such activities as watching television and sleeping. Although active recovery requires some investment of resources, the potential returns on this type of investment are greater, meaning that active forms of recovery have been shown to not only restore spent resources, but also generate new resources. Passive recovery experiences, however, tend to only facilitate a restoration to a homeostatic level of perceived stress/demand and resource availability (Sonnentag, 2001). One exception to this general conceptualization, however, is sleep, which is considered to be a relative easy and very effective method of recovery (Sonnentag, Binnewies, & Mojza, 2008). Sleep can arguably be seen as passive or active depending on one's perspective, and as such it falls in a sort of grey area between active and passive recovery options.

There are other challenges too, when the effort is made to distinguish recovery activities as only active or passive in nature. For instance, some of these experiences might be better

viewed as existing on a continuum ranging from passive to active. In addition, there are other ways of categorizing recovery behaviors and activities that might more clearly support recovery theory and intervention development.

Ultimately, recovery is a personal process and each individual is the only one with control over and an understanding of which recovery strategies and activities will enable him/her to effectively manage physiological and psychological responses to daily stressors. Apart from considering the many different behaviors and activities that can facilitate recovery as active or passive, it is also possible to group recovery activities into the following core forms: psychological detachment, relaxation, mastery experiences, control, and sleep (Sonnentag & Fritz, 2007).

Psychological Detachment. Detachment from one's work can be both physical and psychological in nature. This "switching off" after an employee has left the workplace is the basis for psychological detachment. Psychological disengagement from one's job is a necessary component for recovery so that workplace thoughts do not further drain the employee's emotional resources when he/she is supposed to be in a state of recovery (Fritz et al., 2010; Kaplan, 1995). With today's technology, it is becoming more difficult to successfully detach psychologically from work after the workday is done. Now, just because one is not physically at the workplace does not mean that he/she is not still mentally working or preparing for the following day.

A lack of psychological detachment from the workplace environment has been shown to have potential negative effects in the short and long term. For example, in a longitudinal study conducted by Sonnentag et al. (2011), "a lack of psychological detachment from work during

off-job time predicted an increase in emotional exhaustion one year later" (p. 971). A lack of successful psychological detachment from work has also been shown to affect an individual's wellbeing before sleep (Sonnentag & Bayer, 2005). An individual's wellbeing at bedtime has been shown to influence the quality of sleep one receives that night (Morin et al., 2003; Sonnentag & Bayer). Sleep quality has also been shown to affect an employee's workplace behavior the following day (Krueger, 1989).

With a lack of psychological detachment before bedtime potentially influencing one's quality of sleep, it can be inferred that psychological detachment plays a role in determining an individual's workplace behavior. Sonnentag et al. (2008) found that low levels of psychological detachment from work during the evening hours were associated with feelings of fatigue and negative affectivity during the morning after. Alternatively, relaxation and mastery experiences were associated with positive activation during the following morning. These findings demonstrate that experiences the night before can play a significant role in how the individual feels the morning after.

Relaxation. Relaxation involves mental and physical experiences that are associated with "low sympathetic activation" (Hahn et al., 2011). Meaning that it is associated with a decreased heart rate, tension in the muscles, and other types of physical reactions to stress (Sonnentag et al., 2008). There are stress interventions that can calm the body and mind. Examples of these activities would be meditation or listening to certain types of music. Relaxation methods are often associated with feelings of positive affectivity (positive mental states), and have been shown to have a negative relationship with sleep problems, need for recovery, and feelings of fatigue (Sonnentag & Fritz, 2007). Participation in relaxation

experiences after vacationing has been shown to help prologue the positive recovery effects gained during the off-work time (Kuhnel & Sonnentag, 2011).

Mastery Experiences. These are recovery activities that are associated with challenge and learning. These experiences are meant to help distract the individual from the demands of one's job and gain back lost resources, which can be used to help cope with future demands (Hahn et al., 2011; Hobfoll, 1989). According to Sonnentag et al. (2008), mastery experiences "challenge the person without overtaxing his or her capabilities" (p. 676). These experiences increase the individual's resources by yielding a sense of expertise or confidence in one's abilities (Hahn et al.; Sonnentag et al., 2008). Mojza, Lorenz, Sonnentag, and Binnewies (2010) found that mastery experiences help in one's ability to create a sense of self-efficacy.

Certain types of mastery experiences have been identified as more beneficial than others. The most effective activities include exercise, learning activities, and volunteer work (Hahn et al., 2011; Mojza et al., 2010). Volunteer work has been shown to aid significantly in the recovery process because of one's ability to create new relationships and experiences, which aid in building new resources. Volunteer work can be demanding on the individual, but still serve as a source for recovery (Mojza et al.); one possible explanation for this is that choosing to volunteer is an act of control that would not be possible in an otherwise strongly demanding work environment. Research has shown that individual's perceptions of his or her positive impact through volunteer experiences helped to serve as a buffer against feelings of emotional exhaustion caused by employees having negative perceptions of one's workplace tasks and identities (Grant & Sonnentag, 2010). Grant and Sonnentag also found that having these positive

mastery experiences (through the building up of new resources) affects the employee's perception of their workplace identity, which positively affects job performance.

In addition to volunteering, when an individual is experiencing high levels of workplace stress, physical exercise has been shown to be especially beneficial with not just recovery from stress, but also as a mood regulator (Sonnentag & Jelden, 2009). Exercise has also been shown to be associated with a positive mood at bedtime (Sonnentag & Bayer, 2005). This could imply that exercise routines have the ability to influence the quality of the employee's daily life due to its effect on mood at bedtime.

Unfortunately, mastery experiences are sometimes difficult for individuals to participate in because they require an additional investment of resources during a time when many individuals simply want to "relax". This natural desire will lead to potentially less effective, passive recovery strategies, especially if the individual lacks self-regulatory resources (Mojza et al., 2010; Sonnentag & Jelden, 2009). Self-regulation is the ability of the individual to consciously alter its processes, and override the individual's desires (Sonnentag & Jelden).

Self-regulation is a limited resource, similar to other resources expended when dealing with work-related stress. When self-regulatory resources are depleted in response to continued stress, people may be prevented from engaging in activities that require aspects of self-control, like exercise, thus continuing a vicious cycle. An individual feels a need for recovery (Cunningham, 2008), but does not have the necessary resources available (due to fatigue, etc.) to participate in active recovery experiences (Sonnentag, 2001; Sonnentag & Jelden, 2009). After a stressful day at work, employees tend to want to avoid participating in activities that require more effort, which is typically when self-regulatory processes step in. The existence of routines

has been shown to aid in the participation in mastery activities when self-regulatory resources are depleted (Sonnentag & Jelden).

Control. These types of workplace recovery experiences allow the individual to spend time on things that matter most to him/her. These could be any form of activities or experiences that are in line with goals or other individual desires (Hahn et al., 2011). This leaves less time for things that are considered stressful or not beneficial. Research has shown that having control over an individual's non-work time has the potential to increase the positivity of the individual's affective state. For the purposes of the present study, specific questions of control were developed and posed to participants in reference perceptions of control over work, home, and leisure time usage.

Sleep. Sleep is sometimes ignored as a method of recovery because it is so passive in nature. Paradoxically, carving out time for sleep and preparing oneself for sleep requires significant effort for many individuals. Regardless of whether sleep is seen as a passive or active recovery strategy, sleep has been shown to have significant restorative and positive effects on workplace performance (Krueger, 1989). The impact of sleep quantity is not typically researched as much as the impact of sleep quality. Sonnentag et al. (2008) found that sleep quality was the strongest predictor of positive and negative affective states during the following morning. Poor sleep quality has also been shown to have a negative impact on the individual during the following workday (Krueger, 1989; Sonnentag et al.), and negatively impact an individual's ability to self-regulate (Muraven & Baumeister, 2000). This creates a type of "domino-effect" for the employee because if self-regulation abilities are effected by poor sleep

quality then the employee will have less of the self-regulatory resources available to successfully cope with the following day's stressors.

As mentioned previously, regardless of whether a specific recovery behavior or activity is active or passive in nature, or could be identified as detachment, relaxation, mastery experiences, control, or sleep, the actual choice of which type of recovery to engage in is an individual one. This raises the possibility that individual differences in recovery strategies and preferences are likely to exist. Thus, what one person might find relaxing may not have the same effects for another person. An individual's definition of what they find to be relaxing is influenced by their individual preferences or individual differences (Fritz et al., 2010). In addition, these two typologies of recovery experiences highlight the possibility that not all recovery behaviors and activities are equivalent in terms of their ability to address an individual's specific recovery needs.

Burnout among Medical Residents: Consequence of High Stress and Poor Recovery

Workers in all occupations can experience burnout, though employees in human service and education fields have been found to have the highest reported rates of employee burnout (Dobkin & Hutchinson, 2010; Maslach et al., 2001). Maslach et al. attributes higher rates of burnout in these fields to "emotional strain" that is encountered by individuals in those professions. Employees in such organizations tend to become more emotionally invested in their work resulting in the potential to be more intensely affected by what they encounter. Social workers, physicians, and individuals in health professions have been considered to be in the "high risk" category for burnout (Cohen & Gagin, 2005). However, within this "high risk" category, general medical practitioners have been shown to experience relatively high levels of

burnout when compared to other types of human service professions (Bakker et al., 2000). It has been shown that a prolonged imbalanced relationship between practitioners and patients may deplete the practitioner's emotional resources, resulting in burnout (Bakker et al.).

Burnout has been shown to have significant negative effects on employee performance (Lakin, Leon, & Miller, 2008). For medical residents, the existence of burnout has the potential to negatively affect job performance and consequentially the quality of patient care (Dobkin & Hutchinson, 2010; Lue, Chen, Wang, Cheng, & Chen, 2010; Shanafelt, Bradley, Wipf, & Back, 2002;). Shanafelt et al. found that those residents who were considered to be "high" in their level of burnout "were also more likely to report suboptimal patient care practices at least monthly" (p. 362).

Baldwin, Dodd, and Wrate (1997) found that the amount of mistakes reported by medical residents was positively associated with feeling overwhelmed at work. Similarly, Maslach, Schaufeli, Leiter, and Goldberg (2003) found that medical residents who were categorized as being "high" in depersonalization were more likely to report suboptimal attitudes, and twice as likely to report suboptimal patient practices. West, Huschka, Novotny, Sloan, Kolars, Habermann et al. (2006) found that each one point increase in reported depersonalization and emotional exhaustion in internal medicine residents yielded a 10% and 7% increase (respectively) in self-reported medical errors over the course of three months. Burnout has been shown to be associated with "more difficult client problems, higher emotional demands of patients, greater percent of time in direct care for patients, and a higher exposure to patients with a poor diagnosis" (Bakker et al., 2000, p. 422).

The Present Study

In hopes of improving our understanding of the occupational stress and recovery practices of medical residents, the following hypotheses and research questions were formed. These questions are the foundation for the present proposed exploratory study. Figures 1 and 2 summarize the first few hypotheses involving the links between perceptions of stress, measures of recovery quality and need, and burnout.

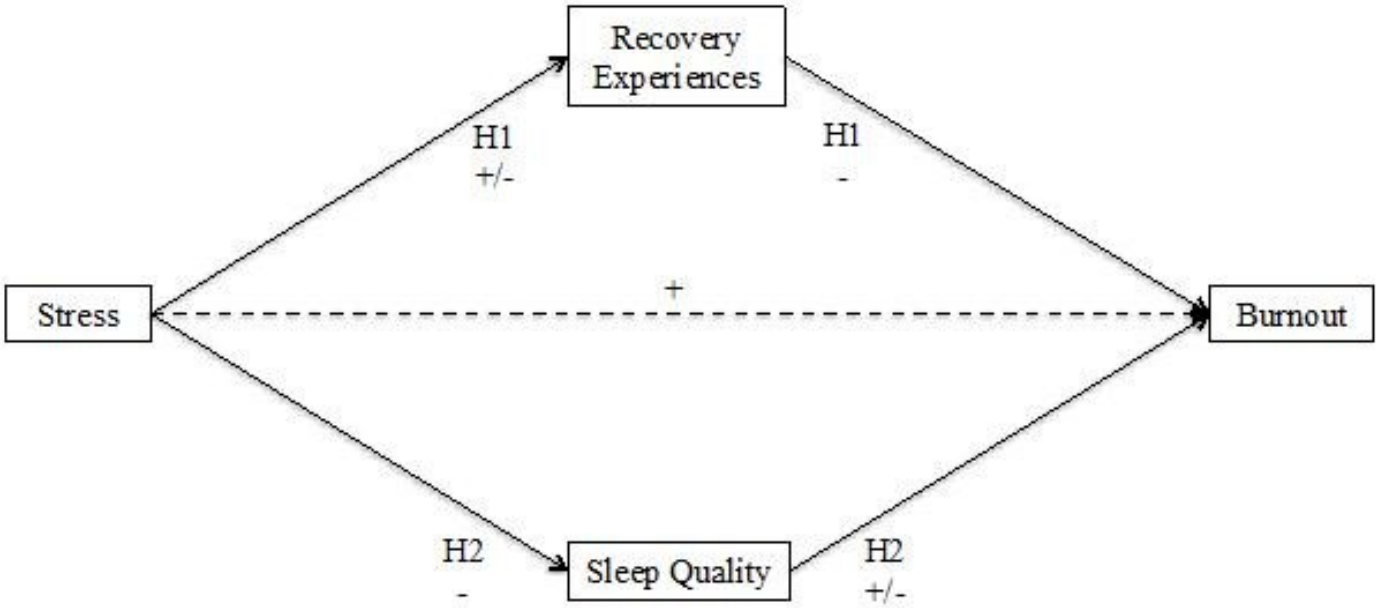

Figure 1 Conceptual Model of Predicted Relationships of Recovery Experiences and Sleep Quality Between Stress and Burnout

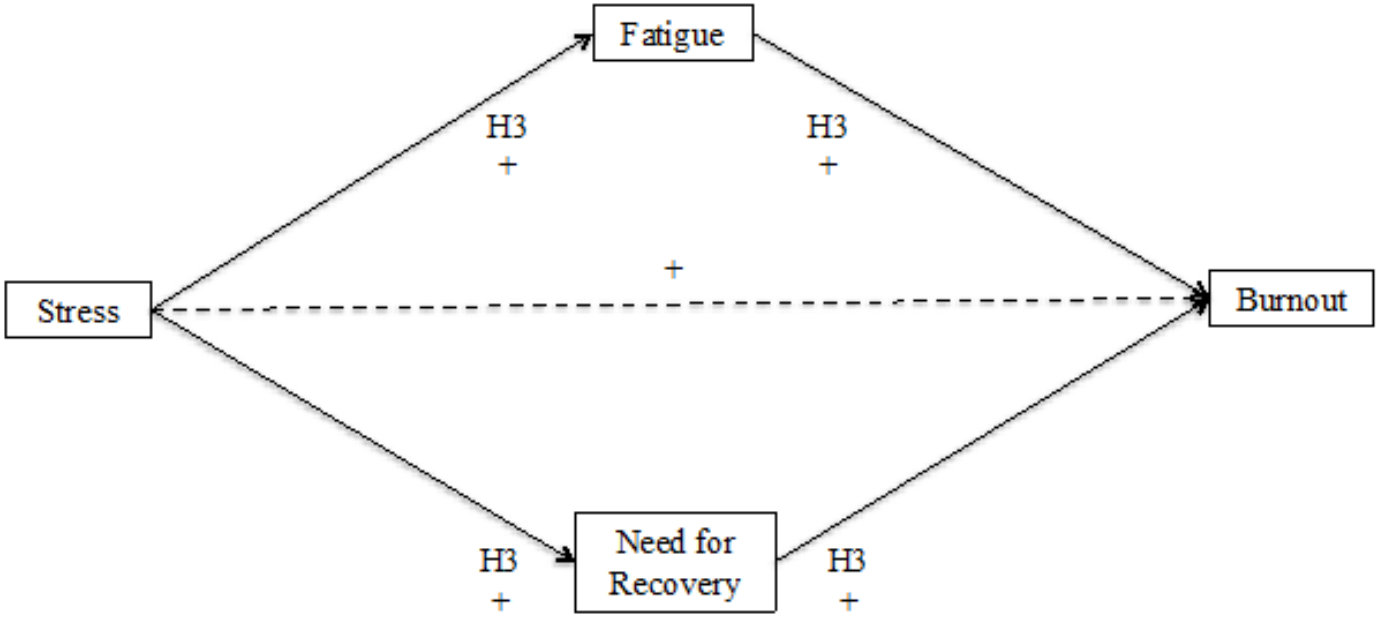

Figure 2 Conceptual Model of Predicted Relationships of Fatigue and Need for Recovery Between Stress and Burnout

Hypotheses

1. The relationship between stress and burnout is mediated by recovery experiences. More specifically, perceptions of stress are associated with efforts to recover, which in turn are associated with lower levels of burnout.
2. High levels of workload are associated with low levels of sleep quality. As such, the relationship between workload and burnout is mediated by sleep quality.
3. The relationship between stress and burnout is mediated by lack of recovery, in an opposing fashion to the relationship in H1. More specifically, perceptions of stress are associated with increased levels of need for recovery and fatigue, which are in turn associated with higher levels of burnout.
4. Given the extreme time and work demands, medical residents' time spent at work is expected to exceed their time spent on sleep and leisure activities combined.
5. Given the extreme time and workload demands that medical residents are faced with, it is hypothesized that medical residents do not strongly psychologically detach from work during their "off-work" time.
6. Medical residents participate in more passive forms of recovery rather than active forms of recovery.
7. Reported recovery strategies that are active are more strongly associated with resource gain than recovery strategies that are passive.

Additional Research Questions

1. How do medical residents' perceptions of stress affect their recovery activities?
2. What types of activities do medical residents engage in to recover?

3. How does sleep play a role in medical resident recovery since their sleep schedule is not would be considered the “norm”?
4. Do medical residents experience stressful “off-work” experiences?

CHAPTER II

METHOD

Participants

Thirty-eight medical resident and medical student participants were included in the study sample. All participants were associated with the University of Tennessee College of Medicine-Chattanooga campus and from Erlanger Medical Center in Chattanooga, Tennessee. Twenty-four of the 38 (63.2%) resident participants were part of the internal medicine and transitional year specialties and distributed in terms of post-graduate year (PGY) level as follows: PGY 1 = 11 (28.9%); PGY 2 = 8 (21.1%); PGY 3 = 5 (13.2%). There were also 9 (23.7%) medical student participants, 3 faculty participants (7.9%), and 2 (5.3%) participants who did not indicate their status.

Of these participants, 24 (63.2%) were male and the mean age ranged from 24 to 55 (M = 30.89, SD = 6.32). There were 4 Asian (10.5%), 4 Black/African American (10.5%), 2 Hispanic/Latino (5.3%), 23 White (60.5%), and 5 (13.2%) respondents reporting "other" as their primary race/ethnicity. The marital and family status of participants was as follows: 10 (26.3%) "Married, with children"; 9 (23.7%) "Married, no children"; 3 (7.9%) "Engaged"; 14 (36.8%) "Single, never married"; 1 (2.6%) "Single, formally married"; and 1 participant that chose not to respond to this question. The median number of dependents reported by participants was 0, but there was wide variability. Specifically, 20 participants (52.6%) reported not having any

dependents, 7 (18.4%) reported having one dependent, 3 (7.9%) reported having two dependents, 5 (13.2%) reported having three dependents, and 3 (7.9%) reported having four dependents.

Measures

In addition to the demographic information already reported, participants were asked to respond to the following measures (the complete survey including all of the following measures is included in Appendix A).

Assessment of Medical Resident Time Usage. A new assessment of general time usage was created for the present study. Participants were asked to report the amount of time spent on sleep, work, and leisure activities over three time periods: the past 24 hours, on average over the last three days, and on average over the last seven days. Participants reported this information by coloring in boxes on the chart (each representing one hour) using different colored crayons for each basic life activity: green for leisure, blue for work, and yellow for sleep. There was a separate chart for each of the three time periods being assessed. The number of hourly boxes that were partially or completely filled by a particular color determined the total amount of time spent on each of the three activities. If respondents did not color a box fully the amount of time was estimated to the closest quarter hour (e.g., 5.25 hours).

Detailed Time Usage and Quality Rating. This was also a new assessment developed for the present study. It provides a more detailed assessment of a person's time usage as well as an indication of the quality of each primary activity, in the form of an individual's perception of whether each activity is stressful, resource draining, and resource replenishing. There were three parts to this assessment. First, participants were asked to list up to the top-seven time intensive

the work- and nonwork-related activities that they engage in during a given day (24-hour period). Second, participants estimated the amount of time they spent on each of these primary activities on average over the last three days and on average over the last seven days. Third, participants rated their perception of each activity in terms of its stressfulness, resource draining, and resource replenishing qualities.

Times use responses were recorded numerically to two decimal places. If a participant reported a fraction or percent response it was converted to a numerical response. The activity quality ratings were rated on seven-point scales: stressfulness ("1" – not at all stressful to "7" – extremely stressful), resource draining ("1" – not at all draining, to "7" – extremely draining), and resource replenishing ("1" – not at all replenishing, to "7" – extremely replenishing). If a participant gave a fraction response it was reported as is (e.g., a resource draining response of 3.5). However, if a participant gave a range as their response, the average of the range was taken and reported (e.g., resource replenishing response of 3-4 was reported as a 3.5).

Both assessments of time usage were pilot tested prior to its usage in the present study. The sample consisted of psychology graduate students at the University of Tennessee at Chattanooga. They were asked to complete the survey to the best of their ability and offer comments and suggestions. After the first pilot test, both assessments were altered. Some of these alternations consisted of the addition of an example of a colored time use bar, the clarification of directions for both assessments, and decreasing the amount of free response activities from a range of 5 to 7 to just 5.

General Work-related Stress. For the purposes of the present study, general work-related stress was assessed using the Stress In General scale (SIG; Brodke, Gopalkrishnan, Oyer,

Yankelevich, Withrow, Sliter, et al., 2009; Stanton, Balzer, Smith, Parra, & Ironson, 2001). This scale is considered to be a broad measure of occupational stress. It contains eight items that are used describe different aspects of the job situation. Participants were asked to select "Yes," "No," or "?" in response to each word or short phrase. A "Yes" response meant that the adjective or phrase describes the job situation, "No" means that the adjective or phrase did *not* describe the job situation, and "?" means that the respondent could not decide.

For calculation purposes, a response of "Yes" was coded as a 3, "No" as a 0, and "?" as a 1.5. Item 3 ("Calm") was reversed scored. To calculate the over all SIG score, responses were summed together. Reliability coefficient for the SIG has been previous reported at, $\alpha = .79$ (Brodke et al., 2009; Stanton et al., 2001). Reliability analysis for the present study was shown to be $\alpha = .77$ (at Time 1).

Work-related stress was also measured in terms of perceived quantitative workload or demand using the Quantitative Workload Inventory (QWI; Spector & Jex, 1998). The QWI is a five-item scale that is used to assess the amount of work and the work pace of the participant (e.g., "How often does your job require you to work very fast?"). Respondents rated their experience with each item on a five-point frequency scale ("1" = less than once per month or never to "5" = several times per day). A total score on this measure was calculated by summing participants' responses to each item; higher scores indicated a higher general perception of heavy workload. The range of possible scores of the QWI is 5-25, with 25 being the highest level of quantitative workload. Within previous studies, the average reported score on the QWI was 16.5 ($SD = 3.4$) across 15 samples (3,728 participants). In the present study, these items demonstrated adequate internal consistency, $\alpha = .76$.

Recovery Experiences. A quantitative assessment of recovery activities was conducted using the Recovery Experiences Questionnaire. This is a 16-item questionnaire developed by Sonnentag and Fritz (2007) to assess participants' recovery experiences during their previous off-work time. This measure was adapted slightly for the present purposes to be retrospective in nature, and appropriate for medical residents, who would not all have "last night" as their last off-work time. The response options were also adapted from the original version of this scale to improve the sensitivity of the measure; participants rated their level of agreement with each item on a seven-point Likert scale (1 = Strongly Disagree to 7 = Strongly Agree). Items in this scale assess recovery experiences in terms of four dimensions (four items per dimension): relaxation (e.g., "Last night, I kicked back and relaxed."), psychological detachment (e.g., "Last night, I forgot about work."), mastery experiences (e.g., "Last night, I learned new things."), and control (e.g., "Last night, I decided my own schedule.").

Ratings for each set of items were summed, yielding a recovery scores for each of the four dimensions (higher scores = more experience with a particular type of recovery activity). Reliabilities for the four subscales were good: psychological detachment, $\alpha = .809$; relaxation, $\alpha = .940$; mastery experiences, $\alpha = .867$; control, $\alpha = .924$.

As a second, related assessment of recovery needs, the Need for Resource Recovery Scale (NFRRS; Cunningham, 2008) was also included. This measure is a 12-item scale measuring two dimensions of perceived recovery needs: (1) *lack of attention/cognitive resources* (e.g., "I have been working so hard today that I am losing my ability to concentrate on what I am doing"), and (2) *need for detachment* (e.g., "When I stop my work for today I will need more than an hour to begin feeling recovered"). Participants were asked to rate the accuracy of each of the twelve statements in regards to how they felt in the present moment. The internal

consistencies for each of the dimensions have been estimated previously as the following: lack of attention/cognitive resources, α = .72, and need for detachment, α = .87. For the present study there were calculated at, α = .79 and α = .92, respectively.

Fatigue. To measure participants' levels of fatigue and serve as a complement to the NFRRS, the Fatigue Assessment Scale (FAS; Michielson, De Vries, Van Heck, Van de Vijver, & Sijtsma, 2004) was used. This scale is composed of 10-items (e.g., "I am bothered by fatigue") rated on a five-point scale of frequency ("1" = Never, to "5" = Always). Overall fatigue scores were calculated by summing all scores so that higher scores indicate a higher level of fatigue. Reliability for the FAS in the present study was α = .87.

Sleep Quality. Participants' sleep quality was assessed with the 28-item Sleep Quality Scale (Yi, Shin, & Shin, 2006). This scale addresses six elements of sleep quality: daytime dysfunction (12 items; e.g., "Difficulty in thinking due to poor sleep."), restoration after sleep (4 items; e.g., "Relief of fatigue after sleep."), difficulty in falling asleep (4 items; e.g., "Difficulty in getting back to sleep after nocturnal awakening."), difficulty in getting up (3 items; e.g., "Wish for more sleep after getting up."), satisfaction with sleep (3 items; e.g., "Satisfaction with sleep."), and difficulty in maintaining sleep (2 items; e.g., "Waking up easily due to noise."). For the present study, these items were combined to serve as an overall indication of sleep quality. In previous studies, this measure has demonstrated high internal consistency and convergent validity with the Pittsburgh Sleep Quality Index (r = .72). In the present study, the internal consistency reliability was also high, α = .92.

Burnout. To measure burnout, the 16-item Oldenburg Burnout Inventory (OLBI; Demerouti, Bakker, Kantas, & Vardakou, 2002) was used. This scale measures burnout in terms of two dimensions: *disengagement* (e.g., "I always find new and interesting aspects in my work.") and *exhaustion* (e.g., "There are days when I feel tired before I arrive at work."). Participants rated their level of agreement with each of these statements using a four-point scale ("1"= strongly agree to "4" = strongly disagree). Reliability was calculated for each of the subscales and for the overall measure: disengagement, $\alpha = .69$; exhaustion, $\alpha = .69$; overall, $\alpha = .79$.

Time Use Control. To evaluate participants' perceptions of control, all participants were asked to rate the extent to which they felt that they had control over their time *at work*, *at home*, and *engaging in leisure activities*. These questions served as controls in the multiple mediation analyses, and in congruence with the *control* dimension of the Recovery Experiences Questionnaire. Ratings were made on a seven-point scale (1 = "not at all" to 7 = "completely"). Ratings for the at home and leisure control items were averaged to reflect non-work control. Reliability was calculated for the nonwork control variable (this included the questions related to "at home" and "engaging in leisure activities"), $\alpha = .87$.

Negative Affectivity. A 10-item measure of negative affectivity was used from the Positive and Negative Affectivity Scale (PANAS-X; Watson & Clark, 1994). This brief measure was used as a method to help control for negative affectivity within the sample. Example items included descriptors such as "afraid", "scared", and "nervous." Respondents were asked to rate the degree to which they had felt like each descriptive item indicated over the past few weeks

("1" = very slightly or not at all to "5" = extremely). Internal consistency for the present study was calculated at, $\alpha = .71$.

Procedure

Institutional Review Board approval was obtained prior to the beginning of the study (IRB Approval #11-160). See Appendix B for a copy of the IRB approval letter. To reach participants, email addresses were obtained for all Internal Medicine and Transitional Year faculty, medical students, and residents (from all three PGY years 1, 2, and 3) associated with the local teaching hospital. All potential participants were assigned an identification number prior to the first data collection time, so that all subsequent data could be matched within needing participant name or other identifying information. Participants were only asked to read and sign the informed consent form once during the first session they participated in. The informed consent form document detailed the purpose of the study and that individual responses would be kept completely confidential. Participants were also informed that there might be discussion questions posed to them throughout the course of the study and that they would be recorded.

Four separate data collections were held for participants: October 28th, 2011, November 4th, 2011, November 18th, 2011, and December 2nd, 2011. The data collections were spread out to provide residents with multiple opportunities to participate. Each of these data collections took place during regularly scheduled conference times and participants were reminded via email about each session in advance. To encourage participation at all four time points, small incentives were provided (e.g., food during data collections and coffee gift cards to all residents, with amounts based on the number of data collection participation times they attended [$5 per session]). The original data collection schedule was as follows: (Time 1) general and detailed

time use survey and all quantitative measures; (Time 2) time use assessments only; (Time 3) general and detailed time use survey and all quantitative measures; and (Time 4) time use assessments only. Due to the low rate of participation after Time 1, however, the full survey was administered at Time 4 in addition to Time 3, in an effort to collect additional information from a larger set of participants. Because data collection sessions were open, if a first-time participant attended, he/she was asked to complete the time use assessments and the full survey so that a "baseline" could be established for all participants.

All data were collected and entered into SPSS. Original surveys were stored in a locked file cabinet in a secure research lab on the UTC campus.

CHAPTER III

RESULTS

Preparatory Steps

To make use of as much of the gathered data as possible (especially important, given the small sample size), all missing data points were carefully considered. For collected demographic information, any non-reported demographics were left blank. Participants that reported a race combination (e.g., checking both "Caucasian/white" and "African American/black") were coded under the category of "other".

There were no missing data points for the general time use assessment coloring columns. For the detailed time use assessment there were several participants who chose to report a varying number of activities ranging from 0 to one participant who reported 6 activities. Activity responses were reported and coded "as is" even if the individual did not report five activities. There were a few instances when a participant reported an activity but did not answer the subsequent questions related to that activity (e.g. stressfulness rating, etc.). Therefore, the activity was only counted for frequency purposes and did not affect the overall mean rating for the category.

In any frequency case with missing values the average response was taken of all of the items collectively and then rounded down. Depending on the averages across all responses and the participant's responses decisions were made on how to deal with the missing data. If there

was missing data in a scale with sub-dimensions the scores were filled in based on the average across the sub-dimension responses. The exception to this was for missing data in the Stress In General Scale (Brodke et al, 2009; Stanton, Balzer, Smith, Parra, & Ironson, 2001). For the Stress In General Scale, if there were less than two missing data points the blanks were replaced with a value of 1.5. In the case of three or more missing data points the scale responses were not scored for that participant. There was one respondent who failed to respond to all items in the Sleep Quality Scale, which resulted in total omission of that participant's responses.

Qualitative Data Coding

Data gathered with the qualitative Time Use Assessment Scales that were developed for the present study thematically coded and categorized to facilitate interpretation. This coding process was done in two stages. First, time was spent identifying themes that were most apparent in the responses. For example, responses of "going on rounds", "rounding", and "rounding on patients" were all coded under the theme "rounds". Once that was completed, the broad categories that were most evident among participants' responses were then merged again if possible. For example, some of the stage one coding categories were as follows: "spending time with family/friends", "spending time with significant other", and "talking to family/friends". These categories were put together under the broader label of "time with family".

Participants' reported activities during work-time were coded into the following categories (in alphabetical order): clinic, conference, eating, email, paperwork, patient care, phone calls, reading/studying, rounds, research, talking to patients and families, teaching, walking, and writing notes/charting/dictating. The frequency of these responses and the

percentage of all responses that were identified as each of these categories across the three data collection periods are presented in Table 1.

Table 1

Frequency of Free Response Work-Time Activities

Activity	Frequency of Response	% of Overall Responses
Patient care	47	0.18
Charting/dictating	45	0.17
Conference	42	0.16
Rounds	34	0.13
Reading/studying	26	0.10
Email	21	0.08
Teaching	10	0.04
Research/looking up inform	9	0.03
Talking to patients/families	9	0.03
Walking	8	0.03
Phone calls	7	0.03
Eating	6	0.02
Clinic	4	0.01
Paperwork	3	0.01
total	268	100.00%

Note. All coding activities are presented in order by frequency of response.

Activities during non-work time were coded into the following dominant categories (in alphabetical order): commuting, computer/internet, cooking, eating, email, exercise, household chores, personal care, prepping for work, reading, religious activities, shopping, sleep socializing, taking care of children, talking on the phone, time with family, and watching TV/movies. The frequency of these responses and the percentage of all responses that were identified as each of these categories across the three data collection periods are presented in Table 2.

Table 2

Frequency of Free Response Nonwork Time Activities

Activity	Frequency of Response	% of Overall Responses
Sleep	50	0.17
Watch TV/Movies	43	0.15
Time with Family	39	0.13
Exercise	26	0.09
Eating	20	0.07
Work Prep	16	0.06
Household Chores	15	0.05
Reading	15	0.05
Communiting	14	0.05
Cooking	12	0.04
Computer/Internet	7	0.02
Shopping	6	0.02
Email	6	0.02
Personal Care	5	0.02
Talking on the phone	5	0.02
Religious activities	4	0.01
Socializing	3	0.01
Taking care of children	3	0.01
total	289	100%

Note. All coding activities are presented in order by frequency of response.

These activities were further coded into two categories in terms of resource replenishment into being either “active” or “passive” in nature. This determination was derived from Sonnentag and Jelden’s (2009) use of these labels, which was presented earlier in this manuscript. In identifying active and passive recovery activities, participants’ reported work and non-work activities were considered if they had a median resource replenishing rating of 2 (i.e., A little bit replenishing) or higher (ratings less than 2 would indicate the activity as being non-

replenishing). Once all of a participant's reported activities were identified in this fashion, each participant was then identified as tending to engage in either predominantly active or passive recovery activities.

Descriptive Information

Overall descriptive statistics for each of the quantitative measures are presented in Tables 3 and 4. Also included in Table 3 are norms for each scale (where such norms exist). The participant values included in Table 3 and 4 are from the initial data collection only, due to the fact that this data collection had the highest number of participants. One-sample *t*-tests were conducted comparing mean participant scores to established norms yielding significant differences for quantitative workload, fatigue, sleep quality, burnout (both disengagement and exhaustion), and negative affectivity ($p < .05$). Psychological detachment also approached significance, $p = .085$.

Descriptive results for the detailed assessment of time usage (work and nonwork) are presented in Tables 5 and 6, respectively.

Table 3

Mean Participant Scores Compared to Norms on Quantitative Measures

	Participant Scores		Norms		*t*-test
Scale	*M*	*SD*	*M*	*SD*	*t*
Workplace stress (SIG)	16.89	5.92	n/a	n/a	n/a
Quantitative workload (QWI)	20.13	3.66	16.50	3.40	6.13**
Recovery experiences (REQ)					
Psychological detachment	2.77	0.87	3.00	0.97	−1.772
Relaxation	3.64	0.90	3.70	0.77	−0.383
Mastery experiences	3.13	1.00	3.04	0.71	6.89
Control	3.54	0.96	3.29	0.80	1.62
Need for recovery (NFRRS)					
Lack of attention/cognitive resources	3.01	1.27	n/a	n/a	n/a
Need for detachment	4.25	1.83	n/a	n/a	n/a
Fatigue (FAS)	22.39	6.18	19.80	5.86	2.59*
Sleep quality (SQS)	25.81	12.90	15.80	9.06	4.72**
Burnout (OLBI)					
Disengagment	2.63	0.40	2.78	0.64	−2.26*
Exhaustion	2.31	0.40	2.99	0.61	−10.60**
Negative affectivity (PANAS-X)	18.32	4.60	20.20	7.20	−2.52*

Note. All mean participant scores were calculated from Time 1 data. Each scale is labeled as variable name (measure name).The *df* was 37 for each *t*-test result with the exception of sleep quality (SQS) which was 36.

"n/a" designates a norm that is not yet published in the literature due to the novelty of the scale.

*$p < .05$, **$p < .001$

Table 4

Correlations Between Participant Scores on Quantitative Measures

			REQ				NFRRS				OLBI			Control		
Scales	SIG	QWI	Psychological Detachment	Relaxation	Mastery Experiences	Control	Lack of attention/cognitive resources	Need for detachment	FAS	SQS	Exhaustion	Disengagment	Total	At work	During nonwork	PANAS-X
Workplace stress (SIG)	1.00	.511**	-0.11	-0.04	-0.02	-0.13	.355*	.501**	.360*	.412*	.458**	.440**	.514**	-0.13	0.02	.351*
Quantitative workload (QWI)	.511**	1.00	-0.11	-0.14	0.00	-0.12	.438**	.496**	0.25	0.31	.437**	0.25	.366*	-0.09	-0.04	.377*
Recovery experiences (REQ)																
Psychological Detachment	-0.11	-0.11	1.00	.484**	0.04	.430**	-0.12	-.356*	-.328*	-0.20	-0.13	0.26	0.10	-.341*	0.19	-0.03
Relaxation	-0.04	-0.14	.484**	1.00	0.00	.700**	-0.20	-.453**	-.352*	-.330*	-0.11	0.27	0.10	-0.28	.414**	0.05
Mastery Experiences	-0.02	0.00	0.04	0.00	1.00	0.16	0.04	0.00	-0.05	-0.02	-0.16	-0.25	-0.24	0.00	-0.12	-0.14
Control	-0.13	-0.12	.430**	.700**	0.16	1.00	-0.07	-0.29	-0.27	-.389*	-0.09	-0.01	-0.05	-0.11	0.30	0.00
Need for recovery (NFRRS)																
Lack of attention/cognitive resources	.355*	.438**	-0.12	-0.20	0.04	-0.07	1.00	.700**	.508**	.473**	.477**	0.18	.364*	0.01	-0.22	.427**
Need for detachment	.501**	.496**	-.356*	-.453**	0.00	-0.29	.700**	1.00	.651**	.442**	.500**	0.14	.358*	0.06	-0.24	.456**
Fatigue (FAS)	.360*	0.25	-.328*	-.352*	-0.05	-0.27	.508**	.651**	1.00	.551**	.523**	0.10	.335*	0.10	-.354*	0.28
Sleep quality (SQS)	.412*	0.31	-0.20	-.330*	-0.02	-.389*	.473**	.442**	.551**	1.00	.407*	0.16	0.32	-0.08	-0.17	0.19
Burnut (OLBI)																
Exhaustion	.458**	.437**	-0.13	-0.11	-0.16	-0.09	.477**	.500**	.523**	.407*	1.00	.552**	.852**	-0.18	0.13	.544**
Disengagment	.440**	0.25	0.26	0.27	-0.25	-0.01	0.18	0.14	0.10	0.16	.552**	1.00	.901**	-.399*	.350*	.479**
Total	.514**	.366*	0.10	0.10	-0.24	-0.05	.364*	.358*	.335*	0.32	.852**	.901**	1.00	-.351*	0.31	.569**
Control																
At work	-0.13	-0.09	-.341*	-0.28	0.00	-0.11	0.01	0.06	0.10	-0.08	-0.18	-.399*	-.351*	1.00	-.388*	-0.19
During nonwork	0.02	-0.04	0.19	.414**	-0.12	0.30	-0.22	-0.24	-.354*	-0.17	0.13	.350*	0.31	-.388*	1.00	-0.02
Negative affectivity (PANAS-X)	.351*	.377*	-0.03	0.05	-0.14	0.00	.427**	.456**	0.28	0.19	.544**	.479**	.569**	-0.19	-0.02	1.00

Note. All correlations presented are calculated from Time 1 data. N = 38.

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Table 5

Estimates of Medical Resident Time Use and Ratings for Work Time Activities

	Time Use						Rating Scale								
	Average over the past 3 days			Average over the past 7 days			Stressfulness			Resource Draining			Resource Replenishing		
Activity	*M*	*SD*	Median	*M*	*SD*	Median	*M*	*SD*	Median	*M*	*SD*	Median	*M*	*SD*	Median
Patient care	5.36	3.73	4.00	6.78	6.23	4.50	2.79	1.51	2.00	3.24	1.57	3.00	3.03	1.72	3.00
Conference	2.02	1.04	2.00	2.23	1.80	2.00	1.88	1.17	2.00	2.31	1.37	2.00	2.63	1.28	3.00
Charting/dictating	2.63	1.61	2.20	3.11	4.93	2.45	2.63	1.38	3.00	3.24	1.54	3.00	1.26	1.42	1.00
Rounds	5.64	3.88	4.00	7.42	6.86	5.00	2.77	1.52	2.00	3.21	1.66	3.00	3.07	1.65	3.00
Reading/studying	2.33	1.44	2.00	2.73	2.14	2.00	1.96	1.39	2.00	2.54	1.68	2.00	3.15	1.99	3.00
Email	1.30	0.68	1.00	2.30	2.87	1.00	2.00	1.00	2.00	2.14	1.19	2.00	2.86	2.34	1.50
Teaching	3.05	1.84	3.00	3.23	1.91	3.13	2.45	1.14	2.00	2.75	1.06	2.75	3.50	1.77	3.25
Research	1.42	1.27	1.00	1.44	0.85	1.00	2.00	1.00	2.00	2.33	1.00	2.00	2.11	1.05	2.00
Talking to patients/families	2.28	1.64	2.00	2.17	1.64	1.50	2.72	1.37	2.50	3.11	1.27	3.00	2.44	1.94	2.00
Walking	2.05	0.82	2.20	2.03	0.80	2.15	2.50	1.39	2.50	3.50	1.60	3.50	1.25	0.46	1.00
Phone calls	1.75	1.32	1.00	1.77	1.30	1.00	3.57	1.50	4.00	3.00	1.27	3.00	1.71	0.95	1.00
Eating	0.78	0.84	1.00	0.78	0.84	1.00	1.00	0.52	1.00	1.00	0.82	1.00	6.50	0.84	7.00
Clinic	6.00	0.82	6.00	6.00	0.82	6.00	3.50	1.12	3.50	3.50	1.73	3.00	2.25	1.83	2.00
Paperwork	2.33	0.35	2.00	2.67	0.98	3.00	3.33	1.15	4.00	3.33	1.00	4.00	1.00	0.58	1.00

Note. All activities are presented in order of frequency of response. Time use was estimated on average over the past 3 and 7 days on a 24-hour scale. Each of the ratings were on a 1-7 scale with "1" representing "Not at all stressful/resource draining/resource replenishing" and "7" representing "Extremely stressful/resource draining/resource replenishing".

Table 6

Estimates of Medical Resident Time Use and Ratings for Non-Work Time Activities

	Time Use						Rating Scale								
	Average over the past 3 days			Average over the past 7 days			Stressfulness			Resource Draining			Resource Replenishing		
Activity	*M*	*SD*	Median	*M*	*SD*	Median	*M*	*SD*	Median	*M*	*SD*	Median	*M*	*SD*	Median
Sleep	6.72	2.48	6.00	7.36	5.50	6.50	1.04	0.20	1.00	1.12	0.86	1.00	6.07	1.39	7.00
Watch TV/Movies	1.69	1.52	1.00	1.88	1.75	2.00	1.16	0.53	1.00	1.24	0.76	1.00	4.00	2.04	4.00
Time with Family	2.09	1.93	1.50	3.06	4.75	2.00	1.44	0.72	1.00	1.45	0.76	1.00	5.53	1.65	6.00
Exercise	1.04	0.55	1.00	1.23	0.88	1.00	1.44	0.75	1.00	1.65	0.75	2.00	5.00	1.75	5.00
Eating	1.30	0.78	1.00	1.37	0.76	1.00	1.10	0.31	1.00	1.10	0.31	1.00	5.70	1.45	6.00
Work Prep	1.84	1.52	1.25	2.30	2.38	1.75	2.66	1.09	2.25	3.16	1.69	3.00	2.28	1.13	2.00
Household Chores	1.42	1.11	1.00	1.88	1.06	1.00	2.53	0.83	2.00	2.33	1.06	2.00	1.73	1.45	1.00
Reading	1.00	0.89	1.00	1.10	1.66	1.00	1.17	1.94	1.00	1.30	1.65	1.00	4.13	2.07	4.00
Communiting	1.70	1.26	1.00	2.65	2.08	1.75	2.27	1.68	2.00	1.93	1.25	2.00	2.71	1.78	2.00
Cooking	1.87	1.73	1.50	1.60	0.84	1.50	1.69	1.65	1.00	1.38	0.45	1.00	3.42	1.78	3.00
Computer/Internet	1.50	2.22	1.50	1.57	0.93	1.00	1.14	0.38	1.00	1.57	0.49	1.00	4.14	1.46	4.00
Shopping	0.42	6.16	0.25	0.83	15.48	0.75	2.33	0.00	1.50	1.40	0.00	1.00	3.00	0.84	3.00
Email	2.21	0.25	2.50	3.21	0.52	3.50	2.33	0.98	2.00	2.33	1.33	2.00	2.17	1.83	1.50
Personal Care	0.97	0.45	1.00	0.97	0.45	1.00	1.00	0.45	1.00	1.00	1.34	1.00	4.20	1.48	5.00
Talking on the phone	1.20	0.45	1.00	1.20	0.45	1.00	1.00	0.00	1.00	1.20	0.45	1.00	4.00	1.58	4.00
Religious activities	2.00	0.48	1.50	3.88	0.87	3.00	1.00	2.87	1.00	1.50	0.58	1.50	5.25	1.15	5.00
Socializing	1.67	1.15	2.00	2.67	1.00	3.00	1.00	0.50	1.00	2.00	0.00	2.00	6.00	0.00	6.00
Taking care of children	5.00	0.58	5.00	3.75	0.58	3.25	1.83	0.00	1.00	2.50	0.58	2.00	4.00	2.08	4.00

Note. All activities are presented in order of frequency of response. Time use was estimated on average over the past 3 and 7 days on a 24-hour scale. Each of the ratings were on a 1-7 scale with "1" representing "Not at all stressful/resource draining/resource replenishing" and "7" representing "Extremely stressful/resource draining/resource replenishing".

Hypotheses 1 and 3

A multiple mediation analysis was conducted to test both Hypothesis 1 and Hypothesis 3 (Preacher & Hayes, 2008). Hypothesis 1 stated that the relationship between stress and burnout is mediated by recovery experiences. More specifically, perceptions of stress are associated with efforts to recover, which in turn are associated with lower levels of burnout. Only 33 (86.8%) of the 38 participants were included in the multiple mediation analysis due to missing values in the control variables, which were age, gender, year (PGY year, medical student, or faculty member), and negative affectivity. There was a significant total effect (*c*) found between stress and burnout without the mediators present, $p < .05$. However, there was not a significant direct effect (c^{I}) of stress on burnout with all other mediators included in the analysis. Direct effects of mediators are presented in Figure 3.

In terms of mediation, there was no evidence of significant indirect effects linking stress and burnout through the proposed recovery experience mediators (psychological detachment, relaxation, mastery experiences, and control). The total indirect effect between stress and burnout was non-significant. However, the control mediator seemed to approach significance, p = .0539. There were also no significant direct effects of the mediator variables on burnout. It is important to note that the overall model explained a significant 48.5% of the variance in burnout. The indirect effects results are fully summarized in Table 7.

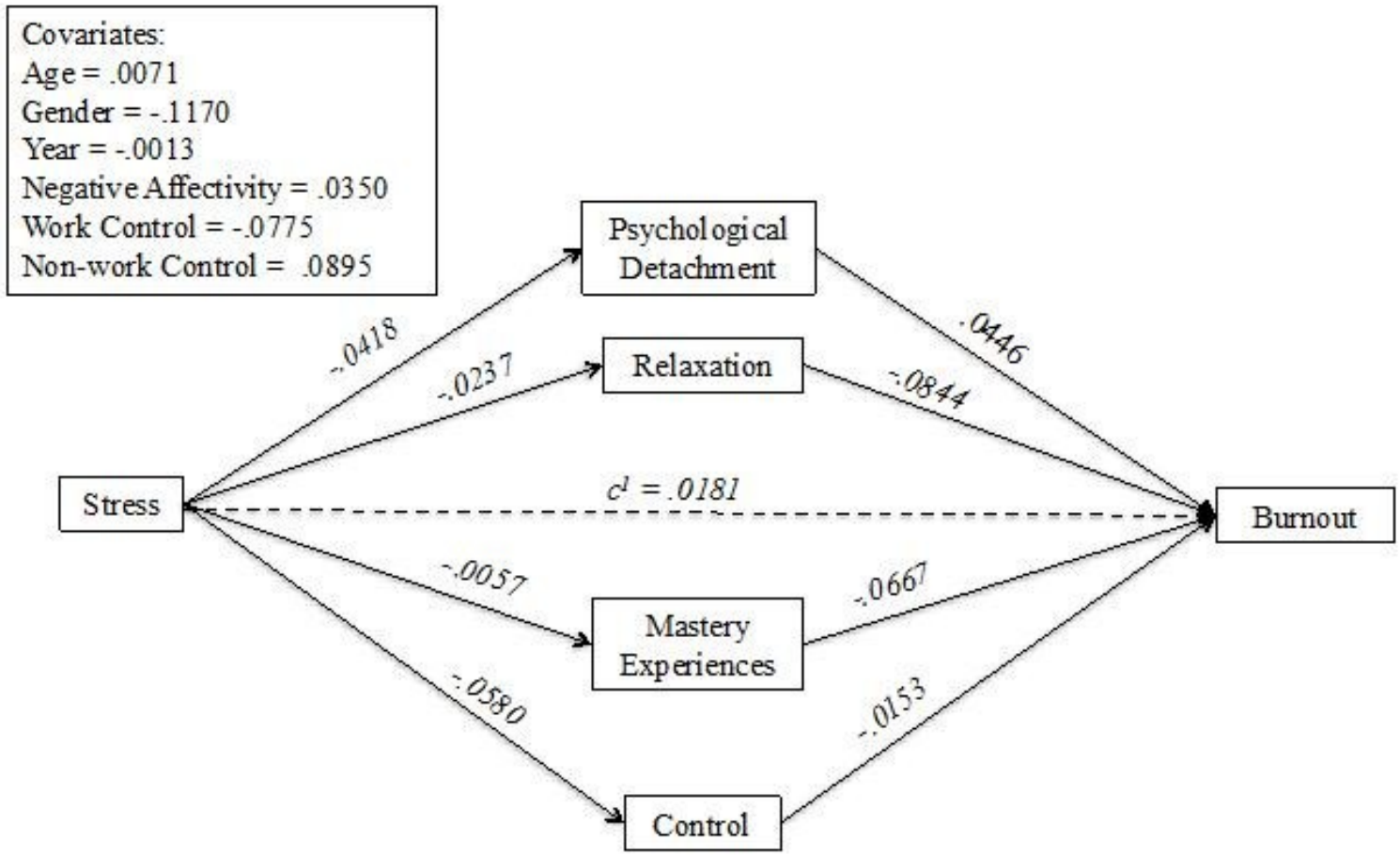

Figure 3 Hypothesis 1: Direct Effects of Recovery Experiences Between Stress and Burnout

Table 7

Hypothesis One: Indirect Effects of Recovery Experiences Between Stress and Burnout

	Product of Coefficients		Bootstrapping			
			Percentile 95% CI		BC 95% CI	
	b	SE	Lower	Upper	Lower	Upper
	Indirect Effects					
Psychological detachment	-0.0019	0.0089	-0.0151	0.0100	-0.0174	0.0077
Relaxation	0.0020	0.0055	-0.0056	0.0160	-0.0027	0.0236
Mastery experiences	0.0004	0.0034	-0.0062	0.0080	-0.0042	0.0113
Control	0.0009	0.0063	-0.0105	0.0151	-0.0099	0.0167
Total stress to burnout	0.0014	0.0089	-0.0158	0.0202	-0.0187	0.0172
	Contrasts					
Psychological detachment vs. relaxation	-0.0039	0.0086	-0.0247	0.0105	-0.0289	0.0078
Psychological detachment vs. mastery experiences	-0.0022	0.0068	-0.0171	0.0111	-0.0184	0.0100
Psychological detachment vs. control	-0.0028	0.0089	-0.0226	0.0139	0.0233	0.0133
Relaxation vs. mastery experiences	0.0016	0.0066	-0.0094	0.0173	0.0077	0.0202
Relaxation vs. control	0.0011	0.0100	-0.0161	0.0240	0.0113	0.0320
Mastery experiences vs. control	-0.0005	0.0068	-0.0150	0.0127	0.0128	0.0143
Full model: Adj $R^2 = .4855$, $F(11, 21)$, $p < .01$						

Note. These estimates were generated using a procedure from Preacher and Hayes (2008). CI = confidence interval; BC = bias corrected. Based on 10,000 bootstrap resammples, N = 33. All analyses were conducted with data from Time 1.
*$p < .05$, ** $p < .01$

A multiple mediation analysis was also conducted to test Hypothesis 3, which stated that the relationship between stress and burnout is mediated by lack of recovery. This is in an opposing fashion to the relationship previously examined in Hypothesis 1. More specifically, perceptions of stress are associated with increased levels of need for recovery and fatigue, which are in turn associated with higher levels of burnout. Similarly to the analysis for Hypothesis 1, only 33 (86.8%) of the 38 participants were included in the mediation analysis because the same demographic controls were used (age, gender, year, and negative affectivity). As presented in Figure 4 there was a significant total effect (*c* path) found between stress (SIG) and burnout (OLBI). However, there was no significant direct effect (c^1 path) found with the mediators included in the analysis.

There were no significant indirect effects found linking stress and burnout through the mediators (lack of emotional/cognitive resources, need for detachment, and fatigue) as shown in Table 8. There was a significant *a*-path effect found between stress and lack of emotional/cognitive resources, $p < .01$. There were also no significant direct effects of the mediator variables on burnout. Again, it is important to note that the overall model explained a significant 50.3% of the variance in burnout.

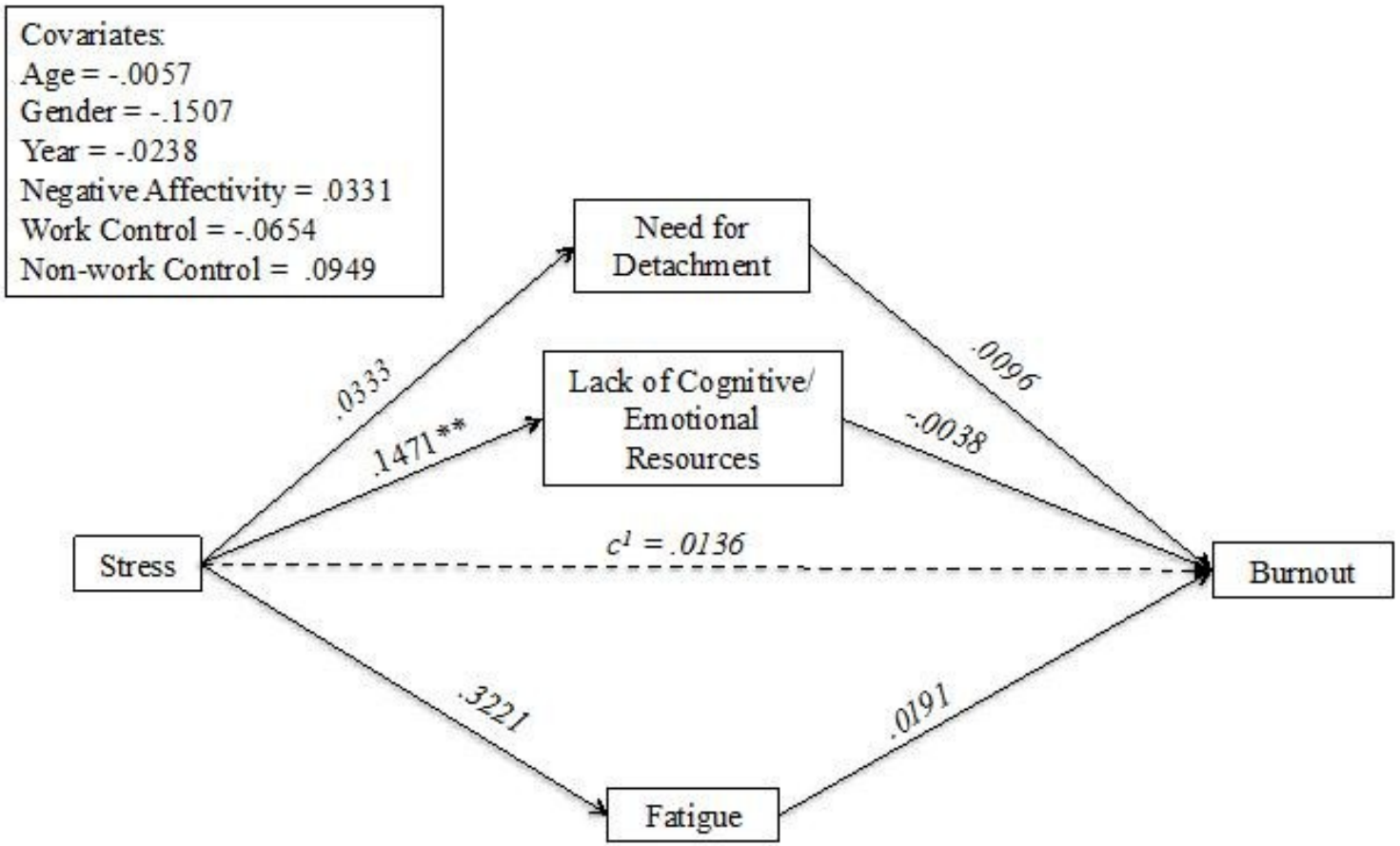

Figure 4 Hypothesis 3: Direct Effects of Need for Recovery and Fatigue Between Stress and Burnout

Table 8

Hypothesis Three: Indirect Effects of Need for Recovery and Fatigue Between Stress and Burnout

	Product of Coefficients		Bootstrapping			
			Percentile 95% CI		BC 95% CI	
	b	SE	Lower	Upper	Lower	Upper
		Indirect Effects				
Lack of cognitive/emotional resources	0.0083	0.0045	-0.0078	0.0108	-0.0062	0.0137
Need for detachment	-0.0006	0.0100	-0.0217	0.0195	-0.0199	0.0212
Fatigue	0.0061	0.0065	-0.0041	0.0210	-0.0014	0.0261
Total stress to burnout	0.0059	0.0088	-0.0112	0.0236	-0.0077	0.0290
		Contrasts				
Lack of cognitive/emotional resources vs. Need for detachment	0.0009	0.0131	-0.0242	0.0305	-0.0257	0.0293
Lack of cognitive/emotional resources vs. Fatigue	-0.0058	0.0075	-0.0215	0.0083	-0.0256	0.0053
Need for detachment vs. Fatigue	-0.0067	0.0135	-0.0368	0.0173	-0.0392	0.0160
Full model: Adj $R^2 = .5034$, $F(10, 22)$, $p < .01$						

Note. These estimates were generated using a procedure from Preacher and Hayes (2008). CI = confidence interval; BC = bias corrected. Based on 10,000 bootstrap resammples, N = 33. All analyses were conducted with data from Time 1.
*$p < .05$, **$p < .01$

Hypothesis 2

A simple mediation analysis was conducted to estimate indirect effects (Preacher & Hayes, 2008). The proposed mediation model for Hypothesis 2 was that sleep quality mediates the relationship between quantitative workload and the exhaustion dimension of burnout. There were no significant direct effects found between quantitative workload and burnout (See Figure 5). The total effect of quantitative workload on the exhaustion dimension of burnout was non-significant. The estimate of the indirect effects also revealed no significant findings. However, the Adjusted R^2 revealed that 45.4% of the variance in burnout was accounted for by this model (See Table 9).

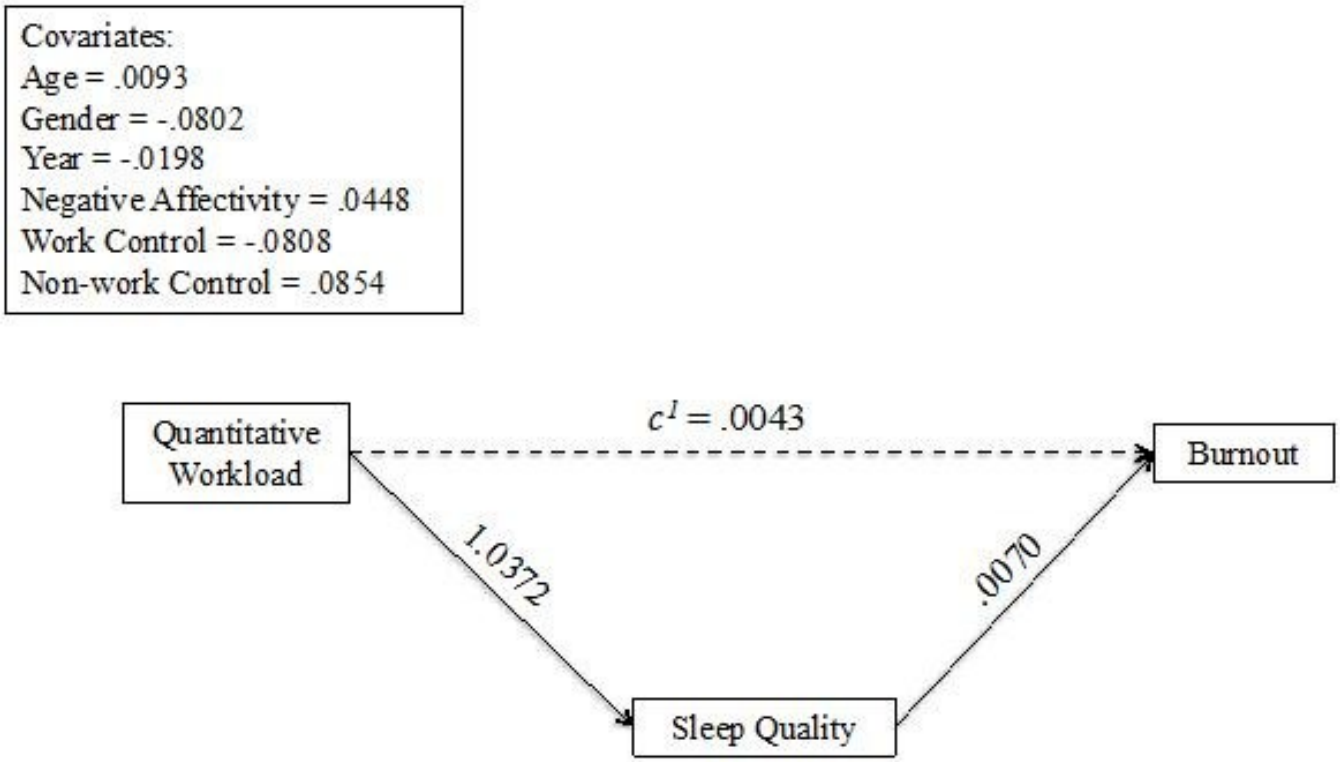

Figure 5 Hypothesis 2: Direct Effects of Sleep Quality Between Quantitative Workload and Burnout

Table 9

Hypothesis Two: Indirect Effects of Sleep Quality Between Quantitative Workload and Burnout

	Product of Coefficients		Bootstrapping			
			Percentile 95% CI		BC 95% CI	
	b	SE	Lower	Upper	Lower	Upper
	Indirect Effects					
Sleep Qality	0.0073	0.0092	-0.0050	0.0305	-0.0049	0.0309
Total quantitative workload to burnout	0.0073	0.0092	-0.0050	0.0305	-0.0049	0.0309
Full model: Adj R^2 = .4538, $F(8, 23)$, $p < .01$						

Note. These estimates were generated using a procedure from Preacher and Hayes (2008). CI = confidence interval; BC = bias corrected. Based on 10,000 bootstrap resammples, N = 32. All analyses were conducted with data from Time 1.
*$p < .05$, ** $p < .01$

Hypothesis 4

A one-sample *t*-test was conducted to test the hypothesis that given the extreme time and work demands, medical residents' time spent at work is expected to exceed their time spent on sleep and leisure activities combined. Responses on the assessment of general time usage were utilized to test this hypothesis. Participants were asked to report the amount of time spent on sleep, leisure, and work activities. The means and standard deviations for time use across T1, T2, and T3 are presented in Table 10. Summing participants' total reported sleep and leisure times together created a nonwork time variable. This was the variable used for comparison against the participants' mean work time.

Table 10

Means and Standard Deviations of General Assessment of Medical Resident Time Usage

		Time 1		Time 2		Time 3	
Response Time Period		M	*SD*	M	*SD*	M	*SD*
Past 24 Hours							
	Work	12.93	2.28	12.76	2.94	12.50	2.81
	Leisure	3.70	1.89	4.33	2.56	4.67	2.33
	Sleep	7.37	1.48	6.91	1.44	6.83	1.47
Average Over the Past 3 Days							
	Work	12.82	2.14	12.28	2.82	12.00	2.89
	Leisure	4.15	1.93	4.63	2.28	5.00	2.19
	Sleep	7.04	1.18	7.09	1.50	7.00	0.89
Average over the Past 7 Days							
	Work	11.97	2.24	11.87	2.22	11.67	2.73
	Leisure	4.76	2.28	4.83	1.69	5.16	2.31
	Sleep	7.26	1.06	7.30	1.44	7.17	0.75

Note: The amount of participants varied from Time 1 to Time 3, and are as follows: Time 1, N = 38; Time 2, n = 23; Time 3, n = 6.

Responses from Time 1 results yielded the following mean results for work versus non-work time usage, respectively: Within the past 24 hours, mean = 12.934 (SD = 2.28), and mean = 11.974 (SD = 2.28); "Average over the past 3 days", mean = 12.816 (SD = 2.14), and mean = 11.1842 (SD = 2.14); and "Average over the past 7 days", mean = 11.974 (SD = 2.28), and mean = 12.0263 (SD = 2.23). The one-sample *t*-test results comparing the means of work versus non-work time usage in each of the three time categories (24 hours, 3 days, and 7 days), yielded mixed results. Significant differences between work and non-work hours were identified the past 24-hour period, $t(37) = 5.005$, $p < .001$ and on average across the past 3 day period $t(37) = 4.690$, $p < .001$. However, non-significant results were found comparing the means for work and non-work across the previous 7-day period. Thus, the hypothesis that medical residents did spent significantly more time at work than in sleep and leisure activities combined was supported, especially over a single or multi-day period of time.

Hypothesis 5

Basic frequency analysis was used to address the hypothesis that medical residents do not strongly psychologically detach from work during their "off-work" time. Any participant who had a mean score of less than three ("neither agree nor disagree") out of the five point response scale on the psychological detachment dimension of the recovery experiences questionnaire was identified as not psychologically detaching from work. At Time 1, 22 participants (57.9%) indicated that they do not psychologically detach from work. This was determined by any participant with scores at a response of "2" or lower (2 = "disagree"). The mean psychological detachment score was mean = 2.75 (*SD* = .87), with 75% of the respondents at or below a score of 3.0 (3 = "Neither agree nor disagree"). Similar results were found for Time 2 showing 10 of

the 16 participants (62.5%) with mean scores below 3.0. The mean psychological detachment score at this time point was mean = 2.76 (*SD* = .80).

Hypothesis 6

The qualitative detailed assessment of time usage was utilized to test this hypothesis. A frequency analysis was conducted on the number of active versus passive recovery activities during both work and non-work time. During non-work time more respondents engaged in more passive forms of recovery activities (24 versus 11) than active recovery activities. The opposite was the case when considering recovery activities that take place during work time. These frequencies are presented in Table 11.

Table 11

Frequency of Passive Versus Active Resource Replenishing Activities

	Work-Time		Non-Work Time	
	Respondents	% of total	Respondents	% of total
Passive	3	7.9	24	63.2
Active	32	84.2	11	28.9
Equal	2	5.3	3	7.9
total	n = 37	100%	n = 38	100%

Note. Respondents is equal to the amount of participants who were designated as reporting predominently either passive or active activities. Some respondents had an equal frequency of both types of activities and are noted under the category of "equal". The n amount of respondents differs due to one respondent whose non-work activities were all nulled.

Hypothesis 7

The last hypothesis tested was that reported recovery strategies that are active are more strongly associated with resource gain than recovery activities that are passive in nature. A paired-samples *t*-test showed that there was no significant difference between the mean average resource replenishing rating of passive ($M = 4.60$, $SD = 1.77$) versus active ($M = 4.27$, $SD = 1.69$) nonwork activities, $t(37) = 0.9267$, $p > .05$.

CHAPTER IV

DISCUSSION AND CONCLUSIONS

The purpose of this exploratory study was to help provide insight into the time use, perceptions of stress, and recovery practices of medical residents. There has been much done with the resident population in the areas of burnout and stress. However, resident recovery practices and time use has, to our knowledge, never been researched in congruence with each other, nor in the way it was examined in the present study. There were several proposed hypotheses and research questions, which are presented and examined below. Followed by the limitations of the present study, and future directions for continued research in this area.

Discussion of Proposed Hypotheses and Research Questions

Given the trends presented in the literature for the resident population, stress and burnout were areas of interest for the present study. There were several proposed hypotheses suggesting the possible mediation of recovery experiences, sleep quality, fatigue, and need for recovery between the effect of workplace stress on burnout. It is important to note the reasoning behind the specific groupings of variables for the mediation analyses. It is believed that a need for recovery and fatigue serve as "warning signs" for burnout. Individuals who score highly on these measures would be more "at risk" for developing a chronic stress condition (i.e., burnout) if their condition went unchecked (Cunningham, 2008). Whereas, recovery experiences and sleep quality are conceptualized as being the direct effects associated with burnout as opposed to

the precursors as presented in Hypothesis three. Therefore, results from the mediation analyses are presented in conceptual order.

It was suggested that a need for recovery and fatigue mediated the relationship between perceived workplace stress and burnout (Hypothesis 3). Respondents in this sample did indicate a significantly higher reported fatigue when compared to established norms (Michielson et al., 2004). This would indicate that these individual's would be in a higher risk category for the development of burnout. In terms of mediation, there were no mediating effects of need for recovery or fatigue between perceived workplace stress and burnout. However, there was a significant effect between stress and need for cognitive/emotional resources. In times of high-perceived workplace stress there is an increased need for resource replenishment. According to previous findings, this would indicate that these individuals are feeling the initial need for recovery from their workplace stress. This also suggests that this group is "at risk" for the development of a more serious stress condition (i.e., burnout) if the need for resources is not met (Cunningham, 2008).

Hypothesis 1 results revealed no evidence to support mediation of psychological detachment, relaxation, mastery experiences, or control between stress and burnout. However, the effect between stress and *control* approached significance, suggesting that perceived workplace stress could have potential effects on participants' engaging in activities that are in line with their personal goals (Sonnentag & Fritz, 2007). However, the *control* dimension was not shown to be significantly different from the reported norms for that scale.

It is relevant to note the differences in participant scores on the other quantitative measures when compared to the metric's norms. Medical resident's reported quantitative workload and sleep quality were both shown to be significantly higher than the norms associated

with those scales. Furthermore, the mean score on the quantitative workload assessment was a little less than five points away from the highest possible score, and the reported sleep quality was approaching the bench marker for the sleep quality reported by individuals who suffer from insomnia. However, there was no mediation present in Hypothesis 2, which examined the potential mediating effects of sleep quality on the relationship between quantitative workload and burnout.

The significantly low reported sleep quality by this population could potentially be attributed to a lack of psychological detachment. Psychological detachment from the workplace environment is a necessary behavior for successful recovery (Fritz et al., 2010; Kaplan, 1995). A lack of psychological detachment has been shown to have a negative impact on sleep quality as well as performance and affectivity the following workday (Morin et al., 2003; Sonnentag & Bayer, 2005). Given the demands (i.e., workload, time spent, etc.) this recovery practice is a relevant concern for the medical resident population. Therefore, it was hypothesized that medical residents do not successfully psychologically detach from the workplace environment during off-work time. This was supported in both the participant's responses on the *psychological detachment* dimension of the recovery experiences questionnaire, and activities reported during nonwork time.

Participants' scores on the psychological detachment dimension were lower than the reported norms found in the literature (Sonnentag & Fritz, 2007). The majority of residents did not report successful detachment from the workplace environment. The differences between the participants' mean scores and the norm scores was shown to be non-significant, but approaching significance. Despite the lack of significance found between the means, there was evidence that supported resident's lack of psychological detachment in the nonwork detailed assessment of

time usage. Activities such as, “emailing” and “prepping for work” were reported frequently. These activities were also associated with higher reported stressfulness and resource draining ratings. According to the literature, engaging in activities that do not facilitate the separation form the workplace environment inhibit the achievement of a beneficial recovery state (Fritz et al., 2010; Kaplan, 1995). However, this is the first study of its kind that has asked for respondents to rate their perceptions of the resource benefits they receive (or do not receive) from the activities they engage in.

There are many potential reasons why psychological detachment may be challenging for the medical resident population. It could be inferred that the amount of work that is expected from this population hinders them from having the opportunity to psychologically detach. Results from the present study shows that not only are resident perceptions of workload significantly higher than the average population, but also are within one standard deviation of the maximum for that particular measure. If the amount of work they are expected to complete is more than the amount of time they have to complete it in there may be pressure to take the residual work home. Whatever work they are not successfully completing while physically at work is taken home, which results in a continued depletion of resources during the time that should be spent in the gaining and developing of new resources.

As previously mentioned, a new assessment of general and detailed time use was developed for the present study. It was believed that through a measure of this nature additional insight could be acquired about the occupation-specific activities that medical residents engage in, and individualized perceptions associated with each of these activities. The information that resulted from the general assessment of time usage was used to test hypothesis four. It was believed that the amount of time medical residents spent at work was significantly more than

their reported nonwork time (e.g., sleep and leisure time combined). The results supported this proposed hypothesis for both response times of "in the last 24 hours", and "average over the past 3 days". However, significant differences were not found for "average over the past 7 days." This non-significant finding was not surprising due to the duty hour restrictions that are in place for the medical resident population. According to the new statute of limitations put in place in 2011 residents are limited to 80 hours per week averaged over the course of a four-week period (ACGME, 2011). Therefore, it would be expected that resident's reported work time over a seven-day period would not exceed eighty hours. Thus, giving the opportunity for the time gap between work and nonwork to reduce.

In an attempt to create a time use comparison to results from the general time use assessment, data from the 2011 American Time Use Survey was used. For comparison purposes, reported time on "leisure activities" and "household activities" by the U.S. Census Bureau were merged to reflect the single "leisure" time category in the general time use assessment. Reasoning for this was because residents reported engaging in what would be considered household activities, but there was not a designated category for respondents to make this distinction. The results show that medical residents sleep less, work longer hours, and have less time for leisure activities when compared to the average working American. Medical residents have less time available to complete the same household activities, and still manage to engage in a "true leisure" activity. The distinction of "true leisure" time is meant to convey time that is spent solely on leisure activities (that would be argued to be resource replenishing in nature) such as, watching television, exercise, and social activities. Engagements in these types of activities facilitate the recovery process, but residents lack the time necessary to participate in them.

Free response activities were assessed for work and nonwork time. At work, many of the activities reported had similar mean scores for resource draining versus replenishing. This was a noteworthy finding in that these activities (according to the resident's perceptions) are neither overly draining nor replenishing their resources. This suggests that residents perceive a pseudo state of homeostasis in terms of their expenditure of resources.

Of the work-time activities reported were rated as being a high source of resource replenishment with the exception of "eating". In terms of frequency, this activity had one of the lowest response rates, and had the least amount of time spent on it out of all of the work-time activities. It also had the lowest stressfulness and resource draining ratings, and the highest resource replenishing ratings out of all reported activities. Eating was also reported during nonwork time, and the mean resource replenishment rating was much lower. This finding suggests that eating is more replenishing at work than during off-work time, and thus a more valuable activity to engage in while at work. For the resident population, taking time to eat not only provides an opportunity to physically replenish (i.e., nourishment through eating, sitting down, etc.), but a time to rest the mind as well. It has also been previously shown through focus groups with the resident population at the current participating hospital, that taking the time to physically leave the hospital environment to eat is beneficial.

On the other end of the spectrum, activities like "charting" and "walking" were lowest source for resource replenishment with the highest amount of drain. Walking is probably a source of physical resource drain. Previous studies have found that the average distanced traveled by nurses in a single day shift (10 hours) ranged between 2.4 and 3.4 miles (Hendrick, Chow, Skierczynski, & Lu, 2008). It can be assumed that resident's travel distance would be similar in nature. The lack of replenishment reported for "charting" makes sense given the

tedious, and time-consuming nature of the activity. It drains resources because it requires the resident to be focused and detail oriented, but there is nothing to be gained from it apart from a possible feeling of completion.

Sleep had the highest reported frequency of the nonwork activities. It was also shown to have the highest ratings of resource replenishment, and was amongst the lowest for reported stress and resource drain. Sleep has the potential to serve as one of the most beneficial recovery activities due to the fact that it is an activity that everyone must engage in on a daily basis. It is passive in nature, meaning it should neither drain nor replenish resources, yet shown to be immensely resource replenishing (Sonnentag & Fritz, 2007). According to the reported general time usage, medical residents are getting a reasonable amount of sleep. It is still less than the average American, but it is still close enough to the range of amount of sleep needed in a single evening for optimal functioning (between 7.5 and 8.5 hours in a single evening) (National Sleep Foundation, 2011). However, despite the fact that residents are reporting a quantitatively sound amount of sleep, it seems that the quality is lacking (as mentioned previously). It could be suggested that one of the reasons for the decreased quality of sleep is the lack of psychological detachment in this population. Medical residents reported a lower than normal perceived psychological detachment from work. An inability to successfully psychologically detach from the workplace environment has been shown to affect quality of sleep and emotional affectivity the following day (Sonnentag & Bayer, 2005). This continued lack of detachment can lead to a continued decreased quality of sleep, which has the potential to have negative long-term effects (Krueger, 1989; Muraven & Baumeister, 2000; Sonnentag et al., 2009).

Sonnentag and Jelden (2009) suggested that recovery activities are can not only grouped into categories (e.g., psychological detachment, relaxation, mastery experiences, and control) but

can more broadly be classified as being active or passive in nature. They classify activities as being "active" in nature if they are associated with the replenishing of resources and the building of new ones to cope with future stressors. Activities that are "passive" are designated as being neither replenishing, nor draining. Essentially, these are activities that keep the individual at a homeostatic level.

Hypotheses 6 and 7 were concerned with the active versus passive nature of the free response activities given for both work and nonwork. For Hypothesis 6, it was believed that residents engaged in more passive rather than active forms of recovery (i.e., resource replenishing activities). This was supported for the activities reported during nonwork time. The majority of participants engaged in predominantly passive resource recovery activities while away from work (i.e., watching TV/movies, surfing the internet, reading, etc.). This is a consistent trend present in the literature. Individuals in high stress workplace environments tend to want to "just relax" after a long workday. This mentality is more often associated with passive forms of recovery because of a lack of self-regulatory resources needed to push one to engage in an active recovery experience (Mojza et al., 2010; Sonnentag & Jelden, 2009). Therefore, passive activities require less effort, and are easier for the individual to engage in. However, during work-time, an overwhelming majority of participants reported engaging in predominantly active activities (i.e., patient care, rounds, talking to patients/families). Interestingly, these active activities were all considerably low in resource replenishment, despite their active nature. This finding raises the possibility that it is not just the active or passive nature of the activity that determines whether it facilitates recovery. Instead, it is suggested that the resource draining versus resource replenishing perception of the activity coupled with its active versus passive nature is a more accurate assessment of the activity.

This novel type of activity classification was further supported by the non-significant findings for Hypothesis 7. Active activities engaged in during nonwork were expected to be associated with higher levels of recovery (i.e., resource gain) in comparison to activities that were considered passive. Passive recovery activities were shown to be associated with a slightly higher reported replenishment score. However, the difference in mean replenishment scores between passive and active activities was non-significant. Suggesting that, for this sample, neither active nor passive activities were significantly more replenishing over the other. This contradicts the findings in previous literature (Sonnentag & Jelden, 2009), which supports the notion that active activities should facilitate recovery though the replenishing of lost resources.

Limitations

There are several limitations within the present study that need to be discussed. The first limitation is related to the sample. Initially, there were a limited number of potential resident participants within the Internal Medicine and Transitional Year residency programs (35 in total). For the present study, we had approximately 69% of the total population of both residency programs from the local teaching hospital participate in our study. However, the resident participants, coupled with medical student and faculty participation, still did not create a large sample size. We attempted to account for this low sample size for the mediation analyses conducted to test Hypotheses 1-3 through the use of bootstrapping (Preacher & Hayes, 2004; Preacher & Hayes, 2008). Nevertheless, this limited sample size does present a challenge in the form of low statistical power for the testing of the study hypotheses.

Another limitation that was presented during the course of the study was that the cohort of potential medical student participants changed halfway through the course of the data

collection. Medical student clinical rotations lengths vary greatly between institutions. As a result, halfway through the course of the data collection the initial group left, and a new group joined in. It would have been preferable to study the same cohort throughout the course of the study if possible for the purposes of consistency and for data collection over time.

Two novel time use assessments were created for the purposes of the present study. The time use assessments, both general and specific, were developed in hopes of gaining insight into the time use practices of medical residents. This portion of the overall survey was pilot tested on Psychology graduate students at The University of Tennessee at Chattanooga. After the first pilot test, the assessment was altered reflecting results and commentary of participants. This included changes to both clarify and simplify the survey instructions and the amount of questions asked. Even though this portion of the survey instruments was pilot tested, it may still benefit from further refinement before use in future research.

It is important to also note the limitations associated with the assessment of the time use measures. First, the free response activities for work and nonwork had to be grouped into umbrella categories described previously. There were several participants' responses that were too different from the response trends that they could not fit into any predominant category. These activities were also reported with such low frequency that a category could not be made out of those responses. There were also several instances when participants used specific jargon when describing their activities. This presented a unique interpretational challenge during coding.

Another step of the coding process for the detailed time use assessment was determining the active or passive nature of each work and nonwork activity recorded. Despite the fact that the designation of work and non-work coded activities as being either "active" or "passive" was

reflective of findings from Sonnentag and Jelden (2009) there was still space for possible subjectivity in determining what constitutes an active or passive activity. There are no specific coding instructions or guidelines for determining whether an activity should be designated as either passive or active, other than the basic definitions provided.

One final limitation was a potential lack of generalizability of the present findings to a broader population of medical residents. The present cohort of medical residents had already been somewhat exposure to stress reduction and burnout prevention education at a very superficial level and there was an on-going, voluntary program in place at their teaching hospital designed to provide residents an opportunity for resource recovery while at work. While this does potentially limit the direct generalizability of the present findings to other resident samples, it also raises the possibility that the present estimates are conservative given that despite some burnout prevention efforts being in place, the present results still show strong evidence of suboptimal recovery strategies among residents both in and out of work. From this, it is important to question the implication of the present findings that even residents who are given opportunities for resource recovery while at work are still showing poor recovery strategies. This being the case, how much more sub-optimal are the recovery strategies employed by residents who work in facilities without any stress and burnout awareness and prevention programming at all? This would be a question better answered through future research in this area considering the differences between various programs across different hospital environments.

Finally, it is important to note the statistical limitations that were also evident in the present study. Preacher and Hayes (2008) discuss the issue of multicollinearity among proposed mediators in multi mediation analysis. According to Preacher and Hayes, contrasts compare

each mediator's independent ability to mediate the relationship above and beyond the other mediators included in the analysis. Because of this, they suggest that it is better to select mediators that are uniquely different from each other to avoid the issue of collinearity. Preacher and Hayes also note that it is not always possible to not have significantly correlations between mediating variables, and this issue was present in this study. Hypotheses 1 and 3 suggested that mediation of recovery experiences, need for recovery, and fatigue between perceived workplace stress and burnout. As mentioned previously, recovery experiences consisted of four dimensions (or mediators for the purposes of the analysis), and the need for recovery scale assessed two dimensions. Correlation analysis revealed that the only recovery experience that was not significantly intercorrelated with the other dimensions was mastery experiences. Similarly, the two dimensions within the need for recovery scale were also significantly intercorrelated with each other. Furthermore, Hypothesis 3 also included fatigue as a mediator alongside the two dimensions of the need for recovery scale, and was significantly correlated with each dimension.

Future Directions and Conclusion

There are many suggestions for related research with the medical resident population. First, it may be insightful to assess members of this population over an extended period of time, either longitudinally, or just with the addition of more opportunities for participation. Given the time restraints during work-time many resident participants only had the time to participate in one session despite their interest. If more opportunities were made available, there may have been better participation. Second, it may be beneficial to collect information regarding the rotation that the residents are on during the time of their participation. The nature of the rotation (i.e., stressfulness, level of workload, time requirements) has the ability to influence resident's

affective states. Thus, having the ability to possibly influence perceived workplace stress, levels of fatigue, and various other assessments used in the present study. Related to this, if there are medical student participants, information regarding length of stay should be accounted for as well. Lastly, a comparison between residency tracks could have provided a broader and more linear idea of differences in time use, workplace stress, and recovery. In the present study, data was only collected from residents amongst two residency tracks. Comparisons could have been attempted between the two tracks represented, however the Transitional Year program size totals at six residents, of which only five participated. In future studies, assessments of time use across specialties could yield potentially noteworthy results and should be considered.

Given the novelty of the time use measures developed for the present study, there are many possible future directions regarding usage of this scale going forward. First, since these assessments are qualitative and require significant amounts of categorization and coding it would be helpful to employ more than one individual responsible for coding. Not only would this help decrease potential risks for errors, but could also aid in the interrater reliability associated with the coding process. Second, since there are currently no solidified instructions on how to code activities as being passive or active (in terms of recovery), it could be informative to have participants determine their individualized viewpoints on the active versus passive nature of their reported activities. It has already been stated that individual differences play a major role in determining the types of recovery activities people engage in (Sonnentag & Fritz, 2007), as well as the perceived benefits from these activities. The addition of a self-reported categorization of passive versus active may result in some worthwhile trends that could potentially aid in a better understanding of this distinction.

Due to their unique workplace environment, medical residents do not "fit" perfectly into the developed stress and recovery process models currently presented in the research literature. This uniqueness has been shown not just in their perception of general workplace stressors, but also in their reported time usage and reported recovery strategies. These workplace differences that prevent residents from fitting into developed stress and recovery models could essentially be ascribed to any job where the demands do not reflect the "norm". Unfortunately, the stress models currently amongst the literature do not take into account these workplace-specific characteristics. Thus, keeping the resident population (and others) from the potential benefits that result from research conducted with these models. It hoped that through research like the present study, more occupation-specific models of workplace stress can be developed for medical residents and other professionals that can account for unique stressors.

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APPENDIX A

SURVEY MEASURES GIVEN TO PARTICIPANTS

Informed Consent Form

Purpose of the Study

This study is being conducted by Nicole Marie Cranley, a graduate student at the University of Tennessee at Chattanooga, under the supervision of Dr. Chris Cunningham. The primary purpose of the present study is to provide insight into the stress and recovery challenges faced by medical residents in a typical hospital environment. Furthermore, it is to examine medical resident perceptions of stress and recovery practices and how this effects their level burnout. Medical resident time usage will also be assessed in both work and non-work settings.

What will I have to do?

If you agree to participate you will be asked to respond to a measurements of your time usage, recovery activities, stress, fatigue, sleep quality, fatigue, and burnout. These assessments will take place over the course of four one-hour scheduled meeting times. Along with these surveys, questions will be posed to you regarding your opinions, feelings, and experiences towards your recovery from workplace stress. Responses to these questions will be recorded.

What are the risks to me?

There are very few risks to you if you participate in this study. If any question makes you uncomfortable, you can skip that question or withdraw from the study completely. If you decide to quit at any time before you have finished the survey, your answers will NOT be recorded. **We really need complete surveys, though, so we greatly appreciate your full cooperation.**

Confidentiality

Your responses will be kept completely confidential and anonymous (no one will know your name or identity and your answers will only be viewed by the researchers). All colleted data (both surveys and audio files) will be inputed into a coded document, and all original surveys and recordings will be stored in a locked cabinet.

Voluntary participation

Your participation in this study is completely your choice. You may stop or withdraw at any time.

How the findings will be used

Results of the study will be used to help better understand how medical residents recover from workplace stress. It will also provide insight into the day-to-day life of a medical resident, and their perceptions towards how their time is spent. It is the hope that through exploratory studies like this, a more occupation-specific model of workplace stress can be developed for medical residents. In doing so, helping to implement preventative programs to help train medical residents, like you, to better recover from workplace stress.

Contact Information:

If you have any concerns or questions about this study, please contact Nicole Cranley at Nicole-Cranley@mocs.utc.edu or Dr. Chris Cunningham at Chris-Cunningham@utc.edu or (423) 425-4264. You may also contact the chair of the UTC IRB committee, Dr. Weathington at (423) 425-4289. By completing and returning this survey, you acknowledge that you have read this information and agree to participate in this research, with the knowledge that you are free to withdraw your participation at any time without penalty. You understand that the researcher will tape you. The researcher will keep these tapes in a locked filing cabinet. You understand that only the researcher will have access to these tapes and that they will be destroyed by May 1, 2012. Thank you in advance for your assistance and participation.

Sincerely,
Nicole Marie Cranley
Christopher J. L. Cunningham, Ph.D.
The University of Tennessee at Chattanooga
Department of Psychology

I acknowledge that I have reviewed the above information and that I consent to participate in this research.

_____ _____

Printed name Signature

Example: In the last 24 hours, I spent approximately 10 hours on *Work* , 4 hours on *Leisure* activities, and 10 hours on *Sleep* .

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
			Work								*Leisure*							*Sleep*					

Approximately how many of the last 24 hours have *you* spent on (1) work, (2) leisure, and (3) sleep? Please color in your responses below using Blue to indicate Work, Green to indicate Leisure, and Yellow to indicate Sleep.

Hours

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

Now, think back across the last 3 days -- averaging across these days, how much time would you say you typically spent (out of 24 hours) on (1) work, (2) leisure, and (3) sleep? Use Blue to indicate Work, Green to indicate Leisure, and Yellow to indicate Sleep

Hours

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

Finally, think back across the last 7 days -- averaging across these days, how much time would you say you typically spent (out of 24 hours) on (1) work, (2) leisure, and (3) sleep? Use Blue to indicate Work, Green to indicate Leisure, and Yellow to indicate Sleep

Hours

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

To what extent are your **work activities** (i.e., what you do as a part of your job) resource *draining* versus resource *replenishing*? By definition, "resources" are psychological or physical factors that allow us to respond to demands and changes in our daily lives. Some of our daily activities require more from us than they give back; these are highly draining activities. Participating in other activities, however, may help us feel restored, as if we gained more from the activity than it took away; these are highly replenishing activities.

Where is your time going ***at work*** *?*	*Time Use*		*Rating of Stressfulness*	*Rating of Resource Drain*	*Rating of Resource Replenishment*
In this first column, please list the five (5) specific work-related actvities that occupy most of your time during a typical 24-hour period. Do not list compound or complex activities such as "work", but rather list more specific work-related activities that require significant portions of your time (e.g., emails, report writing, etc.).	Now, please estimate how much time out of a 24-hour period you typically spend on each activity:		On average, how stressful is each of these activities to you?	To what extent does participating in each of these activities drain you of resources?	To what extent does participating in each of these activities replenish your resources?
	(a) based on an average of your time usage over the last 3 days	(b) based on an average of your time usage over the last 7 days	1 = Not at all stressful 2 = A little bit stressful 3 = Somewhat stressful 4 = Moderately stressful 5 = Quite stressful 6 = Very stressful 7 = Extremely stressful	1 = Not at all draining 2 = A little bit draining 3 = Somewhat draining 4 = Moderately draining 5 = Quite draining 6 = Very draining 7 = Extremely draining	1 = Not at all replenishing 2 = A little bit replenishing 3 = Somewhat replenishing 4 = Moderately replenishing 5 = Quite replenishing 6 = Very replenishing 7 = Extremely replenishing

To what extent are your **outside of work activities** (i.e., things you do away from your job) resource draining versus resource replenishing? By definition, "resources" are psychological or physical factors that allow us to respond to demands and changes in our daily lives. Some of our daily activities require more from us than they give back; these are highly draining activities. Participating in other activities, however, may help us feel restored, as if we gained more from the activity than it took away; these are highly replenishing activities.

*Where is your time going **outside of work** ?*	*Time Use*		*Rating of Stressfulness*	*Rating of Resource Drain*	*Rating of Resource Replenishment*
In this first column, please list the five (5) specific nonwork-related actvities that occupy most of your time during a typical 24-hour period. Do not list compound or complex activities such as "work", but rather list more specific work-related activities that require significant portions of your time (e.g., sleep, watching TV, running, etc.).	Now, please estimate how much time out of a 24-hour period you typically spend on each activity:		On average, how stressful is each of these activities to you?	To what extent does participating in each of these activities drain you of resources?	To what extent does participating in each of these activities replenish your resources?
	(a) based on an average of your time usage over the last 3 days	(b) based on an average of your time usage over the last 7 days	1 = Not at all stressful 2 = A little bit stressful 3 = Somewhat stressful 4 = Moderately stressful 5 = Quite stressful 6 = Very stressful 7 = Extremely stressful	1 = Not at all draining 2 = A little bit draining 3 = Somewhat draining 4 = Moderately draining 5 = Quite draining 6 = Very draining 7 = Extremely draining	1 = Not at all replenishing 2 = A little bit replenishing 3 = Somewhat replenishing 4 = Moderately replenishing 5 = Quite replenishing 6 = Very replenishing 7 = Extremely replenishing

Directions: ***Do you find your job to be stressful?*** **For each of the following words or phrases, select: "Yes" if it describes your job, "No" if it does not describe it, or "?" if you cannot decide.**

	Yes	No	?
Demanding	◯	◯	◯
Pressured	◯	◯	◯
Calm	◯	◯	◯
Many things stressful	◯	◯	◯
Hassled	◯	◯	◯
Nerve-wracking	◯	◯	◯
More stressful than I'd like	◯	◯	◯
Overwhelming	◯	◯	◯

Directions: Thinking about the work you do in your job, please respond to each of the following items:

	Less than once per month or never	Once or twice per month	Once or twice per week	Once or twice per day	Several times per day
1. How often does your job require you to work very fast?	◯	◯	◯	◯	◯
2. How often does your job require you to work very hard?	◯	◯	◯	◯	◯
3. How often does your job leave you with little time to get things done?	◯	◯	◯	◯	◯
4. How often is there a great deal to be done?	◯	◯	◯	◯	◯
5. How often do you have to do more work than you can do well?	◯	◯	◯	◯	◯

Directions: ***Think back to your most recent off-work time (e.g., last night).*** **Please rate your agreement with each of the following statements.**

During that off-work time, I...

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
1. ...forgot about work.	◯	◯	◯	◯	◯
2. ...did not think about work at all.	◯	◯	◯	◯	◯
3. ...distanced myself from my work.	◯	◯	◯	◯	◯
4. ...got a break from demands of work.	◯	◯	◯	◯	◯
5. ...kicked back and relaxed.	◯	◯	◯	◯	◯
6. ...did relaxing things.	◯	◯	◯	◯	◯
7. ...used the time to relax.	◯	◯	◯	◯	◯
8. ...took time for leisure.	◯	◯	◯	◯	◯

(continued from previous page)Think back to your most recent off-work time (e.g., last night). **Please rate your agreement with each of the following statements.**

During that off-work time, I...

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
9. ...learned new things.	◯	◯	◯	◯	◯
10. ...looked for intellectual challenges.	◯	◯	◯	◯	◯
11. ...did things that challenge me.	◯	◯	◯	◯	◯
12. ...did something to broaden my horizons.	◯	◯	◯	◯	◯
13. ...felt like I decided for myself what I wanted to do.	◯	◯	◯	◯	◯
14. ...decided my own schedule.	◯	◯	◯	◯	◯
15. ...determined for myself how I spent my time.	◯	◯	◯	◯	◯
16. ...took cre ó things sthe avy I wnt ed them done.	◯	◯	◯	◯	◯

<u>Directions:</u> ***How accurate are each of the following statements at describing how you feel right now, at this moment?***

	Not at all accurate	Moderately inaccurate	Slightly inaccurate	Neither accurate nor inaccurate	Slightly accurate	Moderately accurate	Completely accurate
1. I have been working so hard today that I am losing my ability to concentrate on what I am doing.	◯	◯	◯	◯	◯	◯	◯
2. I have been so busy working today that I am beginning to feel I am losingv control oer a t he wr k I have to do.	◯	◯	◯	◯	◯	◯	◯
3. If my work were finished for today, I would still have trouble concentrating on other things.	◯	◯	◯	◯	◯	◯	◯
4. I hve wrked so l ong and hard today that I do not have much attention left to give to my job tasks.	◯	◯	◯	◯	◯	◯	◯
5. My work has taken so much effort today that I am having difficulty keeping my thoughts straight.	◯	◯	◯	◯	◯	◯	◯
6. Despite my work efforts so far today, I am thinking as clearly as I was when I started working today.	◯	◯	◯	◯	◯	◯	◯

(continued from previous page)* <u>Directions:</u> *How accurate are each of the following statements at describing how you feel right now, at this moment?

	Not at all accurate	Moderately inaccurate	Slightly inaccurate	Neither accurate nor inaccurate	Slightly accurate	Moderately accurate	Completely accurate
7. It will be difficult for me to show interest in other people when I finish working today.	◯	◯	◯	◯	◯	◯	◯
8. When I stop my work for today I will need more than an hour to begin feeling recovered.	◯	◯	◯	◯	◯	◯	◯
9. When I stop my work for today, I hope other people will leave me alone for a little while.	◯	◯	◯	◯	◯	◯	◯
10. After working today I will be too tired to start on other activities.	◯	◯	◯	◯	◯	◯	◯
11. I need to step away from my work very soon because a break would help me function better.	◯	◯	◯	◯	◯	◯	◯
12. When work is finished today I will need some time by myself to start recovering and readjusting myself before starting something else.	◯	◯	◯	◯	◯	◯	◯

<u>Directions:</u> Please respond to the following statements based on how you typically or usually feel.

	Never	Sometimes	Regularly	Often	Always
1. I am bothered by fatigue	◯	◯	◯	◯	◯
2. I get tired very quickly	◯	◯	◯	◯	◯
3. I don't do much during the day.	◯	◯	◯	◯	◯
4. I have enough energy for everyday life.	◯	◯	◯	◯	◯
5. Physically, I feel exhausted.	◯	◯	◯	◯	◯
6. I have problems to start things.	◯	◯	◯	◯	◯
7. I have problems to think clearly.	◯	◯	◯	◯	◯
8. I feel no desire to do anything.	◯	◯	◯	◯	◯
9. Mentally, I feel exhausted.	◯	◯	◯	◯	◯
10. When I am doing something, I can concentrate quite well.	◯	◯	◯	◯	◯

Directions: ***Please think about the quality of sleep you typically get.*** **How many times in a typical week would each of the following things occur?**

	Few	Sometimes	Often	Always
1. Difficulty in thinking due to poor sleep.	◯	◯	◯	◯
2. Difficulty in concentrating due to poor sleep.	◯	◯	◯	◯
3. Increase of mistakes due to poor sleep.	◯	◯	◯	◯
4. Irritated feeling due to poor sleep.	◯	◯	◯	◯
5. Decrease of interest in work or others due to poor sleep.	◯	◯	◯	◯
6. Getting tired easily at work due to poor sleep.	◯	◯	◯	◯
7. Sleepiness that interferes with daily life.	◯	◯	◯	◯
8. Painful life due to poor sleep.	◯	◯	◯	◯
9. Decrease of desire due to poor sleep.	◯	◯	◯	◯
10. Increase of forgetfulness due to poor sleep.	◯	◯	◯	◯
11. Headache due to poor sleep.	◯	◯	◯	◯
12. Decrease of appetite due to poor sleep.	◯	◯	◯	◯
13. Relief of fatigue after sleep.	◯	◯	◯	◯
14. Regaining vigor after sleep.	◯	◯	◯	◯
15. Clear-headed feeling after sleep.	◯	◯	◯	◯
16. Refreshing feeling of body after sleep.	◯	◯	◯	◯
17. Difficulty in getting back to sleep after nocturnal awakening.	◯	◯	◯	◯
18. Never falling asleep after awakening during sleep.	◯	◯	◯	◯
19. Difficulty in falling asleep.	◯	◯	◯	◯
20. Tossing and turning sleeplessly.	◯	◯	◯	◯
21. Wish for more sleep after getting up.	◯	◯	◯	◯
22. Difficulty in getting up after sleep.	◯	◯	◯	◯
23. Feeling unlikely to sleep after sleep.	◯	◯	◯	◯
24. Satisfaction with sleep.	◯	◯	◯	◯
25. Deep sleep.	◯	◯	◯	◯
26. Enough sleep time.	◯	◯	◯	◯
27. Waking up easily due to noise.	◯	◯	◯	◯
28. Waking up during sleep.	◯	◯	◯	◯

Directions: **Below are statements with which you may agree or disagree. Please indicate your level of agreement with each of the following statements:**

	Strongly Agree	Agree	Disagree	Strongly Disagree
1. There are days when I feel tired before I arrive at work.	○	○	○	○
2. After work, I tend to need more time than in the past in order to relax and feel better.	○	○	○	○
3. Lately, I tend to think less at work and do my job almost mechanically.	○	○	○	○
4. During my work, I often feel emotionally drained.	○	○	○	○
5. After working, I have enough energy for my leisure activities.	○	○	○	○
6. After my work, I usually feel worn out and weary.	○	○	○	○
7. Usually, I can manage the amount of my work well.	○	○	○	○
8. When I work, I usually feel energized.	○	○	○	○
9. I always find new and interesting aspects in my work.	○	○	○	○
10. It happens more and more often that I talk about my work in a negative way.	○	○	○	○
11. I can tolerate the pressure of my work very well.	○	○	○	○
12. I find my work to be a positive challenge.	○	○	○	○
13. Over time, one can become disconnected from this type of work.	○	○	○	○
14. Sometimes I feel sickened by my work tasks.	○	○	○	○
15. This is the only type of work that I can imagine myself doing.	○	○	○	○
16. I feel more and more engaged in my work.	○	○	○	○

Please rate the extent to which you feel that you have control over how you spend your time while...

	Not at all	A little	Somewhat	Moderately	Quite	Very	Completely
...at work.	○	○	○	○	○	○	○
...at home.	○	○	○	○	○	○	○
...engaging in leisure activities.	○	○	○	○	○	○	○

Directions: **This scale consists of a number of words and phrases that describe different feelings and emotions. Read each item and then indicate the extent to which you have felt this way during the past few weeks.**

	Very slightly or not at all	A little	Moderately	Quite a bit	Extremely
1. afraid	◯	◯	◯	◯	◯
2. scared	◯	◯	◯	◯	◯
3. nervous	◯	◯	◯	◯	◯
4. jittery	◯	◯	◯	◯	◯
5. irritable	◯	◯	◯	◯	◯
6. hostile	◯	◯	◯	◯	◯
7. guilty	◯	◯	◯	◯	◯
8. ashamed	◯	◯	◯	◯	◯
9. upset	◯	◯	◯	◯	◯
10. distressed	◯	◯	◯	◯	◯

Year in Residency:

☐ PGY 1 ☐ PGY 2 ☐ PGY 3

Gender:

☐ Male ☐ Female

Age (please round to nearest year):

☐

Race/Ethnicity:

☐ American Indian/Alaska Native ☐ Hispanic/Latino ☐ Other

☐ Asian ☐ Native Hawaiian/Pacific Islander

☐ Black/African American ☐ White

Marital Status:

☐ Married, with children ☐ Single, never married

☐ Married, no children ☐ Single, formerly married

☐ Engaged

How many individuals depend on you for their day-to-day survival (i.e., what number of dependents do you support, regardless of their age):

☐

Thank you for your participation!

APPENDIX B

IRB APPROVAL LETTER

MEMORANDUM

TO: Nicole Marie Cranley **IRB # 11-160**
Dr. Chris Cunningham

FROM: Lindsay Pardue, Director of Research Integrity
Dr. Bart Weathington, IRB Committee Chair

DATE: November 1, 2011

SUBJECT: IRB # 11-160: Understanding Time Use, Stress, and Recovery in Medical Residents

The Institutional Review Board has reviewed and approved your application and assigned you the IRB number listed above. You must include the following approval statement on research materials seen by participants and used in research reports:

The Institutional Review Board of the University of Tennessee at Chattanooga (FWA00004149) has approved this research project # 11-160.

Please remember that you must complete a Certification for Changes, Annual Review, or Project Termination/Completion Form when the project is completed or provide an annual report if the project takes over one year to complete. The IRB Committee will make every effort to remind you prior to your anniversary date; however, it is your responsibility to ensure that this additional step is satisfied.

Please remember to contact the IRB Committee immediately and submit a new project proposal for review if significant changes occur in your research design or in any instruments used in conducting the study. You should also contact the IRB Committee immediately if you encounter any adverse effects during your project that pose a risk to your subjects.

For any additional information, please consult our web page http://www.utc.edu/irb or email instrb@utc.edu

Best wishes for a successful research project.

VITA

Nicole Marie Cranley was born in Anaheim, California to parents Harald Herrmann and Sandra Cranley. She attended The University of Tennessee at Chattanooga where she graduated Magna Cum Laude with a Bachelor of Science in Psychology and Sociology. She is a member of Alpha Delta Pi Sorority, Psi Chi, and Golden Key Honor Society. During her undergraduate career she received the Psi Chi Award of Excellence for her independent research on academic self-concept priming and performance. She also served as the assistant editor, and ultimately fulfilled the role of Editor-in-Chief to Modern Psychological Studies, a Journal of Undergraduate Research. Nicole continued on to pursue her Master of Science in Psychology at the University of Tennessee at Chattanooga. During her graduate studies she served as a research assistant to Dr. Christopher Cunningham as well as an undergraduate research methods lab instructor. She was also an adjunct instructor for Introduction to Psychology courses during her second year. Nicole graduates in May 2012 with a Master of Science in Research Psychology, and is continuing her education pursuing a Ph.D. in Public Health with a concentration in Social and Behavioral Sciences at the University of Florida.