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Daily Recovery from Work: The Role of Guilt

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Daily Recovery from Work: The Role of Guilt

by

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Dedication

To God whom I attribute all my abilities.

To my parents. Your love and trust fueled me to follow my passion.

To Tim. In no language I can express how grateful I am to have you in my life.

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Abstract

Acknowledging the critical role that occupational factors play in employee health, researchers have tried to understand ways to reduce the harmful effects of work on employee health. As the process by which individuals recharge resources that have been depleted, recovery has been recognized as important due to its potential to mitigate the negative effects of work on employee well-being. Although the recovery literature has continued to grow, many questions remain unanswered. The purpose of the present study was to expand our knowledge of recovery by examining situational (job characteristics) and individual (trait guilt) predictors of recovery and investigating psychological attributes of off-job activities. An experience sampling design was used to understand relationships among focal variables at day level. Hypotheses were tested using the data from 99 full-time employees living with a full-time working spouse and at least one dependent. The results suggest that daily job characteristics serve an important role in recovery such that they relate to recovery experiences of psychological detachment and relaxation. However, job characteristics did not have significant relationships with the choice of off-job activities. With regard to subjective experiences of off-job activities, findings demonstrated considerable variance across individuals. Further, psychological attributes of off-job activities were found to relate to recovery experiences although the results were not always consistent with expectation. Next, little support was found for the moderating role of trait guilt in the relationship between job characteristics and off-job

activities. Finally, consistent with previous research, recovery experiences related to better well-being outcomes.

Chapter One

Introduction

"The long arm of the job" signifies the considerable influence that work has on various aspects of an employee's nonwork life (Lynd & Lynd, 1929). Among those aspects, individual health and well-being have drawn much attention as occupational factors have been shown to adversely impact employee health (Nixon, Mazzola, Bauer, Krueger, & Spector, 2011; Sonnentag & Frese, 2003). Accordingly, researchers have tried to understand ways to reduce the harmful effects of work on employee health and well-being. As the process by which individuals recharge resources that have been depleted (Meijman & Mulder, 1998), recovery has been recognized as important due to its potential to mitigate the negative effects of work on employee health (Demerouti, Bakker, Geurts, & Taris, 2009; Sonnentag, 2001).

Although knowledge about recovery has continued to grow, many questions remain unanswered. First, little is known about the antecedents of recovery as only a small number of studies have examined predictors of recovery (e.g., Sonnentag & Fritz, 2007; Sonnentag & Zijlstra, 2006). Furthermore, while occupational characteristics have been examined as antecedents of recovery, the conceptualization of job characteristics has been too narrow in scope to capture various aspects of work that may impact recovery. Specifically, previous studies examined mainly job stressors (e.g., demands) and job control (e.g., Mojza & Sonnentag, 2010; Sluiter, van der Beek, & Frings-Dresen, 1999; Sonnentag, 2001; Sonnentag, Binnewies, & Mojza, 2010; Sonnentag & Zijlstra, 2006, but

see van Hooff, Geurts, Beckers, & Kompier, 2011 for an exception). Although job demands and control are two key job characteristics (Karasek, 1979), they are not sufficient to fully understand the relationship between work and recovery because some characteristics of the job that are independent of demands and control might also influence recovery.

Second, the role of individual differences has received relatively less attention in the recovery literature (for an exception see Sonnentag & Fritz, 2007). This is a critical void in the literature because recovery is arguably a self-regulation process. That is, individuals make various decisions regarding their recovery in order to maximize their resource utilization (Repetti, 1989; Sonnentag & Jelden, 2009). For example, the experience of the need for recovery, a psychological signal that helps people to regulate their effort investment (Sonnentag & Zijlstra, 2006), motivates people to withdraw from the work situation and take a break. In sum, it is important to study the role of individual differences in recovery.

Third, the impact of various off-job activities on recovery has not been well understood. While previous research has argued that some activities facilitate recovery whereas other activities have the potential to inhibit recovery (Ragsdale, Beehr, Grebner, & Han, 2011; Sonnentag, 2001; Sonnentag & Zijlstra, 2006), results have been equivocal (e.g., Rook & Zijlstra, 2006; Sonnentag, 2001; Sonnentag & Bayer, 2005; Sonnentag & Natter, 2004). These inconsistent findings might be because various aspects of each off-job activity influence recovery in a more complex way. Therefore, a systematic investigation on the attributes of each off-job activity is warranted to elucidate relationships among off-job activities and recovery.

The purpose of the present study is to broaden our understanding of recovery by investigating aspects of the situation (i.e., job characteristics) and an individual difference (i.e., trait guilt). Also, the role of off-job activities in recovery is examined in depth by considering various attributes of off-job activities. In doing so, this study makes several theoretical contributions. First, the study extends the current literature by examining daily fluctuation of job characteristics based on a more fine-grained approach. Although previous research has examined job characteristics (e.g., Sonnentag & Zijlstra, 2006; von Thiele Schwarz, 2011), it conceptualized job characteristics in a general way (e.g., job demand and control) rather than looking at specific characteristics. Assessing job characteristics on a daily basis (within-individual perspective) is also a unique addition to the literature. Despite the fact that within-individual fluctuation in job characteristics may also affect recovery, prior research has largely focused on the variation across different occupations (between-individuals perspective) in studying job characteristics. Second, the present study considers the role of individual differences in recovery. Specifically, the tendency to experience guilt (i.e., trait guilt) is examined as a moderator in the relationships between job characteristics and off-job activities. Integrating the recovery literature that suggests different capacity of various activities in facilitating recovery (Ragsdale et al., 2011; Sonnentag, 2001) and the literature on the motivational function of guilt (Baumeister, Stillwell, & Heatherton, 1994; George & Brief, 1996), the present study posits that trait guilt may help explain individual variances in recovery. Lastly, this study examines various attributes of off-job activities in their relation to recovery. Although previous research has studied various off-job activities, it has been based on an assumption that each off-job activity is either beneficial or detrimental for recovery

(Ragsdale et al., 2011; Sonnentag, 2001; Sonnentag & Zijlstra, 2006). The present study proposes that each off-job activity may have both helpful and harmful characteristics for recovery and that acknowledging these various aspects of off-job activities helps understand the complex way that off-job activities contribute to recovery.

This study advances the literature methodologically as well. Specifically, an experience sampling methodology is utilized to assess the dynamics of recovery in situ. Although the experience sampling methodology has been recommended for examining recovery because it enables researchers to better capture temporal fluctuations of the process (Sonnentag & Geurts, 2009), only a few studies have used this methodology (e.g., Mojza & Sonnentag, 2010; Sanz-Vergel, Demerouti, Moreno-Jiménez, & Mayo, 2010; van Hooff et al., 2011). Furthermore, the majority of existing studies have assessed recovery outcomes twice per day (i.e., morning and bedtime; but see van Hooff et al., 2011 for an exception). Extending prior research, the current study assesses health outcomes three times per day (morning, after work, and bedtime). In doing so, this study provides a more complete picture of daily recovery.

In subsequent sections, a theoretical model of recovery is discussed in a sequential order. Figure 1 demonstrates hypothesized relationships among the focal variables. After conceptualization of recovery is introduced, job characteristics as theoretical antecedents of recovery are reviewed. Then, the relationships among off-job activities, recovery experiences, and health outcomes are discussed, which are based on a critical review of existing research. Finally, trait guilt as a motivational force in the context of recovery will be discussed.

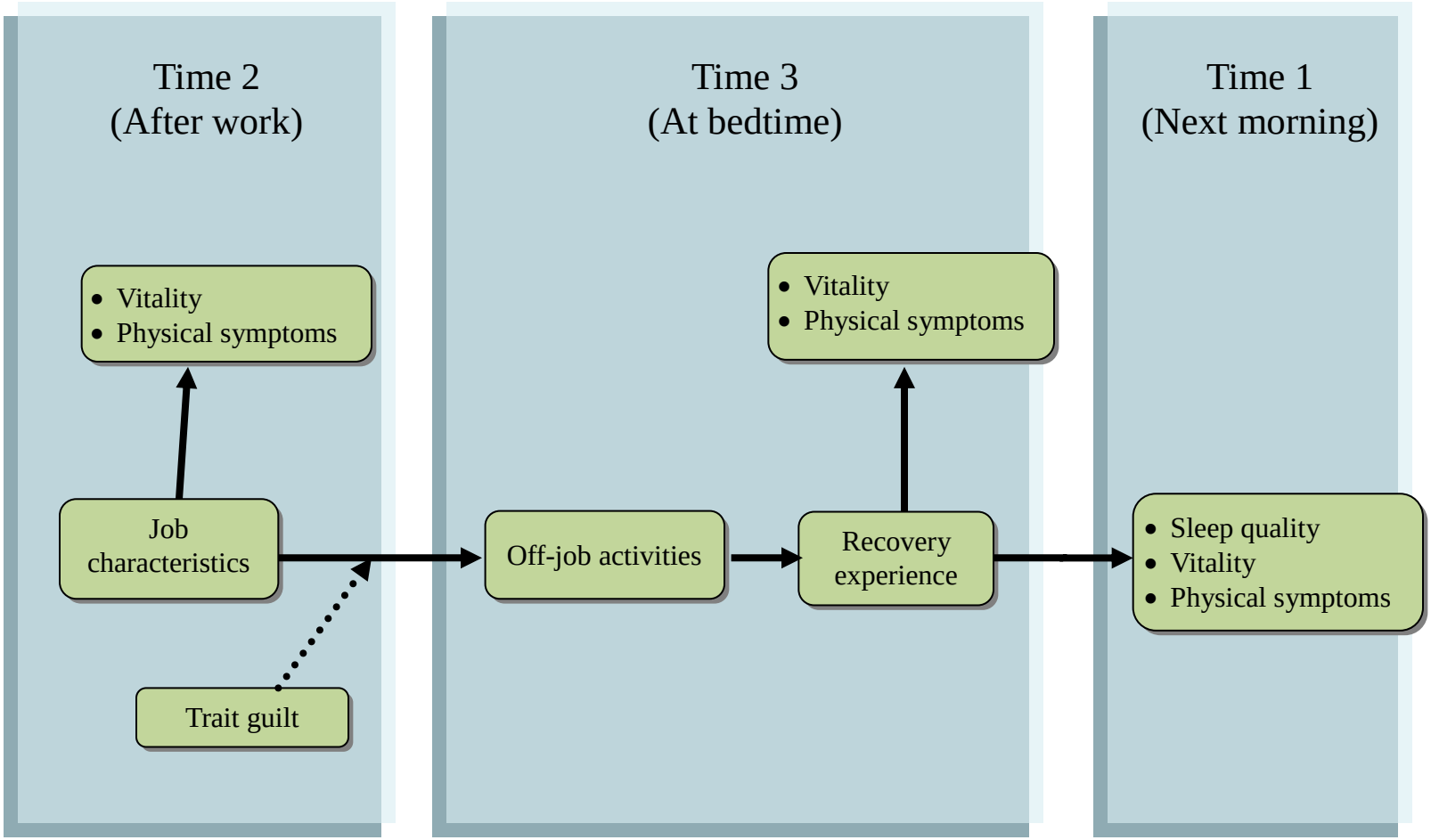

Figure 1. Hypothesized Relationships

Conceptualization of Recovery

Recovery refers to the process by which individuals' functional systems that have been activated during some type of activity (e.g., while working) return to a baseline level (Meijman & Mulder, 1998). Recovery that happens in the context of work is called *internal recovery* (e.g., recovery during short breaks at work) whereas recovery that occurs during nonwork (e.g., recovery during after-work hours, weekends, and vacation) is referred to as *external recovery* (Geurts & Sonnentag, 2006). Among external recovery, daily recovery has been considered particularly critical for protecting employee health and well-being (Sonnentag, 2001, 2003) with evidence showing that long-term negative health consequences tend to originate from insufficient daily recovery (Geurts & Sonnentag, 2006; Meijman & Mulder, 1998). Accordingly, the current study focuses on external daily recovery, which refers to recovery that occurs during after-work hours before the next working period starts (i.e., recovery in-between working days).

The effort-recovery model is a theoretical model that describes recovery (Meijman & Mulder, 1998). The basic idea of the model is that effort expenditure at work results in short-term physiological (e.g., muscle pain) as well as psychological reactions (e.g., fatigue). Under optimal circumstances in which individuals can rest (i.e., not being exposed to demands), recovery occurs, which negates short-term reactions. In this case, employee health is not at risk. However, recovery may not happen if individuals are exposed to continued demands. Under such circumstances, individuals' functional systems have to operate again before they have the opportunity to return to a baseline level. Successive exertion of effort without sufficient recovery has been associated with poor health outcomes (Meijman & Mulder, 1998; Sonnentag, Binnewies, & Mojza, 2008).

The conservation of resource theory (Hobfoll, 1989) also provides an important insight to understand recovery. Resources refer to those objects (e.g., a house), personal characteristics (e.g., self-esteem), conditions (e.g., being employed), or energies (e.g., vigor) that are valued in and of themselves or that serve as a means for obtaining other valued resources. According to this theory, people strive to gain, protect, and build resources. Furthermore, people are motivated to restore resources when they are lost. Therefore, it is expected that employees would seek for opportunities for recovery when various tasks (e.g., physically demanding tasks) and events at work (e.g., negative feedback from supervisor) exhaust their resources (e.g., energy, self-esteem) given that restoring resources is one of the core functions of recovery (Sonnentag & Fritz, 2007).

Previous research has distinguished recovery experiences from off-job activities. Off-job activities refer to observable behaviors that people engage in during their off-job time (e.g., taking a walk, listening to music, and cleaning the house) whereas recovery experiences are defined as underlying psychological (subjective) attributes of the specific off-job activities that contribute to recovery (Fritz & Sonnentag, 2005; Sonnentag & Fritz, 2007). That is, recovery experiences occur as a result of participation in the off-job activities.

Sonnentag and Fritz (2007) proposed four distinctive recovery experiences that contribute to recovery. *Psychological detachment* refers to mental disengagement from the work situation. To stop thinking about work facilitates recovery by not drawing on the resources that had been called upon (Etzion, Eden, & Lapidot, 1998; Meijman & Mulder, 1998). Second, *relaxation* is experienced when individuals sustain simple focus while reducing overt behavior and covert mental activity (Smith, 2001). To relax promotes

recovery by allowing time at a state of low activation and positive affect (Stone, Kennedy-Moore, & Neale, 1995). Third, *mastery* is experienced when individuals deal with challenging tasks or learn something new in domains other than work. Drawing on conservation of resources theory (Hobfoll, 1989), mastery experiences were thought to contribute to recovery by helping individuals gain resources such as skills, expertise, or sense of competence. Finally, *control* refers to the ability to choose one's behavior from two or more options (Spector, 1998). Experiencing control during off-work time facilitates recovery because it generates resources by fulfilling the fundamental need for autonomy and control (Deci & Ryan, 1985).

In the current study, I focus on the recovery experiences of psychological detachment and relaxation. Given that this study investigates daily recovery, mastery is thought less relevant because the degree of daily fluctuation of mastery is likely small. That is, it may take a longer time for individuals to experience mastery via participating in an off-job activity (e.g., learning a new language). The conceptualization of control as a recovery experience (e.g., I feel like I can decide for myself what to do, I took care of things the way that I want them done; Sonnentag & Fritz, 2007) implies that control originates from the ability to decide when and how to do off-job activities rather than from the participation per se. Considering that the interest of the current study lies in the relationship between day-level participation in off-job activities and subsequent recovery experiences control is deemed not relevant.

Previous research has recognized that the potential to promote recovery varies across off-job activities and, therefore, it is important to investigate off-job activities that are qualitatively different (Sonnentag, 2001). Elaborating this idea, the current study

examines various attributes of off-job activities that may demonstrate different relationships with recovery experiences. Off-job activities may be categorized along two dimensions. The first dimension concerns *the level of engagement* required for an activity, distinguishing between those that are active versus those that are passive. Active activities involve cognitive and/or physical engagement and require effort exertion. Passive activities, on the other hand, refer to activities that do not require much effort. The second dimension is *the beneficiary* of an activity, which differentiates self-oriented activities from other-oriented activities. Self-oriented activities are behaviors that individuals engage in for the benefit of the self. In contrast, other-oriented activities refer to behaviors that individuals do for other others. Hence, off-job activities can be grouped into four types: active self-oriented, active other-oriented, passive self-oriented, and passive other-oriented. Figure 2 describes the proposed typology of off-job activities.

		The Level of Engagement	
		Active	Passive
Beneficiary	Self-oriented	Exercise	Watching TV
	Other-oriented	Helping child with homework	Folding the family laundry

Figure 2. Typology of Off-Job Activities with Examples of Each

Numerous benefits of recovery for employee health and well-being have been reported such that successive exertion of effort at work without sufficient recovery is associated with a variety of deleterious health and well-being outcomes including chronic tension, impaired mood, feelings of prolonged fatigue, sleep problems, and other psychosomatic complaints (Kagan & Levi, 1974; Meijman & Mulder, 1998; Sonnentag, Binnewies, & Mojza, 2008; von Thiele, Lindfors, & Lundberg, 2006). In reviewing the current literature on the benefits of recovery, it is evident that recovery influences both psychological and physiological health. This is in line with the conceptualization of recovery as a psychophysiological process (Geurts & Sonnentag, 2006). In terms of psychological aspect, recovery involves restoring psychological resources and repairing negative mood. On the other hand, physiological recovery involves inactivation that returns the body system to a baseline level. Acknowledging that both physiological and psychological aspects are important to fully understand salutary effects of recovery on health, the current study investigates various indicators of health that are likely to be affected by daily recovery.

Vitality is the state of feeling alive, alert, and energized (Ryan & Frederick, 1997). Vitality at work is an important asset as it enables employees to better handle various job tasks. Previous research has found that recovery after breaks at work predicts vigor at home (Sanz-Vergel et al., 2010). Next, *physical symptoms* are one of the frequently reported negative consequences of work (Nixon et al., 2011). Physical symptoms have been shown to be reflective of recovery such that employees who psychologically detached from work during off-job time reported fewer symptoms than those who failed to detach from work (Sonnentag, Binnewies, & Mojza, 2010). Finally, s*leep quality* has

been considered as an indicator of recovery because successful recovery improves sleep quality whereas lack of recovery results in sleep problems (Åkerstedt, Nilsson, & Kecklund, 2009). Research has also demonstrated the relationships of sleep quality with health complaints and psychological distress (Steptoe, O'Donnell, Marmot, & Wardle, 2008; Strine & Chapman, 2005).

Job Characteristics as Antecedents of Recovery

Specific job characteristics provide critical information as to what employees do on-the-job. Job characteristics are proposed as antecedents of recovery because the nature of the job determines the degree of effort that employees are required to expend. Workdays that involve high levels of cognitive or physical effort consume more resources and make it more difficult to recover than do workdays that involve low cognitive or physical effort (Geurts & Sonnentag, 2006; Meijman & Mulder, 1998). Although specific job characteristics were not measured, previous empirical studies have been supportive of the idea that occupational factors (e.g., workload, work hours, job demands and control) play an important role in employees' recovery (Meijman, Mulder, Van Dormolen, & Cremer, 1992; Sonnentag & Zijlstra, 2006; Totterdell, Spelten, Smith, Barton, & Folkard, 1995).

Job characteristics can be categorized into four groups (Morgeson & Humphrey, 2006). *Task characteristics* reflect how the work itself is accomplished and the nature of tasks associated with a particular job. *Knowledge characteristics* are concerned with the kinds of knowledge, skill, and ability demands that are placed on an employee whereas *social characteristics* involve interpersonal aspects of a particular job. Finally, *contextual characteristics* describe situational characteristics of a job. Of interest in the current study

are job characteristics that reflect the degree of employees' on-the-job effort. Also considered is the expected level of day-to-day variance. As such, three job characteristics in the knowledge characteristics category (job complexity, information processing, and problem solving) and two characteristics in the contextual characteristics category (physical demands and work conditions) are deemed relevant to the current investigation.

Job complexity refers to the extent to which the tasks on a job are complex and difficult to perform. Work that involves complex tasks is thought to be more mentally demanding and challenging. *Information processing* reflects the degree to which a job poses cognitive demands on employees in terms of monitoring and processing data or other information. *Problem solving* refers to the degree that a job requires innovative solutions. As an extension to information processing, problem solving reflects an active cognitive processing requirement of a job. *Physical demands* indicate the level of physical activity or effort required for a job. Work that involves higher physical demands is likely to result in exhaustion. Finally, *work conditions* reflect the environmental factors associated with where a job is performed. Completing tasks in unpleasant work situations (e.g., loud or humid environments) is likely to be effortful.

The strength model of self-control (Muraven & Baumeister, 2000) provides a theoretical framework for the link between these job characteristics and recovery. According to this model, self-control is a limited resource that is depleted when an individual attempts to override one's own impulses and alter internal processes (e.g., thoughts, feelings, and behavior). Although some scholars have distinguished self-control and self-regulation such that self-control is deliberate, conscious, effortful subset of self-

regulation, they are often used interchangeably (Baumeister, Vohs, & Tice, 2007). In this study, the two terms are used interchangeably.

Performing various tasks at work exemplifies the self-control process in that employees are required to change their behaviors or regulate their thoughts and feelings in order to perform the task at hand. Also, engaging in job tasks tend to involve selectively attending to task-relevant information, avoiding various distractions, and delaying gratification, all of which require certain level of self-control (Hockey, 1997). For example, an employee might have to stop thinking about his or her sick family member and smile in order to greet a customer. Or, an employee may need to inhibit his or her desire to surf the web, to chat with colleagues, or to take a coffee break in order to complete a task on time.

Notably, job tasks that are challenging or demanding require a high degree of self-control (Hockey, 1997) because maintaining an effortful state is often difficult and aversive (Kahneman, 1973). Thus, employees may need to exert more self-control to carry out demanding mental or physical job tasks because they have to restrain themselves from giving up on the tasks and resist impulses to engage in desired behaviors that provide immediate gratification. In this sense, work days that employees perform job tasks that involve knowledge characteristics (e.g., tasks that are complex or require an innovative solution), physical demands, or unpleasant work conditions tax more effort and consume more self-control than work days that involve less of these tasks.

Of critical relevance to the current study is the behavioral implication of self-regulatory resource depletion. Research has demonstrated that people tend to give up easily and resist putting further effort after engaging in self-regulatory activities that

require them to exert a high degree of effort (Baumeister, Bratslavsky, Muraven, & Tice, 1998). It is important to note that self-control is a domain-independent resource, which means that exerting self-control in one domain can impair subsequent behavior in another domain. This suggests that an employee who exerted considerable self-regulatory effort at work would experience difficulty in not only completing subsequent job tasks but also in participating in off-job activities.

In studying the effect of work experiences on the choice of off-job activities, it is important to consider the degree of effort that is necessary to participate in each off-job activity. This is because active activities require a higher degree of self-control than do passive activities (Kahneman, 1973). Supporting this idea, previous research demonstrated that employees engaged in more low-effort activities (i.e., passive activities) after stressful, demanding work days while avoiding off-job activities, such as exercise, that require high levels of effort (Sonnentag & Jelden, 2009). Therefore, it is expected that employees who exerted much self-control at work due to demanding job tasks are less likely to engage in active activities during after work-hours, while gravitating towards passive activities that do not require self-control. Based on these ideas, the following hypotheses are proposed:

Hypothesis 1: Within individuals, day-specific knowledge characteristics (job complexity, information processing, and problem solving) are (a) negatively associated with vitality and (b) positively associated with physical symptoms after work, controlled for morning levels of vitality and physical symptoms.

Hypothesis 2: Within individuals, day-specific contextual characteristics (physical demands and unpleasant work conditions) are (a) negatively associated with

vitality and (b) positively associated with physical symptoms after work, controlled for morning levels of vitality and physical symptoms.

Hypothesis 3: Within individuals, day-specific knowledge characteristics are negatively associated with (a) active self-oriented and (b) active other-oriented activities after work.

Hypothesis 4: Within individuals, day-specific knowledge characteristics are positively associated with (a) passive self-oriented and (b) passive other-oriented activities after work.

Hypothesis 5: Within individuals, day-specific contextual characteristics are negatively associated with (a) active self-oriented and (b) active other-oriented activities after work.

Hypothesis 6: Within individuals, day-specific contextual characteristics are positively associated with (a) passive self-oriented and (b) passive other-oriented activities after work.

Off-Job Activities and Recovery Experiences

It has been argued that an individual's off-job activities are closely related with the level of recovery achieved due to different attributes of the activities (Demerouti et al., 2009). Nonetheless, the impact of various off-job activities on recovery has not been well understood with inconsistent empirical findings. For example, low-effort activities have been considered beneficial for recovery because they do not occupy resources that are utilized at work. However, empirical findings are mixed such that some studies reported their beneficial effect on recovery (Sonnentag, 2001) while others have found no effect (Rook & Zijlstra, 2006; Sonnentag & Natter, 2004). Similarly, dependent-care activities

have been regarded detrimental for recovery because of their obligatory and energy-consuming nature (Sonnentag, 2001), but no supportive evidence has been found (e.g., Sonnentag, 2001; Sonnentag & Bayer, 2005; Sonnentag & Natter, 2004).

While previous research has investigated off-job activities, few have paid attention to *various* characteristics of each off-job activity. That is, the extant research has neglected that each off-job activity has various attributes and that those attributes can be either beneficial or detrimental for recovery. Considering various aspects of each off-job activity, as opposed to capitalizing only one aspect, may shed light on inconsistent findings in the literature, in so far as an off-job activity exhibits different relationships with recovery experiences as a function of its various attributes. For example, an off-job activity might help employees to psychologically detach from work while it impedes relaxation. As such, it might be misleading to label an off-job activity as either facilitating or inhibiting for recovery without the knowledge on relationships between the activity's characteristics and recovery experiences.

It is proposed that the level of engagement is the key characteristic that predicts the extent that each off-job activity relates to psychological detachment because this dimension reflects the capacity of an off-job activity to occupy individuals' attention. Specifically, active activities are expected to provide opportunities for employees to psychologically detach from work. Previous research has shown that to perform active activities is an effective way that people utilize in order to distract themselves (Totterdell & Parkinson, 1999). While engaging in active off-job activities that require effort, individuals likely get distracted from work. Furthermore, individuals are likely absorbed in active activities because active activities are behaviors that involve cognitive and/or

physical engagement. According to the theory of flow, flow state is experienced when people are so involved in the task at hand (Csikszentmihalyi, 1990). During the flow state, people tend to think that nothing else matters and forget everything around them. Taken together, a positive relationship is expected between active activities and psychological detachment. On the other hand, passive activities may have a negative relationship with psychological detachment. Most passive activities are sedentary and pose hardly any demands on individual. Due to these characteristics, passive activities have been found to relate to free-time boredom (Iso-Ahola, 1997). This finding suggests that the degree that individuals are engrossed in passive activities is low and that the individuals might still think about their work while doing passive activities.

The beneficiary of an activity might explain the potential of each activity that leads to relaxation. That is, self-oriented activities are expected to result in relaxation whereas other-oriented activities hinder relaxation. Several differences between self-oriented and other-oriented activities bolster this argument. First, the two types of activities differ in their ability to evoke positive affective states and reduce tension. Participating in self-oriented activities is most likely to increase individuals' positive affective states and to reduce tension because they are pursued for one ultimate goal of serving oneself (e.g., self-maintenance, pleasure). In contrast, doing other-oriented activities may or may not bring about such benefits because the self is not first and foremost concern of these activities. Second, the two kinds of activities differ in the extent that people can refuse to participate in them. While it is unlikely for individuals to engage in self-oriented activities when they do not want to, they might engage in other-oriented activities at times against their will because other-oriented activities are

necessary to meet other needs. For example, individuals may have to take care of dependents when they would rather take a rest. To the extent participation in other-oriented activities is opposed to the individuals' will or obligatory, other-oriented activities may hurt the sense of autonomy and generate negative emotion. Taken together, a positive relationship is expected between self-oriented activities and relaxation while a negative relationship is expected between other-oriented activities and relaxation.

To expect a positive relationship between *active* self-oriented activities and relaxation may seem counterintuitive because relaxation is known to result from activities that require little physical or cognitive effort (Tinsley & Eldredge, 1995). However, being self-oriented might enable even active activities to promote relaxation. That is, while people are performing an activity for their own sake, whether it is active or passive, they might have a chance to be inattentive to other matters at the moment. Maintaining such a simple focus allows individuals to experience relaxation (Smith, 2001). As an example, considerable research evidence suggests that exercise, an active self-oriented activity, induces sedation, relates to the state of being calm, and generates positive mood (Hoeger & Hoeger, 2007; Penedo & Dahn, 2005; Salmon, 2001).

Hypothesis 7: Within individuals, active, self-oriented activities are (a) positively associated with psychological detachment and (b) positively associated with relaxation.

Hypothesis 8: Within individuals, active, other-oriented activities are (a) positively associated with psychological detachment and (b) negatively associated with relaxation.

Hypothesis 9: Within individuals, passive, self-oriented activities are (a) negatively associated with psychological detachment and (b) positively associated with relaxation.

Hypothesis 10: Within individuals, passive, other-oriented activities are (a) negatively associated with psychological detachment and (b) negatively associated with relaxation.

Recovery Experiences and Health Outcomes

As recovery experiences are psychological attributes of off-job activities that contribute to recovery, they are expected to be associated with various health outcomes (Sonnentag & Fritz, 2007). Previous empirical research has provided supportive evidence for the relationship between recovery experiences and health outcomes. Regarding psychological detachment, studies have found that employees who were psychologically detached from work during off-job time reported less health complaints, fewer physical symptoms, less emotional exhaustion, and less sleep problems (Fritz & Sonnentag, 2006; Sonnentag & Fritz, 2007; Sonnentag, Binnewies, & Mojza, 2010). Research on relaxation has also demonstrated consistent findings. Specifically, relaxation was negatively related with sleep problems, health complaints, and tension (Sonnentag & Fritz, 2007; Sonnentag, Binnewies, & Mojza, 2008). In sum, it is hypothesized that recovery experiences are associated with positive health outcomes (i.e., high vitality and sleep quality; fewer physical symptoms).

Hypothesis 11: Within individuals, psychological detachment at bedtime is associated with (a) vitality and (b) physical symptoms at bedtime, controlled for vitality and physical symptoms after work.

Hypothesis 12: Within individuals, relaxation at bedtime is associated with (a) vitality and (b) physical symptoms at bedtime, controlled for vitality and physical symptoms after work.

Hypothesis 13: Within individuals, psychological detachment at bedtime is associated with (a) sleep quality, (b) vitality, and (c) physical symptoms in the next morning, controlled for vitality and physical symptoms at bedtime.

Hypothesis 14: Within individuals, relaxation at bedtime is associated with (a) sleep quality, (b) vitality, and (c) physical symptoms in the next morning, controlled for vitality and physical symptoms at bedtime.

The Moderating Role of Guilt

Guilt is an unpleasant emotion that is experienced when an individual acknowledges responsibility for a perceived failure to meet norms or fulfill personal goals (Tangney & Dearing, 2002). Due to its aversive nature, guilt possesses a motivational force such that people will perform or avoid a variety of actions because of the anticipation of guilt (Baumeister, Stillwell, & Heatherton, 1994). That is, individuals monitor their own behavior and initiate appropriate action to counteract negative consequences of their behavior in an attempt to avoid feeling guilt (George & Brief, 1996). Relevant to the present study, guilt may encourage or discourage employees to engage in certain off-job activities depending on the nature of the activities.

Interestingly, the extent that guilt motivates varies across individuals because people are different in terms of the capacity to experience guilt (i.e., trait guilt). Research has demonstrated several behavioral characteristics of individuals who have the tendency to experience guilt. First, people who are high on trait guilt are more likely to experience

guilty feelings in a specific situation and to take other persons' perspective than those who are low on trait guilt (Leith & Baumeister, 1998). Also, guilt-prone people tend to contemplate their role in the failure and feel responsibility more so than those who are low on trait guilt (Tangney, 1990). With this in mind, it is expected that the degree that guilt encourages or discourages the participation in off-job activities varies across individuals.

Self-oriented activities tend to be pleasant and benefit only the self. Given that the ideal family member (e.g., partner, parent) as depicted by cultural norms is warm and caring, it might be considered selfish to pursue activities of this nature, which may signify a failure to meet the standard. Anticipating the experience of guilt, employees may minimize their participation in self-oriented activities. As the extent that individuals avoid these activities may vary along with their level of trait guilt, trait guilt is expected to moderate the relationship of job characteristics with self-oriented activities. Thus, the negative relationship between job characteristics and active self-oriented activities is stronger among those who are high on trait guilt than those who are low on trait guilt whereas the positive relationship between job characteristics and passive self-oriented activities is weaker among those who are high on trait guilt than those who are low on trait guilt.

Other-oriented activities are unselfish in that they benefit other family members by addressing their needs and/or other necessities in the household. Given that performing these activities is an expected behavior of an ideal family member, to shirk these activities can be considered deviating from expectation. As the experience of guilt is anticipated when failing to do these other-oriented activities, individuals may force

themselves to carry out these activities. Such behaviors may be particularly salient among individuals who are high on trait guilt because they tend to take personal responsibility and initiate corrective actions (George & Brief, 1996; Tangney, 1990). Therefore, trait guilt is expected to moderate the negative relationship between job characteristics and active other-oriented activities such that the relationship is weaker among those who are high on trait guilt than those who are low on trait guilt whereas the positive relationship between job characteristics and passive other-oriented activities is stronger among those who are high on trait guilt than those who are low on trait guilt.

Hypothesis 15: The relationship between knowledge characteristics and active, self-oriented activities is moderated by trait guilt, such that the negative relationship is stronger for those with higher trait guilt than for those with lower trait guilt.

Hypothesis 16: The relationship between knowledge characteristics and passive, self-oriented activities is moderated by trait guilt, such that the positive relationship is weaker for those with higher trait guilt than for those with lower trait guilt.

Hypothesis 17: The relationship between knowledge characteristics and active, other-oriented activities is moderated by trait guilt, such that the negative relationship is weaker for those with higher trait guilt than for those with lower trait guilt.

Hypothesis 18: The relationship between knowledge characteristics and passive, other-oriented activities is moderated by trait guilt, such that the positive

relationship is stronger for those with higher trait guilt than for those with lower trait guilt.

Hypothesis 19: The relationship between contextual characteristics and active, self-oriented activities is moderated by trait guilt, such that the negative relationship is stronger for those with higher trait guilt than for those with lower trait guilt.

Hypothesis 20: The relationship between contextual characteristics and passive, self-oriented activities is moderated by trait guilt, such that the positive relationship is weaker for those with higher trait guilt than for those with lower trait guilt.

Hypothesis 21: The relationship between contextual characteristics and active, other-oriented activities is moderated by trait guilt, such that the negative relationship is weaker for those with higher trait guilt than for those with lower trait guilt.

Hypothesis 22: The relationship between contextual characteristics and passive, other-oriented activities is moderated by trait guilt, such that the positive relationship is stronger for those with higher trait guilt than for those with lower trait guilt.

Chapter Two

Method

Participants

Participants were 99 full-time employees who worked a minimum of 40 hours per week. Previous research has shown that 100 is a sufficient sample size for an accurate estimation in multi-level analysis (Maas & Hox, 2005). To be eligible to participate, individuals had to be married or living with a partner, have at least one dependent living in the home (e.g., children or elderly parent), work the day shift, be fluent and literate in English, and be member of a dual-earner couple (both participants and their spouses must work full-time).

Of the 99 participants, 13.1% were male and 86.9% were female. The average age of the sample was 40.13 years (*SD* = 7.56). The majority was White/Caucasian (70.7%), followed by Asian (11.1%), Hispanic/Latino(a) (9.1%), Black/African American (8.1%), and Other (1.0%). With regard to marital status, 97.0% were married and 3.0% were living with a partner. In terms of the highest level of education obtained, 2.0% had a high school degree, 8.1% had attended some college, 47.5% had a college degree, and 42.4% had a graduate degree. The majority of participants had occupations associated with education, training, and library (42.4%), business and financial (15.2%), office and administrative support (14.1%), or health care practitioners and technical (6.1%). Other occupations included sales and related (5.1%), computer and mathematical (3.0%), life, physical, and social science (3.0%), and management (3.0%). On average, participants

worked 44.16 hours per week (*SD* = 5.89). The average household income was $83,500 (*SD* = $23,390) with approximately half of the participants (45.9%) reporting that the total household income was more than $100,000. Mean job tenure was 7.26 years (*SD* = 6.78). On average, participants reported 2.29 dependents living in the household (*SD* = 1.24). Most participants (97.0%) had children (*M* = 1.81, *SD* = .88) while some reported having elderly parents (6.0%) at home. Descriptive statistics for all demographic variables are listed in Table 1.

Table 1

Descriptive Statistics of Person-Level Variables

	α	*M*[a]	*SD*	*Obs. Min*	*Obs. Max*
Gender	--	13.1	--	0	1
Age	--	40.13	7.56	27	61
Ethnicity	--	70.7	--	0	1
Marital status	--	97	--	0	1
Education	--	6.24	1.25	2	9
Work hour	--	44.16	5.89	40	70
Income	--	9.35	2.34	4	12
Tenure[b]	--	7.26	6.78	0.5	29
Dependent	--	2.29	1.24	1	6
NA	.81	1.85	.47	1	2.73
Trait guilt	.77	1.88	.60	1	3.67

Note. *N* = 99. NA = Negative trait affect; Work hour = Number of work hours per week; Dependent = A total number of dependents in the household.
[a]For gender, ethnicity, and marital status, percentage of male, White/Caucasian, and married participants are shown, respectively.
[b]Tenure was reported in years.

Procedure

Recruitment. Various recruitment strategies were used. First, recruitment flyers were posted throughout the community (e.g., public libraries, grocery stores, and after-school programs) in a metropolitan area within the southeastern region of the U.S. Second, an invitation email for this study was sent to employees of a large public university and a community college. Finally, participants were encouraged to spread the word to their professional and personal network (i.e., snowball sampling method). Eligible individuals who were interested in the current study were invited to an orientation session to learn about the purpose, procedures, and incentive associated with the study.

Data collection. An experience sampling design was used in which data were collected over the course of 14 days. Given the focus of this dissertation is on the link between job characteristics and off-job activities, only the data from workdays are included in the analysis. All data were collected using an online survey system, which could be accessed via participants' personal or work computer and their mobile devices (e.g., Smartphone). At the orientation session, participants were told to take the baseline survey before the beginning of the following week, the time that they started taking the daily survey. During the main data collection period, participants completed the survey pertaining to their work experiences, recovery, and health outcomes three times per day (morning, after work, and bedtime). At the end of the two-week period, participants were invited to take the daily survey on additional days depending on the number of missing surveys during the main data collection period so that sufficient data can be collected from each individual. For example, a person who missed three daily surveys during the

initial period was asked to take the daily survey one more day. As compensation, participants received $45.

In total, 114 individuals showed initial interest and attended the orientation. Among them, 106 completed the baseline survey, for a completion rate of 92.98%. Of these 106 employees, 103 took the daily surveys, providing a total of 2937 data points. Data from four participants (47 data points) who completed less than 20% of the daily survey were excluded from the analyses (McCabe, Mack, & Fleeson, 2012). Of 99 individuals in the final sample, 51 individuals took the daily survey for an extended period to make up missing surveys during the initial data collection period. The length of extension was two days on average, with two individuals who had a five-day extension. On average, participants made 28 daily survey entries (*SD* = 4.87). Based on timestamps, surveys that were taken at the wrong times were excluded from the analyses. For morning and after work surveys, surveys completed past one hour from participants' typical working shift were excluded. For bedtime survey, surveys that were taken less than one hour from the time that the after work survey was taken were excluded. Of the 2890 data entries, 2795 (96.71 %) were completed at the correct times (996 morning, 906 after work, and 893 bedtime surveys). Considering that compliance rates reported in previous daily diary studies range from 75% to 85% (e.g., Harris, Daniels, & Briner, 2003; Wang, Liu, Zhan, & Shi, 2010), the number of correct data entries reflects that participants in the current study complied with the instruction.

Measures

All measures are included in the appendix. Scores on each scale were obtained by averaging the score on each item with the exception of off-job activities. Higher scores indicate a greater prevalence of the construct.

Person-Level Variables

Negative trait affect. The positive and negative affect schedule—expanded form (PANAS-X; Watson & Clark, 1994) was used to measure negative trait affect (α = .81). Participants indicated the extent that they experience various emotions *in general*. Example items include "nervous", "irritable", "hostile", "upset", and "distressed." Response options ranged from 1 (*Very slightly or not at all*) to 5 (*Extremely*).

Trait guilt. Six items from the personal feelings questionnaire—2 (the PFQ-2; Harder & Zalma, 1990) were used to assess trait guilt (α = .77). The measure assesses how common the emotions are for the rater on a 5-point Likert-type scale that ranges from 0 (*Never experience the feeling*) to 4 (*Experience the feeling continuously or almost continuously*). Sample items include "mild guilt," "regret," and "remorse."

Demographic information. Participants were asked to indicate their gender (0 = male, 1 = female), age, ethnicity (0 = White/Caucasian, 1 = all others); marital status (0 = married, 1 = not married), education level (1 = did not graduate high school, 2 = high school diploma or GED, 3 = vocational school, 4 = some college, 5 = 2 year college degree, 6 = 4 year college degree, 7 = Master's degree, 8 = Ph.D, or 9 = professional degree (e.g., MD, JD)), average work hours per week, income (measured using intervals of $10,000, ranging from 1 = less than $10,000, 11 = $100,000 – $149,000, to 12 =

$150,000 or more), occupation, organizational tenure, and the number of dependents (children, elderly parents, or other dependents) living in the home.

Day-Level Variables

Job characteristics (After work). The five job characteristics (knowledge and contextual) were measured using the work design questionnaire (Morgeson & Humphrey, 2006). With an exception of physical demands (3 items), each subscale consisted of four items. All items were revised to address *daily experience at work* as opposed to the job in general. Example items include "Today, I performed relatively simple tasks" (job complexity), "Today, I monitored a great deal of information" (information processing), "Today, I dealt with problems that I have not met before" (problem solving), "Today, I exerted a lot of physical effort" (physical demands), and "Today, the climate at work place was comfortable in terms of temperature and humidity" (work conditions). Work conditions were reverse-coded such that higher scores reflect unpleasant work conditions. Participants indicated the extent that they agreed with each statement on a 5-point scale (1 = *Strongly disagree*, 5 = *Strongly agree*).

Multi-level confirmatory factor analysis suggested that a 5-factor model fit the data well (See Table 2). Specifically, the 5-factor model that consists of the five job characteristics fit the data better than the 2-factor model that consists of knowledge and contextual characteristics ($\chi^2_{diff}(21) = 3124.32$, $p < .001$). Accordingly, the five job characteristics were included in the analyses as separate variables. Reliabilities across study days ranged from .85 to .93 ($M = .90$) for job complexity, from 84 to .94 ($M = .90$) for information processing, from .75 to .91 ($M = .84$) for problem solving, from .90 to .97

(*M* = .95) for physical demands, and from .62 to .89 (*M* = .77) for unpleasant work conditions.

Table 2

Results of Multi-Level Confirmatory Factor Analysis for Day-Level Job Characteristics

Model	χ^2	*df*	CFI	TLI	RMSEA	$SRMR_{b-p}$	$SRMR_{w-p}$
1-Factor	5059.31	322	.31	.26	.13	.21	.15
2-Factor	3715.09	319	.50	.47	.11	.17	.12
5-Factor	590.77	298	.96	.95	.03	.07	.03

Note. CFI = Comparative fit index; TLI = Tucker-Lewis Index; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root-mean-square residual.

Off-job activities (Bedtime). Participants reported up to 15 activities that they engaged during off-job time on each day. In addition to the name of activities (e.g., exercise, laundry), participants indicated attributes of each activity based on the definition of four types of activities (i.e., active self-oriented, passive self-oriented, active other-oriented, and passive other-oriented). For active activities, participants further indicated whether an activity was mentally, physically, or both mentally and physically active. Then, participants reported the amount of time spent on each activity on a scale that ranged from "0-15 minutes" to "more than 4 hours." For analyses, mean values of each anchor were summed to create scores for each activity category. For example, if a participant reported that 'checking work-related email' took 15-30 minutes and 'helping my daughter with her homework' took 0-15 minutes and that both activities were mentally active other-oriented, his score for mentally active other-oriented activity category is 30 minutes. Thus, variables of the day-level time spent were created for a total of eight off-job activity categories: mentally active self-oriented, physically active self-

oriented, both mentally and physically active self-oriented, passive self-oriented, mentally active other-oriented, physically active other-oriented, both mentally and physically active other-oriented, and passive other-oriented.

Recovery experience (Bedtime). Psychological detachment was measured using a 4-item subscale from Sonnentag and Fritz (2007). An example item is "I have forgotten about work." Response options ranged from 1 (*Strongly disagree*) to 5 (*Strongly agree*). Reliabilities ranged from .90 to .96 (*M* = .94). Relaxation was measured with eight items from the Smith Relaxation States Inventory (the SRSI; Smith, 2001). The SRSI is a 38-item scale that measures 19 states that are hypothesized to be associated with relaxation (e.g., childlike innocence, deep mystery, prayerfulness). Four subscales that are of most relevance to the current study (i.e., rested/refreshed, at ease/peace, joy, and mental quiet) were used. Example items are "I feel rested and refreshed" and "My mind is quiet and still." Response options ranged from 1 (*Not at all*) to 6 (*Maximum*). Reliabilities ranged from .88 to .96 (*M* = .94).

Sleep quality (Morning). Sleep quality was measured with seven items from the Groningen Sleep Quality Scale (the GSQS; Meijman, de Vries-Griever, & de Vries, 1988). The scale encompasses various sleep complaints such as insufficient sleep and trouble falling asleep. An example item is "I feel that I slept poorly last night." Response options ranged from 1 (*Strongly disagree*) to 5 (*Strongly agree*). Reliabilities ranged from .85 to .88 (*M* = .85).

Vitality (Morning, after work, and bedtime). Three items selected from the subjective vitality scale (Ryan & Frederick, 1997) were used to measure vitality (e.g., At this moment, I feel alive and vital). Bostic, Rubio, and Hood (2000) demonstrated the

soundness of this scale by factor analysis. Response options ranged from 1 (*Not at all true*) to 7 (*Very true*). Reliabilities in the current study ranged from .96 to .99 (*M* = .98) for morning vitality, from .96 to .98 (*M* = .98) for after work vitality, and from .94 to .98 (*M* = .96) for bedtime vitality.

Physical symptoms (Morning, after work, and bedtime). Items from the Larsen and Kasimatis (1991) checklist were used to measure physical symptoms. The list includes 12 physical symptoms (e.g., headache, loss of appetite, and muscle pain). It has been suggested that physical symptoms can serve as a reliable health indicator, especially if specific symptoms that happened during a short period of time are measured (Ganster, 2008). Given that individual items of this checklist do not reflect a specific underlying construct (i.e., a causal indicator), internal consistency was thought not to be a meaningful measure of reliability for this scale (see Spector & Jex, 1998).

Data Analysis

In this study, daily measurements are nested within individuals. Level 1 variables include the daily measurements of job characteristics after work, off-job activities and recovery experiences at bedtime, and well-being outcomes throughout the day (i.e., vitality, physical symptoms, and sleep quality). Level 2 variables include trait guilt and other person-level variables (e.g., gender, age). Therefore, hypotheses were tested with multi-level modeling using the program *Hierarchical Linear Modeling* 6.02 (HLM; Raudenbush, Bryk, Cheong, & Congdon, 2004).

For main analyses, predictor variables at Level 2 were grand mean-centered and predictor variables at Level 1 were centered on each individual's mean (Hofmann & Gavin, 1998). An alpha level of .05 was used for all analyses. To test hypotheses

regarding trait guilt as a moderator of the relationships between job characteristics and off-job activities, the effects of trait guilt on the slope of the focal relationship was examined to see if the focal relationship was qualified by the level of trait guilt. Gender, age, and negative trait affect were included as control variables based on their significant associations with recovery experiences and health outcomes indicated in previous research (Fritz & Sonnentag, 2005; Fritz, Sonnentag, Spector, & McInroe, 2010; Mojza, Lorenz, Sonnentag, & Binnewies, 2010). All analyses were conducted with and without control variables; there was no significant difference, and results with control variables are reported here.

Chapter Three

Results

Descriptive Statistics

Descriptive statistics for all person-level variables are shown in Table 1. Correlations among person-level variables are shown in Table 3. Descriptive statistics for day-level variables are listed in Table 4. Correlations among day-level variables are included in Table 5. Correlations among the person-level variables and aggregated day-level variables (i.e., between-persons association) are shown in Table 6.

Hypotheses Testing

Prior to hypotheses testing, day-level (i.e., within-individual) and person-level (i.e., between-individual) variance were examined by calculating a null model for each variable. It is important to estimate the proportion of variance accounted for at each level in order to justify the use of multi-level modeling. On the one hand, sufficient between-individual variance suggests that the data are nested, which necessitates multi-level modeling approach. On the other hand, sufficient within-individual variance suggests that individuals' experiences vary across days, which makes it meaningful to conduct a day-level study. The percentages of variance attributable to within individual ranged from 35.87% to 83.21%. For example, 41.93% of the total variance in job complexity can be explained as variation within a person across days whereas 58.07% of the total variance can be explained as variance between individuals who have different occupations. As the results demonstrated substantial variation at each level, multi-level modeling was deemed

Table 3

Correlations among the Person-Level Variables

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Gender	--										
2. Age	.09	--									
3. Ethnicity	-.01	.07	--								
4. Marital	-.11	-.18	.02	--							
5. Education	-.26**	-.22*	.12	-.13	--						
6. Work hour	.02	-.03	-.13	.03	.08	--					
7. Income	-.16	-.01	-.01	-.11	.42**	.09	--				
8. Tenure	-.01	.37**	-.04	-.09	-.13	.10	.14	--			
9. Dependent	-.03	-.13	-.08	.20	-.11	.03	-.07	-.02	--		
10. NA	-.09	-.16	-.15	-.02	.02	.22*	.03	.02	.07	--	
11. Trait guilt	.06	-.05	-.04	-.15	-.02	-.05	.08	.07	-.11	.38**	--

Note. $N = 99$. NA = Negative trait affect.

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

Table 4

Descriptive Statistics of Day-Level Variables

Variables	α[a]	*M*	$SD_{b\text{-}p}$	$SD_{w\text{-}p}$	*Obs. Min*	*Obs. Max*
Job complexity	.90	3.52	.75	.64	1	5
Information processing	.90	3.82	.65	.64	1	5
Problem solving	.84	3.28	.71	.61	1	5
Physical demands	.95	1.78	.70	.52	1	5
Unpleasant work conditions	.77	3.90	.63	.55	1	5
Mentally active self-oriented[b]	--	28.98	22.88	45.22	0	420
Physically active self-oriented[b]	--	14.51	14.82	31.37	0	315
Both active self-oriented[b]	--	9.54	12.53	27.88	0	247.50
Passive self-oriented[b]	--	55.04	42.66	62.31	0	540
Mentally active other-oriented[b]	--	24.66	20.56	44.30	0	375
Physically active other-oriented[b]	--	22.20	22.31	37.06	0	262.50
Both active other-oriented[b]	--	27.03	33.47	46.29	0	375
Passive other-oriented[b]	--	30.01	27.26	45.15	0	315
Psychological detachment	.94	3.51	.66	.82	1	5
Relaxation	.94	3.28	.70	.89	1	6
Sleep quality	.85	3.35	.44	.71	1	5
Vitality at morning	.98	4.26	.96	1.25	1	7
Vitality after work	.98	4.36	.91	1.19	1	7
Vitality at bedtime	.96	3.39	.98	1.12	1	7
Physical symptoms at morning	--	.60	.44	.79	0	5
Physical symptoms after work	--	.58	.53	.83	0	7
Physical symptoms at bedtime	--	.60	.53	.82	0	6

Note. $SD_{b\text{-}p}$ = Between-person standard deviation; $SD_{w\text{-}p}$ = Within-person standard deviation.
[a]Reliabilities reported here were calculated by averaging reliability scores across study days that have more than 50 participants. [b]Off-job activities were measured in minutes.

Table 5

Correlations among the Day-Level Variables

Variables	1	2	3	4	5	6	7	8	9	10	11
1. Job complexity	--										
2. Info. processing	.59**	--									
3. Prob. solving	.52**	.60**	--								
4. Physical demands	.04	.03	.15*	--							
5. Unpleas. wk cond.	-.01	-.05	.11	.25**	--						
6. Mental active self	.02	.02	-.04	.02	.05	--					
7. Phys. active self	-.03	.04	-.07	.04	.01	-.02	--				
8. Both active self	.08	.06	.02	.01	.02	.07*	.05	--			
9. Passive self	-.07	-.08	-.08	.02	-.02	-.09**	.01	-.06	--		
10. Mental active other	.10**	.07	.09*	.03	.05	.02	.03	.01	-.11**	--	
11. Phys. active other	.07	.03	.08	-.04	-.02	-.00	.06	-.09**	-.01	.03	--
12. Both active other	.07	.15**	.06	.09	-.07	.02	.02	.11	-.12**	.11*	.05
13. Passive other	-.10	-.10*	-.12*	-.07	-.05	.08**	.00	-.11**	.06	.05	-.03
14. Detachment	-.17**	-.14*	-.24**	-.14*	-.20**	-.07	-.00	.03	.09	-.20**	-.04
15. Relaxation	-.13*	-.11	-.11	-.06	-.11	.01	.03	.03	.19**	-.06	-.09
16. Sleep quality	-.11*	-.17**	-.10	-.04	.01	.00	-.02	-.06	.08	-.02	-.02
17. Vitality											
a. Morning	-.11	-.16**	-.07	.08	.05	.01	-.04	-.02	.09	.03	-.05
b. After work	-.09	-.09	-.06	-.01	-.09	.06	-.02	.04	.07	.03	-.06
c. Bedtime	-.11	-.08	-.06	-.03	-.01	.01	.02	.05	.13**	.00	-.07
18. Physical symptoms											
a. Morning	-.00	-.02	-.05	-.03	.06	.02	-.04	.01	.04	-.02	-.01
b. After work	-.01	.00	-.02	.00	.03	-.06	-.00	.02	.02	-.09**	-.03
c. Bedtime	.01	.03	-.02	-.00	.04	-.05	-.01	-.01	.06	-.04	-.05

Note. Correlations reflect the within-person associations of the constructs of the same day (N = 898-1079) and were calculated with Mplus (Muthén & Muthén, 2010).

*p < .05. **p < .01.

Table 5 (*Continued*)

Variables	12	13	14	15	16	17a	17b	17c	18a	18b	18c
12. Both active other	--										
13. Passive other	-.08*	--									
14. Detachment	-.03	.10*	--								
15. Relaxation	-.06	.08	.48**	--							
16. Sleep quality	-.05	.11**	.17**	.18**	--						
17. Vitality											
a. Morning	-.11*	.13**	.13*	.29**	.54**	--					
b. After work	-.01	.15**	.21**	.48**	.19**	.43**	--				
c. Bedtime	-.01	.06	.28**	.67**	.18**	.32**	.52**	--			
18. Physical symptoms											
a. Morning	.04	-.09*	-.09	-.11**	-.26**	-.29**	-.11*	-.03	--		
b. After work	.00	-.13**	-.07	-.16**	-.12**	-.10**	-.28**	-.07	.42**	--	
c. Bedtime	-.00	-.11**	-.14**	-.24**	-.12**	-.09*	-.19**	-.12**	.37**	.61**	--

Table 6

Correlations among the Person-Level Variables and Aggregated Day-Level Variables

Variables	1	2	3	4	5	6
1. Gender	--					
2. Age	.09	--				
3. Ethnicity	-.01	.07	--			
4. Marital	-.11	-.18	.02	--		
5. Education	-.26**	-.22*	.12	-.13	--	
6. Work hour	.02	-.03	-.13	.03	.08	--
7. Income	-.16	-.01	-.01	-.11	.42**	.09
8. Tenure	-.01	.37**	-.04	-.09	-.13	.10
9. Dependent	-.03	-.13	-.08	.20	-.11	.03
10. NA	-.09	-.16	-.15	-.02	.02	.22*
11. Trait guilt	.06	-.05	-.04	-.15	-.02	-.05
12. Complexity	-.10	-.07	-.05	-.17	.06	.31**
13. Info. processing	-.10	-.06	.01	.06	-.02	.27**
14. Prob. solving	-.07	-.14	.11	-.04	.02	.28**
15. Physical demands	.06	.09	.00	.13	-.20*	.06
16. Unpleas. wk cond.	.13	-.01	.10	-.09	.09	.10
17. Mental act. self	-.12	.04	-.15	-.03	.09	.09
18. Phy. act. self	.07	.03	-.03	-.14	-.02	.13
19. Both. act. self	-.03	.08	-.04	-.08	-.09	.04
20. Passive self	.09	.14	-.20*	-.13	-.20*	.01
21. Mental act. other	.03	.09	-.11	.03	.15	.20*
22. Phy. act. other	-.04	-.19	-.06	.03	.12	.19
23. Both. act. other	-.12	-.00	-.03	.20*	-.01	.01
24. Passive other	.18	.03	-.13	.21*	-.05	-.09
25. Detachment	.11	.24*	.00	.04	-.17	-.46**
26. Relaxation	.01	.20	-.02	.05	-.01	-.22*
27. Sleep quality	.13	.23*	.13	-.08	.03	-.09
28. VitalityM	.21*	.20	.03	-.09	-.10	-.15
29. VitalityA	.14	.13	-.14	.02	-.21*	-.21*
30. VitalityB	.12	.27**	-.04	-.03	-.13	-.17
31. PhySxM	.03	-.12	-.11	-.10	-.02	.13
32. PhySxA	.03	-.15	.05	-.11	.04	.16
33. PhySxB	-.03	-.16	.02	-.14	-.05	.17

Note. N = 99. NA = Negative trait affect; Vitality M, A, and B = Morning, after work, and bedtime vitality, respectively; PhySx M, A, and B = Morning, after work, and bedtime physical symptoms, respectively.

Table 6 (*Continued*)

Variables	7	8	9	10	11	12	13	14	15
7. Income	--								
8. Tenure	.14	--							
9. Dependent	-.07	-.02	--						
10. NA	.03	.02	.07	--					
11. Trait guilt	.08	.07	-.11	.38**	--				
12. Complexity	.04	.20*	-.09	.06	.02	--			
13. Info. processing	.03	.16	-.06	.05	-.06	.70**	--		
14. Prob. solving	.02	.09	.01	.10	-.11	.60**	.66**	--	
15. Physical demands	-.21*	.04	.21*	-.05	-.10	-.04	-.02	.14	--
16. Unpleas. wk cond.	-.14	-.14	.16	.03	-.11	-.05	-.10	.15	.33**
17. Mental act. Self	.25*	-.01	.10	.02	.10	.02	.04	-.16	.05
18. Phy. Act. Self	-.05	-.04	.06	-.12	-.11	-.02	.04	-.18	.05
19. Both. Act. Self	-.06	.03	-.06	-.11	-.06	.17	.19	.10	.08
20. Passive self	-.01	.02	-.29**	.05	-.03	-.09	-.13	-.19	-.02
21. Mental act. Other	.14	.03	.08	.20	.08	.14	.20*	.12	-.02
22. Phy. Act. Other	.15	.06	.01	.03	.02	.20*	.11	.18	-.02
23. Both. Act. Other	-.03	.03	.15	.08	-.05	.06	.22*	.03	.12
24. Passive other	.14	-.12	.09	-.08	.05	-.17	-.21*	-.26*	-.15
25. Detachment	.02	.24*	-.09	-.18	.16	-.25*	-.17	-.35**	-.18
26. Relaxation	.10	.22*	-.21*	-.19	.11	-.10	-.03	-.13	-.05
27. Sleep quality	.10	-.01	.02	-.32**	-.15	-.15	-.31**	-.15	-.04
28. VitalityM	-.07	.02	-.07	-.35**	-.11	-.12	-.20	-.06	.08
29. VitalityA	-.02	.16	-.02	-.21*	.10	-.05	-.05	-.09	-.01
30. VitalityB	.05	.21*	-.11	-.13	.08	-.06	-.05	-.10	-.01
31. PhySxM	-.05	.04	-.04	.33**	.20	-.01	-.06	-.04	-.02
32. PhySxA	-.15	-.04	-.11	.17	.07	.00	-.03	.03	-.02
33. PhySxB	-.12	.01	-.08	.25*	.12	.04	.02	.01	.01

Table 6 (*Continued*)

Variables	16	17	18	19	20	21	22	23	24	25
16. Unpleas. wk cond.	--									
17. Mental act. Self	.06	--								
18. Phy. Act. Self	.01	-.00	--							
19. Both. Act. Self	.05	.23*	.15	--						
20. Passive self	-.05	-.07	.02	-.09	--					
21. Mental act. Other	.03	.23*	-.04	.01	-.04	--				
22. Phy. Act. Other	.02	-.09	.09	-.10	-.08	.07	--			
23. Both. Act. Other	-.12	.03	.08	.33**	-.18	.12	.10	--		
24. Passive other	-.08	.16	-.01	-.30**	.25*	.17	-.10	-.17	--	
25. Detachment	-.20*	-.06	.01	-.01	.11	-.24*	-.15	-.06	.21*	--
26. Relaxation	-.09	.07	-.03	-.04	.26*	.02	-.15	-.05	.21*	.44**
27. Sleep quality	.13	-.04	-.02	-.13	.21*	-.05	-.05	-.17	.21*	.17
28. VitalityM	.19	.03	-.11	.03	.19	.10	-.21*	-.20*	.22*	.09
29. VitalityA	-.07	.13	-.08	.12	.13	.06	-.19	-.03	.27**	.24*
30. VitalityB	.06	.03	-.06	.09	.17	.06	-.17	.00	.13	.20
31. PhySxM	.09	-.03	-.03	-.00	.13	.00	.03	-.02	-.04	-.21*
32. PhySxA	.07	-.05	-.01	.03	.04	-.20	.02	-.04	-.22*	-.20
33. PhySxB	.06	-.03	.02	.07	.15	-.18	-.01	-.04	-.17	-.18

Table 6 (*Continued*)

Variables	26	27	28	29	30	31	32	33
26. Relaxation	--							
27. Sleep quality	.33**	--						
28. VitalityM	.51**	.55**	--					
29. VitalityA	.68**	.24*	.64**	--				
30. VitalityB	.71**	.27**	.55**	.77**	--			
31. PhySxM	-.22*	-.33**	-.22*	-.20	.02	--		
32. PhySxA	-.23*	-.24*	-.15	-.26*	-.10	.71**	--	
33. PhySxB	-.21*	-.33**	-.19	-.20	-.07	.75*	.81**	--

appropriate. Variance components for all study variables are shown in Table 7.

Hypotheses 1 and 2 stated that day-level job characteristics are associated with vitality and physical symptoms after work, controlling for the morning level of the outcomes. Among the five job characteristics, only job complexity was negatively associated with vitality after work (B = -0.15, $p < .05$). Thus, Hypotheses 1 and 2 were not supported. Results of the multilevel analyses are displayed in Tables 8 and 9.

Hypotheses 3 proposed that day-level knowledge characteristics (job complexity, information processing, and problem solving) negatively relate to activities that are active self-oriented (Hypothesis 3a) and active other-oriented (Hypothesis 3b). Hypotheses 3a and 3b were not supported in that none of the job characteristics were significantly associated with active activities. Results are summarized in Table 10. Hypothesis 4 addressed positive relationships of the three knowledge characteristics with activities that are passive self-oriented (Hypotheses 4a) and passive other-oriented (Hypotheses 4b). Both Hypotheses 4a and 4b were not supported as relationships of day-level job complexity, information processing, and problem solving with passive activities were not significant regardless of the beneficiary of activities. Results are shown in Table 11.

Hypotheses 5 and 6 pertained to the relationship between day-level contextual job characteristics (physical demands and unpleasant work conditions) and off-job activities. Specifically, these job characteristics were expected to negatively relate to activities that are active self-oriented (Hypothesis 5a) and active other-oriented (Hypothesis 5b) whereas positively relate to activities that are passive self-oriented (Hypothesis 6a) and passive other-oriented (Hypothesis 6b). Hypotheses 5 and 6 were not supported because no significant relationship was observed among these job

Table 7

Variance Components of Null Models for Day-Level Variables

Variable	Day level	Person level	% within person	% between person
Job complexity	0.41	0.56	41.93	58.07
Information processing	0.41	0.42	49.60	50.40
Problem solving	0.38	0.51	42.63	57.37
Physical demands	0.27	0.49	35.87	64.13
Unpleasant work conditions	0.30	0.40	43.07	56.93
Mentally active self-oriented	2045.22	523.60	79.62	20.38
Physically active self-oriented	984.35	219.78	81.75	18.25
Both active self-oriented	777.53	156.91	83.21	16.79
Passive self-oriented	3881.99	1820.27	68.08	31.92
Mentally active other-oriented	1962.17	422.53	82.28	17.72
Physically active other-oriented	1373.63	497.61	73.41	26.59
Both active other-oriented	2142.42	1119.95	65.67	34.33
Passive other-oriented	2038.39	743.08	73.28	26.72
Detachment	0.66	0.43	60.56	39.44
Relaxation	0.79	0.48	62.00	38.00
Sleep quality	0.51	0.20	72.25	27.75
Vitality at morning	1.56	0.92	62.96	37.04
Vitality after work	1.41	0.83	62.96	37.04
Vitality at bedtime	1.25	0.97	56.33	43.67
Physical symptoms at morning	0.62	0.20	76.08	23.92
Physical symptoms after work	0.69	0.28	70.95	29.05
Physical symptoms at bedtime	0.68	0.28	70.84	29.16

Table 8

Multilevel Estimates for Models Predicting Vitality and Physical Symptoms after Work (Hypothesis 1)

	Vitality						Physical symptoms					
	Complexity		Info. processing		Prob. solving		Complexity		Info. processing		Prob. solving	
	B	*SE B*	*B*	*SE B*	*B*	*SE B*	*B*	*SE B*	*B*	*SE B*	*B*	*SE B*
Intercept	3.98**	.23	3.98**	.23	3.98**	.23	.54**	.18	.54**	.18	.54**	.18
Person-level												
Gender	.39	.25	.39	.25	.39	.25	.06	.19	.06	.19	.06	.19
Age	.02	.01	.02	.01	.02	.01	-.02	.01	-.02	.01	-.02	.01
NA	-.34	.21	-.34	.21	-.34	.21	.16	.13	.16	.13	.17	.13
Day-level												
DV at morning	.25**	.04	.25**	.04	.26**	.04	.27**	.05	.27**	.05	.28**	.05
Job characteristic	-.15*	.07	-.13	.07	-.00	.08	.00	.05	.03	.05	-.03	.06

Note. Hypothesis was tested separately by running models with one job characteristic at a time. NA = Negative trait affect.
*$p < .05$. **$p < .01$.

Table 9

Multilevel Estimates for Models Predicting Vitality and Physical Symptoms after Work (Hypothesis 2)

	Vitality				Physical symptoms			
	Physical demands		Unpleasant work conditions		Physical demands		Unpleasant work conditions	
	B	*SE B*	*B*	*SE B*	*B*	*SE B*	*B*	*SE B*
Intercept	3.98**	.23	3.98**	.23	.54**	.18	.54**	.18
Person-level								
Gender	.39	.25	.39	.25	.06	.19	.06	.19
Age	.02	.01	.02	.01	-.02*	.01	-.02*	.01
NA	-.34	.21	-.34	.21	.17	.12	.18	.13
Day-level								
DV at morning	.26**	.04	.25**	.04	.26**	.05	.30**	.05
Job characteristic	-.11	.07	-.16	.11	.05	.08	.02	.07

Note. Hypothesis was tested separately by running models with one job characteristic at a time. NA = Negative trait affect.
*$p < .05$. **$p < .01$.

Table 10

Multilevel Estimates for Models Predicting Active Activities (Hypothesis 3)

	Self-oriented					
	Mentally active		Physically active		Both active	
	B	*SE B*	*B*	*SE B*	*B*	*SE B*
Intercept	40.27**	8.68	13.13**	3.33	13.86*	5.61
Person-level						
Gender	-9.42	9.41	2.02	3.86	-4.36	5.79
Age	.37	.37	.09	.23	.24	.24
NA	3.14	6.11	-2.43	3.35	-2.98	3.23
Day-level						
Complexity	.91	2.12	-1.36	1.43	-1.37	2.35
Intercept	40.55**	8.71	13.13**	3.33	13.55*	5.93
Person-level						
Gender	-9.75	9.44	2.02	3.86	-3.98	6.12
Age	.37	.37	.09	.23	.18	.20
NA	2.81	6.05	-2.43	3.35	.36	2.94
Day-level						
Info. processing	3.57	2.73	2.25	1.51	-2.29	1.80
Intercept	40.27**	8.68	13.13**	3.33	14.03**	5.08
Person-level						
Gender	-9.42	9.41	2.02	3.86	-4.53	5.22
Age	.37	.37	.09	.23	.19	.23
NA	3.14	6.11	-2.43	3.35	-2.50	3.35
Day-level						
Prob. solving	2.39	2.78	1.04	1.34	-2.65	1.93

Note. Hypothesis was tested separately by running models with one job characteristic at a time. NA = Negative trait affect.
*$p < .05$. **$p < .01$.

Table 10 (*Continued*)

	Other-oriented					
	Mentally active		Physically active		Both active	
	B	*SE B*	*B*	*SE B*	*B*	*SE B*
Intercept	24.96**	4.85	25.08**	6.72	36.08**	12.26
Person-level						
Gender	1.56	5.74	-.30	7.72	-10.43	12.92
Age	.20	.38	-.73	.37	-.16	.50
NA	8.61	5.45	-.79	5.43	6.73	6.31
Day-level						
Complexity	3.31	2.92	-3.23	2.36	4.79	3.35
Intercept	24.63**	4.60	25.08**	6.72	37.21**	12.72
Person-level						
Gender	1.91	5.59	-.30	7.72	-11.70	13.41
Age	.40	.41	-.73	.37	-.17	.50
NA	10.87	5.84	.79	5.43	6.64	6.22
Day-level						
Info. processing	-1.16	2.36	-3.26	2.07	2.93	2.48
Intercept	24.63**	4.60	24.38**	6.27	37.21**	12.71
Person-level						
Gender	1.91	5.59	.50	7.29	-11.70	13.41
Age	.40	.41	-.78*	.36	-.17	.50
NA	10.87	5.84	.98	5.39	6.63	6.22
Day-level						
Prob. solving	3.03	2.67	-.19	2.32	5.10	2.78

Table 11

Multilevel Estimates for Models Predicting Passive Activities (Hypothesis 4)

	Passive			
	Self-oriented		Other-oriented	
	B	*SE B*	*B*	*SE B*
Intercept	48.18**	13.46	18.88*	7.40
Person-level				
Gender	10.14	14.41	13.85	7.95
Age	1.31	.76	.11	.52
NA	9.94	11.66	-6.48	6.93
Day-level				
Complexity	-2.47	3.05	-1.04	2.49
Intercept	48.18**	13.46	18.88*	7.40
Person-level				
Gender	10.14	14.41	13.85	7.95
Age	1.31	.76	.11	.52
NA	9.94	11.66	-6.48	6.93
Day-level				
Info. processing	-.92	3.25	-3.10	2.64
Intercept	48.18**	13.46	18.88*	7.40
Person-level				
Gender	10.14	14.41	13.85	7.95
Age	1.31	.76	.11	.52
NA	9.94	11.66	-6.48	6.93
Day-level				
Prob. solving	3.05	3.13	-1.68	2.84

Note. Hypothesis was tested separately by running models with one job characteristic at a time. NA = Negative trait affect.
*$p < .05$. **$p < .01$.

characteristics and off-job activities. Results are displayed in Tables 12 and 13.

Hypotheses 7 and 8 predicted that active off-job activities relate to recovery experiences. Specifically, Hypothesis 7a proposed a positive relationship between active self-oriented activities and psychological detachment. Contrary to expectation, a negative relationship was found between mentally active self-oriented activities and psychological detachment (B = -0.001, $p < .05$). Other types of active self-oriented activities were not significant predictors of psychological detachment. Hypothesis 7b was not supported as there was no significant relationship between active self-oriented activities and relaxation. Next, a negative relationship was observed between mentally active other-oriented activities and psychological detachment (B = -0.004, $p < .01$), which is the opposite of Hypothesis 8a. Hypothesis 8b was also not supported in that active other-oriented activities showed no significant relationship with relaxation. In sum, Hypotheses 7 and 8 were not supported. Results are shown in Tables 14 and 15.

Hypotheses 9 and 10 proposed that passive off-job activities relate to recovery experiences. Hypothesis 9a that stated a negative relationship between passive self-oriented activities and psychological detachment was not supported in that a positive relationship was observed between the two (B = 0.001, $p < .05$). Hypothesis 9b that concerns a positive relationship between passive self-oriented activities and relaxation was supported (B = 0.002, $p < .01$). Next, Hypotheses 10a and 10b were not supported because passive other-oriented activities were associated with neither psychological detachment nor relaxation. Results are demonstrated in Table 16.

Hypotheses 11 and 12 focused on the relationship between recovery experiences and well-being indicators at bedtime, controlling for the outcomes measured after work.

Hypothesis 11a was supported in that psychological detachment was positively associated with vitality at bedtime ($B = 0.33$, $p < .01$). Hypothesis 11b was also supported because a significant negative relationship was observed between psychological detachment and physical symptoms at bedtime ($B = -0.10$, $p < .01$). In support of Hypotheses 12a and 12b, relaxation was positively associated with vitality at bedtime ($B = 0.70$, $p < .01$) and negatively associated with physical symptoms at bedtime ($B = -0.18$, $p < .01$). Results are displayed in Table 17.

For Hypotheses 13 and 14, the relationships of recovery experiences with sleep quality, vitality, and physical symptoms in the next morning were tested, controlling for the outcomes at bedtime. Hypotheses 13a and 13b were supported with significant positive relationships of psychological detachment with sleep quality ($B = 0.15$, $p < .01$) and vitality ($B = 0.29$, $p < .01$). However, there was no significant relationship between psychological detachment and physical symptoms in the next morning ($B = -0.07$, $p = .09$). Hypothesis 14 was fully supported because relaxation at bedtime was associated with better sleep quality ($B = 0.14$, $p < .01$), higher vitality ($B = 0.30$, $p < .01$), and fewer physical symptoms ($B = -0.11$, $p < .01$) in the next morning. Results are shown in Table 18.

Hypotheses 15-18 proposed that trait guilt moderates relationships among day-specific knowledge characteristics and various off-job activities. Hypothesis 15 concerned the moderating role of trait guilt in the relationship between the three knowledge characteristics and active self-oriented activities. This hypothesis was not supported in that the relationship among the three knowledge characteristics and active self-oriented activities did not differ across individuals as a function of trait guilt. Results

Table 12

Multilevel Estimates for Models Predicting Active Activities (Hypothesis 5)

	Self-oriented						Other-oriented					
	Mentally active		Physically active		Both active		Mentally active		Physically active		Both active	
	B	*SE B*	*B*	*SE B*	*B*	*SE B*	*B*	*SE B*	*B*	*SE B*	*B*	*SE B*
Intercept	39.81**	7.34	13.13**	3.33	13.68*	5.66	24.63**	4.60	25.08**	6.72	37.21**	12.72
Person-level												
Gender	-8.89	7.99	2.03	3.86	-4.12	5.84	1.95	5.60	-.28	7.72	-11.71	13.41
Age	.32	.37	.09	.23	.25	.25	.39	.41	-.73	.37	-.17	.50
NA	.90	6.12	-2.44	3.35	-2.94	3.24	10.82	5.85	.77	5.43	6.65	6.22
Day-level												
Physical demands	-1.87	3.88	2.50	2.10	-3.75	2.22	3.07	2.44	-1.03	2.23	2.75	3.65
Intercept	40.27**	8.68	13.13**	3.33	13.68*	5.66	24.63**	4.60	25.08**	6.72	37.21**	12.72
Person-level												
Gender	-9.42	9.41	2.03	3.86	-4.12	5.85	1.95	5.60	-.28	7.72	-11.71	13.41
Age	.37	.37	.09	.23	.25	.25	.39	.41	-.73	.37	-.17	.50
NA	3.13	6.11	-2.44	3.35	-2.94	3.24	10.82	5.85	.77	5.43	6.65	6.22
Day-level												
Unpleasant work conditions	3.16	3.36	.89	1.71	-2.36	1.86	4.32	3.20	-3.08	2.39	-1.69	2.12

Note. Hypothesis was tested separately by running models with one job characteristic at a time. NA = Negative trait affect.
*$p < .05$. **$p < .01$.

Table 13

Multilevel Estimates for Models Predicting Passive Activities (Hypothesis 6)

	Passive			
	Self-oriented		Other-oriented	
	B	*SE B*	*B*	*SE B*
Intercept	48.18**	13.46	18.88*	7.40
Person-level				
Gender	9.97	14.41	13.85	7.95
Age	1.33	.76	.11	.52
NA	10.12	11.65	-6.49	6.93
Day-level				
Physical demands	1.52	3.74	-2.28	3.07
Intercept	48.18**	13.46	18.88*	7.40
Person-level				
Gender	9.97	14.41	13.85	7.95
Age	1.33	.76	.11	.52
NA	10.12	11.65	-6.49	6.93
Day-level				
Unpleasant work conditions	-.18	3.22	-.06	2.70

Note. Hypothesis was tested separately by running models with one job characteristic at a time. NA = Negative trait affect.
*$p < .05$. **$p < .01$.

Table 14

Multilevel Estimates for Models Predicting Detachment and Relaxation (Hypothesis 7)

	Detachment		Relaxation	
	B	*SE B*	*B*	*SE B*
Intercept	3.40**	.18	3.31**	.21
Person-level				
Gender	.14	.20	-.04	.23
Age	.02	.01	.02*	.01
NA	-.23	.16	-.25	.18
Day-level				
Mentally active self-oriented	-.001*	.00	-.00	.00
Intercept	3.40**	.18	3.31**	.21
Person-level				
Gender	.14	.20	-.04	.23
Age	.02	.01	.02*	.01
NA	-.23	.16	-.25	.18
Day-level				
Physically active self-oriented	-.00	.00	.00	.00
Intercept	3.38**	.18	3.33**	.21
Person-level				
Gender	.16	.20	-.06	.23
Age	.02	.01	.02*	.01
NA	-.21	.16	-.27	.18
Day-level				
Both active self-oriented	.00	.00	.00	.00

Note. Hypothesis was tested separately by running models with one off-job activity at a time. NA = Negative trait affect. *$p < .05$. **$p < .01$.

Table 15

Multilevel Estimates for Models Predicting Detachment and Relaxation (Hypothesis 8)

	Detachment		Relaxation	
	B	*SE B*	*B*	*SE B*
Intercept	3.42**	.18	3.31**	.21
Person-level				
Gender	.11	.19	-.04	.23
Age	.02	.01	.02*	.01
NA	-.21	.16	-.25	.18
Day-level				
Mentally active other-oriented	-.004**	.00	-.00	.00
Intercept	3.40**	.18	3.31**	.21
Person-level				
Gender	.13	.19	-.03	.23
Age	.02	.01	.02*	.01
NA	-.23	.16	-.24	.18
Day-level				
Physically active other-oriented	.00	.00	-.00	.00
Intercept	3.40**	.18	3.32**	.22
Person-level				
Gender	.13	.20	-.04	.23
Age	.02	.01	.02*	.01
NA	-.23	.16	-.25	.18
Day-level				
Both active other-oriented	.00	.00	-.00	.00

Note. Hypothesis was tested separately by running models with one off-job activity at a time. NA = Negative trait affect.
*$p < .05$. **$p < .01$.

Table 16

Multilevel Estimates for Models Predicting Detachment and Relaxation (Hypotheses 9 and 10)

	Detachment		Relaxation	
	B	*SE B*	*B*	*SE B*
Intercept	3.40**	.18	3.31**	.21
Person-level				
Gender	.14	.20	-.04	.23
Age	.02	.01	.02*	.01
NA	-.23	.16	-.25	.18
Day-level				
Passive self-oriented	.001*	.00	.002**	.00
Intercept	3.39**	.18	3.31**	.21
Person-level				
Gender	.14	.20	-.04	.23
Age	.02	.01	.02*	.01
NA	-.23	.16	-.24	.17
Day-level				
Passive other-oriented	.00	.00	.00	.00

Note. Hypothesis was tested separately by running models with one off-job activity at a time. NA = Negative trait affect.
*$p < .05$. **$p < .01$.

Table 17

Multilevel Estimates for Models Predicting Vitality and Physical Symptoms at Bedtime (Hypotheses 11 and 12)

	Vitality				Physical symptoms			
	Detachment		Relaxation		Detachment		Relaxation	
	B	*SE B*	*B*	*SE B*	*B*	*SE B*	*B*	*SE B*
Intercept	3.26**	.25	3.06**	.25	.63**	.19	.58**	.19
Person-level								
Gender	.08	.26	.31	.27	-.02	.21	.04	.20
Age	.04*	.01	.04*	.02	-.01	.01	-.01*	.01
NA	-.26	.19	-.21	.21	.31*	.12	.17	.11
Day-level								
DV after work	.27**	.04	.12**	.04	.45**	.05	.44**	.04
Recovery experience	.33**	.05	.70**	.04	-.10**	.03	-.18**	.04

Note. Hypothesis was tested separately by running models with one recovery experience at a time. NA = Negative trait affect.
*$p < .05$. **$p < .01$.

Table 18

Multilevel Estimates for Models Predicting Sleep Quality, Vitality, and Physical Symptoms in the Next Morning (Hypotheses 13 and 14)

	Sleep quality		Vitality		Physical symptoms	
	B	*SE B*	*B*	*SE B*	*B*	*SE B*
Intercept	3.12**	.13	3.50**	.21	.58**	.14
Person-level						
Gender	.26	.15	.85**	.24	-.01	.15
Age	.01	.01	.01	.01	-.01	.01
NA	-.31*	.14	-.69**	.24	.33**	.11
Day-level						
DV at bedtime	--	--	.12*	.05	.19**	.05
Detachment	.15**	.03	.29**	.07	-.07	.04
Intercept	3.12**	.13	3.50**	.21	.57**	.14
Person-level						
Gender	.26	.15	.85**	.24	-.01	.15
Age	.01	.01	.01	.01	-.01	.01
NA	-.31*	.14	-.69**	.24	.35**	.11
Day-level						
DV at bedtime	--	--	.06	.06	.16**	.05
Relaxation	.14**	.03	.30**	.07	-.11**	.04

Note. Hypothesis was tested separately by running models with one recovery experience at a time. NA = Negative trait affect.
*$p < .05$. **$p < .01$.

are summarized in Table 19. Hypothesis 16 predicted that trait guilt moderates the relationship between the three knowledge characteristics and passive self-oriented activities. Support for Hypothesis 16 was found from the relationship between information processing and passive self-oriented activities (B = -10.05, p < .05). To demonstrate this significant interaction, participants who scored one standard deviation higher and one standard deviation lower than the trait guilt mean were compared (Preacher, Curran, & Bauer, 2006; See Figure 3). Although the relationship patterns differed for employees who are higher versus lower on trait guilt such that employees who are lower on trait guilt increased the time spent on passive self-oriented activities when daily level of information processing is high whereas more guilt-prone employees spent less time for passive self-oriented activities on the days that they processed a large amount of information, simple slope analysis suggested that neither slope was significantly different from zero (B = 5.83, p = .054 for lower trait guilt and B = -6.23, p = .20 for higher trait guilt). Results are shown in Table 19.

Hypothesis 17 stated that trait guilt moderates the relationship between job characteristics and active other-oriented activities. A significant interaction was observed in the relationship between job complexity and physically active other-oriented activities (B = 8.58, p < .01). The significant interaction is plotted in Figure 4. As hypothesized, employees who were lower on trait guilt decreased the time spent on physically active other-oriented activities on the days that job complexity is high (B = -8.82, p < .01). However, employees who are higher on trait guilt maintained the time spent on physically active other-oriented activities regardless of day level job complexity (B = 1.48, p = .61). Trait guilt was not a significant moderator of any of the other relationships

among the three knowledge characteristics and active other-oriented activities. Hypothesis 18 was not supported in that the relationship between the three knowledge characteristics and passive other-oriented activities did not differ across individuals who are higher versus lower on trait guilt. Results for Hypotheses 17 and 18 are presented in Table 20.

Hypotheses 19-22 proposed that trait guilt moderates relationships among day-specific contextual characteristics and various off-job activities. Hypothesis 19 stated that trait guilt moderates the relationship between job characteristics and active self-oriented activities. A significant interaction was found between trait guilt and unpleasant work conditions in predicting the time spent on mentally active self-oriented activities (B = -11.56, p < .05; See Figure 5). While employees higher on trait guilt did not change the amount of time spent on mentally active self-oriented activities depending on the daily work conditions (B = -1.87, p = .67), employees lower on trait guilt reported that they spent more time on mentally active self-oriented activities on the days that work conditions were unpleasant (B = 11.54, p < .05). Trait guilt did not moderate relationships between physical demands and active self-oriented activities. In sum, Hypothesis 19 was not supported. Hypothesis 20 predicted that trait guilt moderates the relationship between the two contextual job characteristics and passive self-oriented activities. While trait guilt was a significant moderator of the relationship between passive self-oriented activities and daily physical demands (B = 15.19, p < .01), no significant interaction was observed in the relationship between unpleasant work conditions and passive self-oriented activities (B = -3.99, p = .38). The nature of the significant interaction is demonstrated in Figure 6. Simple slope analysis suggested that contrary to expectation employees higher

on trait guilt (B = 10.78, p < .05), but not those lower on trait guilt (B = -7.45, p = .08), reported increased time spent on passive self-oriented activities on days with high physical demands. Results for Hypotheses 19 and 20 are listed in Table 21.

Hypothesis 21 proposed that trait guilt moderates the relationship between active other-oriented activities and contextual job characteristics. The only significant interaction found was between trait guilt and daily physical demands in predicting the time spent on other-oriented activities that are both mentally and physically active (B = -10.35, p < .05; See Figure 7). However, the pattern of the relationship was not consistent with prediction in that employees lower on trait guilt increased the time spent on other-oriented activities that are active both mentally and physically on days with high physical demands (B = 8.86, p < .05) whereas employees higher on trait guilt did not change the time spent on this type of activity (B = -3.55, p = .44). Hypothesis 22 was not supported because the relationship between contextual characteristics and passive other-oriented activities did not differ depending on the level of trait guilt. Results for Hypotheses 21 and 22 are presented in Table 22.

Exploratory Analyses

In order to gain greater insight into the data, several additional analyses were conducted for exploratory purposes. First, the relationships among daily job characteristics, off-job activities, and recovery experiences were examined with six categories of off-job activities based on a single attribute (mentally active, physically active, both mentally and physically active, passive, self-oriented, and other-oriented). Similar to the main analysis, time spent for each activity was summed to create scores for each activity category. Consistent with findings from the main analyses, there was no

Table 19

Multilevel Estimates for Models Predicting Self-Oriented Activities (Hypotheses 15 and 16)

	Mentally active		Physically active		Both active		Passive	
	B	*SE B*	*B*	*SE B*	*B*	*SE B*	*B*	*SE B*
Intercept	41.02**	8.81	12.76**	3.39	13.65*	5.50	47.37**	13.00
Person-level								
Gender	-10.27	9.48	2.43	3.91	-4.12	5.70	11.04	14.06
Age	.35	.38	.10	.23	.24	.24	1.33	.77
NA	-.22	5.94	-.74	3.66	-2.06	3.44	13.48	13.49
Trait guilt (TG)	6.83	5.41	-3.44	2.65	-1.78	2.63	-7.23	8.03
Day-level								
Complexity	.86	2.08	-1.29	1.43	-1.34	2.34	-2.54	3.04
Complexity x TG	1.01	3.64	-1.35	1.61	-3.20	4.73	1.41	3.65
Intercept	41.36**	8.88	12.76**	3.39	13.42*	5.89	47.37**	13.00
Person-level								
Gender	-10.66	9.54	2.43	3.91	-3.83	6.10	11.04	14.06
Age	.35	.38	.10	.23	.18	.19	1.33	.77
NA	-.67	5.91	-.74	3.66	1.01	3.23	13.48	13.49
Trait guilt (TG)	6.98	5.42	-3.44	2.65	-2.74	2.65	-7.23	8.03
Day-level								
Info. processing	3.55	2.71	2.44	1.53	-2.46	1.84	-.20	3.06
Info. processing x TG	.28	4.42	-2.64	1.99	4.35	2.88	-10.05*	4.45

Note. Hypothesis was tested separately by running models with one job characteristic at a time. NA = Negative trait affect.
*$p < .05$. **$p < .01$.

Table 19 (*Continued)*

	Mentally active		Physically active		Both active		Passive	
	B	*SE B*	*B*	*SE B*	*B*	*SE B*	*B*	*SE B*
Intercept	41.02**	8.81	12.76**	3.39	13.97**	5.08	47.37**	13.00
Person-level								
Gender	-10.26	9.48	2.43	3.91	-4.47	5.23	11.04	14.06
Age	.35	.38	.10	.23	.18	.23	1.33	.77
NA	-.22	5.94	-.74	3.66	-2.39	3.49	13.48	13.49
Trait guilt (TG)	6.83	5.41	-3.44	2.65	-1.67	2.64	-7.23	8.03
Day-level								
Prob. solving	2.29	2.73	1.27	1.35	-2.98	1.82	2.70	2.99
Prob. solving x TG	1.34	5.22	-3.14	1.95	5.86	3.44	4.84	4.85

Table 20

Multilevel Estimates for Models Predicting Other-Oriented Activities (Hypotheses 17 and 18)

	Mentally active		Physically active		Both active		Passive	
	B	*SE B*	*B*	*SE B*	*B*	*SE B*	*B*	*SE B*
Intercept	24.87**	4.91	25.52**	6.45	35.93**	11.83	19.35*	7.61
Person-level								
Gender	1.65	5.80	-.80	7.48	-10.27	12.56	13.32	8.08
Age	.20	.37	-.74*	.36	-.15	.50	.10	.51
NA	9.11	6.10	-1.16	5.61	9.53	7.58	-8.60	7.56
Trait guilt (TG)	-1.14	5.39	3.98	4.82	-5.94	7.33	4.31	5.98
Day-level								
Complexity	3.33	2.91	-3.67	2.23	4.67	3.37	-1.03	2.56
Complexity x TG	-.93	3.83	8.58**	2.77	5.48	4.67	-.26	3.91
Intercept	24.43**	4.64	25.52**	6.45	36.54**	12.08	19.35*	7.61
Person-level								
Gender	2.13	5.62	-.80	7.48	-10.95	12.82	13.32	8.07
Age	.41	.40	-.74*	.36	-.15	.50	.10	.51
NA	11.77	6.58	-1.16	5.61	9.56	7.57	-8.60	7.56
Trait guilt (TG)	-1.84	5.43	3.98	4.82	-5.95	7.34	4.31	5.98
Day-level								
Info. processing	-1.19	2.39	-3.44	2.07	2.81	2.44	-3.07	2.66
Info. processing x TG	.43	2.96	2.55	2.55	1.80	3.31	-.40	3.89

Note. Hypothesis was tested separately by running models with one job characteristic at a time. NA = Negative trait affect.
*$p < .05$. **$p < .01$.

Table 20 (*Continued)*

	Mentally active		Physically active		Both active		Passive	
	B	*SE B*	*B*	*SE B*	*B*	*SE B*	*B*	*SE B*
Intercept	24.43**	4.64	24.82**	5.99	36.54**	12.08	19.35*	7.61
Person-level								
Gender	2.12	5.62	.02	7.04	-10.95	12.82	13.32	8.08
Age	.41	.40	-.80*	.35	-.15	.50	.10	.51
NA	11.77	6.58	-.99	5.53	9.55	7.57	-8.60	7.56
Trait guilt (TG)	-1.84	5.43	3.91	4.81	-5.95	7.34	4.31	5.98
Day-level								
Prob. solving	3.09	2.66	-.26	2.41	5.17	2.86	-1.18	2.89
Prob. solving x TG	-.77	3.66	1.00	3.71	-.93	3.85	-6.87	4.00

Table 21

Multilevel Estimates for Models Predicting Self-Oriented Activities (Hypotheses 19 and 20)

	Mentally active		Physically active		Both active		Passive	
	B	*SE B*	*B*	*SE B*	*B*	*SE B*	*B*	*SE B*
Intercept	40.58**	7.47	12.76**	3.39	13.49*	5.55	47.36**	12.99
Person-level								
Gender	-9.75	8.04	2.45	3.91	-3.91	5.75	10.90	14.04
Age	.30	.38	.10	.23	.25	.24	1.35	.77
NA	-2.81	5.95	-.76	3.67	-2.07	3.43	13.76	13.46
Trait guilt (TG)	7.60	5.44	-3.42	2.65	-1.76	2.63	-7.42	8.01
Day-level								
Physical demands	-1.87	3.92	2.47	2.09	-3.71	2.17	1.67	3.28
Physical demands x TG	2.01	6.05	-2.66	2.30	3.90	3.27	15.19**	4.48
Intercept	41.01**	8.81	12.76**	3.39	13.49*	5.55	47.35**	12.99
Person-level								
Gender	-10.26	9.48	2.45	3.91	-3.91	5.76	10.90	14.04
Age	.35	.38	.10	.23	.25	.24	1.35	.77
NA	-.22	5.94	-.76	3.67	-2.07	3.43	13.76	13.46
Trait guilt (TG)	6.84	5.41	-3.42	2.65	-1.76	2.63	-7.42	8.01
Day-level								
Unpleasant work conditions	4.31	2.79	.81	1.76	-2.30	1.98	.21	3.20
Unpleasant work conditions x TG	-11.56*	5.11	.84	2.30	-.55	2.84	-3.99	4.54

Note. Hypothesis was tested separately by running models with one job characteristic at a time. NA = Negative trait affect.
*$p < .05$. **$p < .01$.

Table 22

Multilevel Estimates for Models Predicting Other-Oriented Activities (Hypotheses 21 and 22)

	Mentally active		Physically active		Both active		Passive	
	B	*SE B*	*B*	*SE B*	*B*	*SE B*	*B*	*SE B*
Intercept	24.44**	4.65	25.52**	6.45	36.54**	12.08	19.35*	7.61
Person-level								
Gender	2.16	5.63	-.79	7.48	-10.96	12.82	13.32	8.08
Age	.40	.41	-.74*	.36	-.15	.50	.10	.51
NA	11.70	6.59	-1.19	5.61	9.57	7.57	-8.60	7.56
Trait guilt (TG)	-1.79	5.44	3.99	4.82	-5.96	7.34	4.31	5.99
Day-level								
Physical demands	3.05	2.40	-1.01	2.21	2.65	3.17	-2.26	3.08
Physical demands x TG	-2.25	5.34	1.60	3.53	-10.35*	4.98	2.14	5.55
Intercept	24.44**	4.65	25.52**	6.45	36.54**	12.09	19.35*	7.61
Person-level								
Gender	2.16	5.63	-.79	7.48	-10.96	12.82	13.32	8.08
Age	.40	.41	-.74*	.36	-.15	.50	.10	.51
NA	11.70	6.59	-1.19	5.61	9.57	7.57	-8.60	7.56
Trait guilt (TG)	-1.79	5.44	3.99	4.82	-5.96	7.34	4.31	5.99
Day-level								
Unpleasant work conditions	4.02	3.32	-3.17	2.47	-1.57	2.09	.51	2.64
Unpleasant work conditions x TG	3.09	5.27	.95	3.76	-1.27	3.15	-5.74	3.57

Note. Hypothesis was tested separately by running models with one job characteristic at a time. NA = Negative trait affect.
*$p < .05$. **$p < .01$.

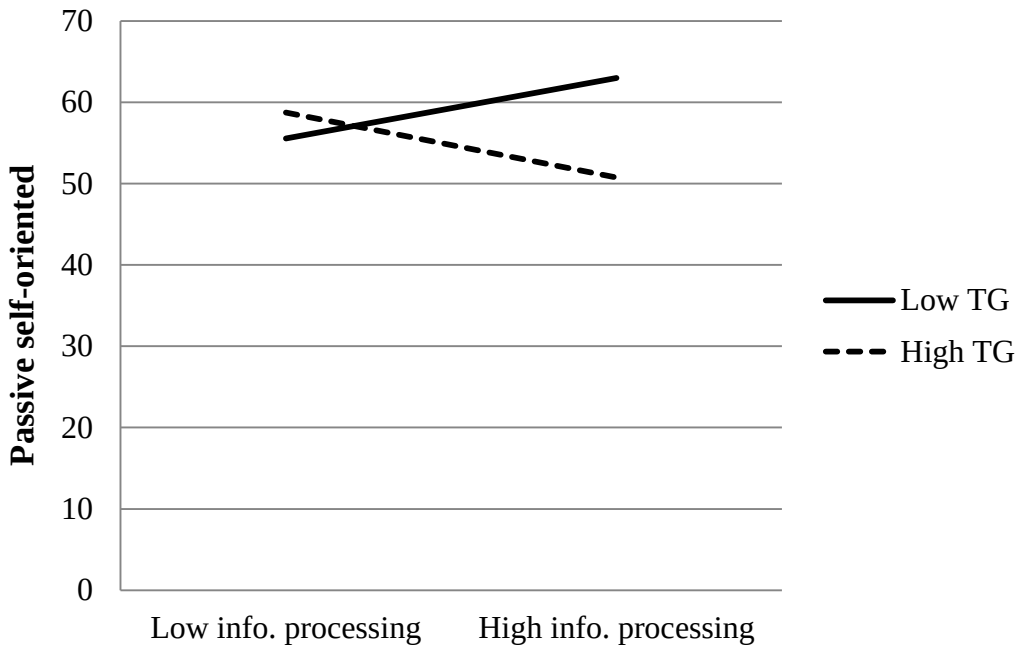

Figure 3. Interaction of Information Processing on Passive Self-Oriented Activities as a Function of Trait Guilt

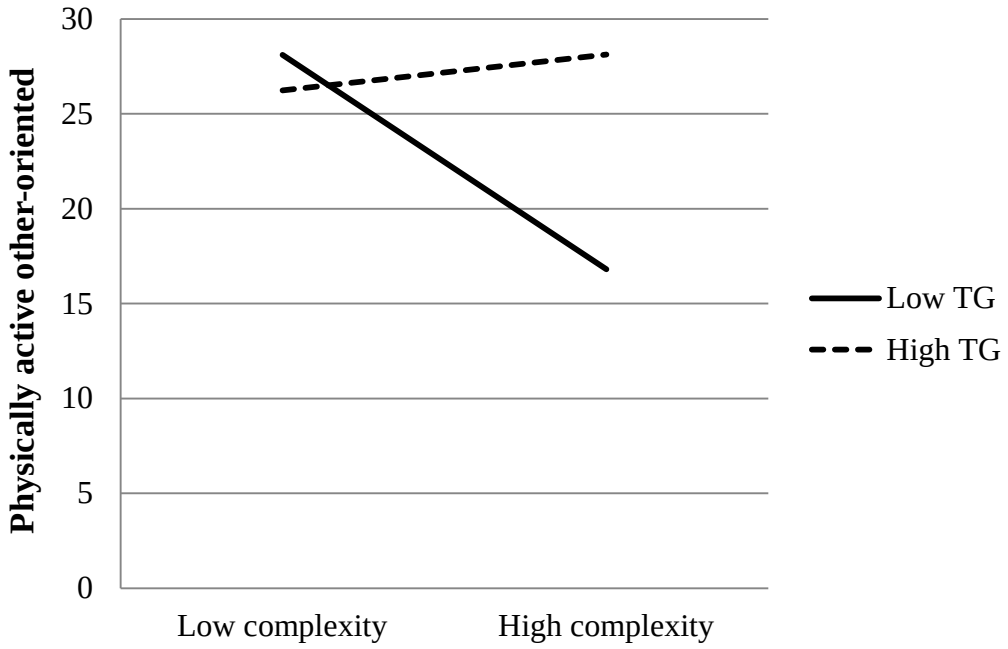

Figure 4. Interaction of Job Complexity on Physically Active Other-Oriented Activities as a Function of Trait Guilt

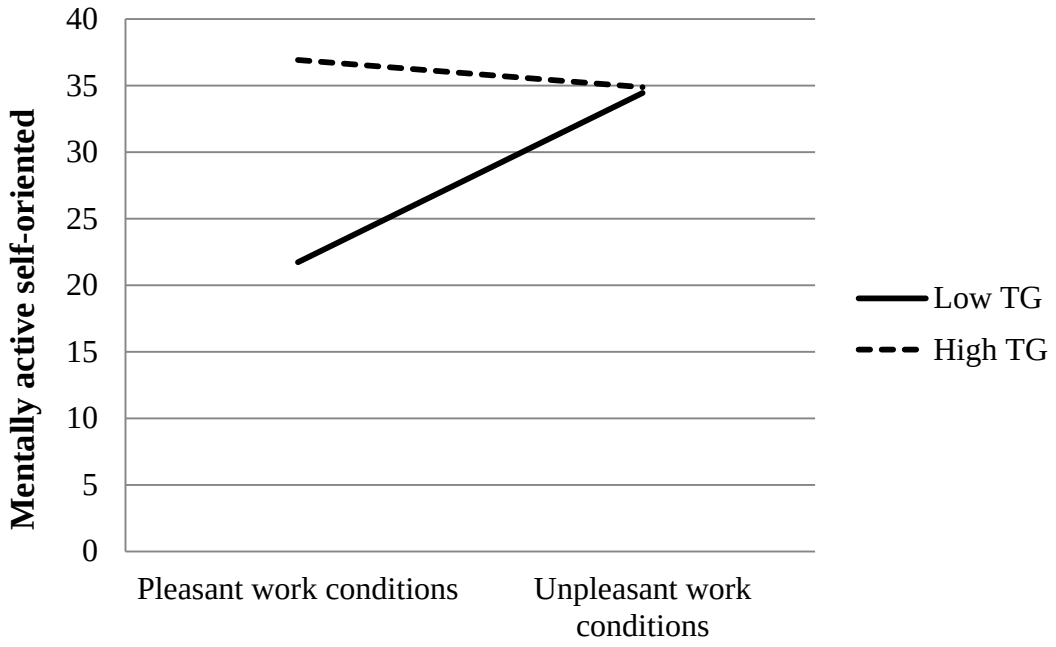

Figure 5. Interaction of Unpleasant Work Conditions on Mentally Active Self-Oriented Activities as a Function of Trait Guilt

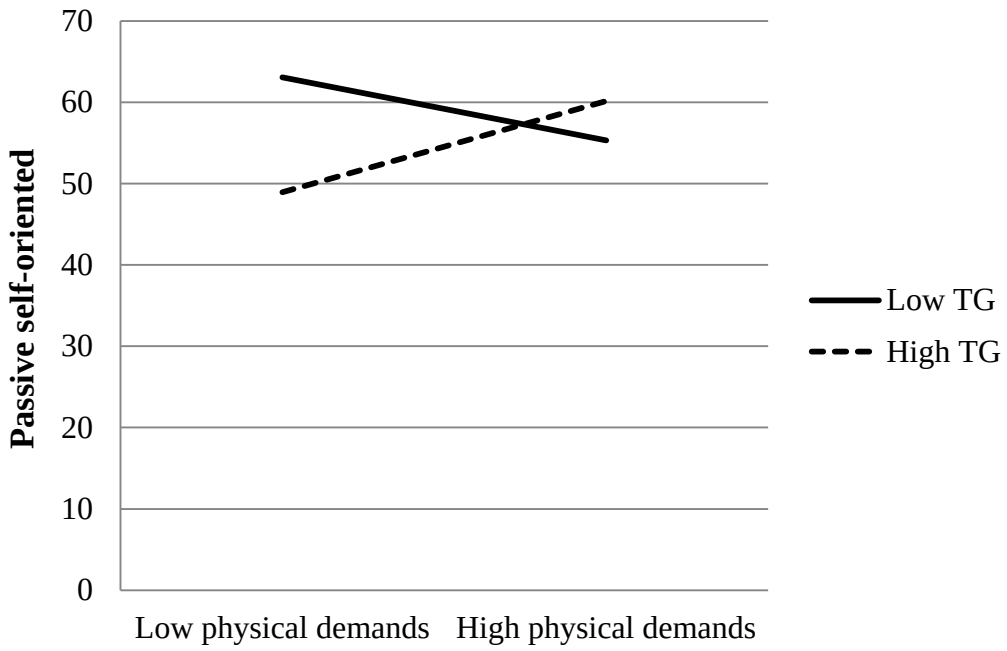

Figure 6. Interaction of Physical Demands on Passive Self-Oriented Activities as a Function of Trait Guilt

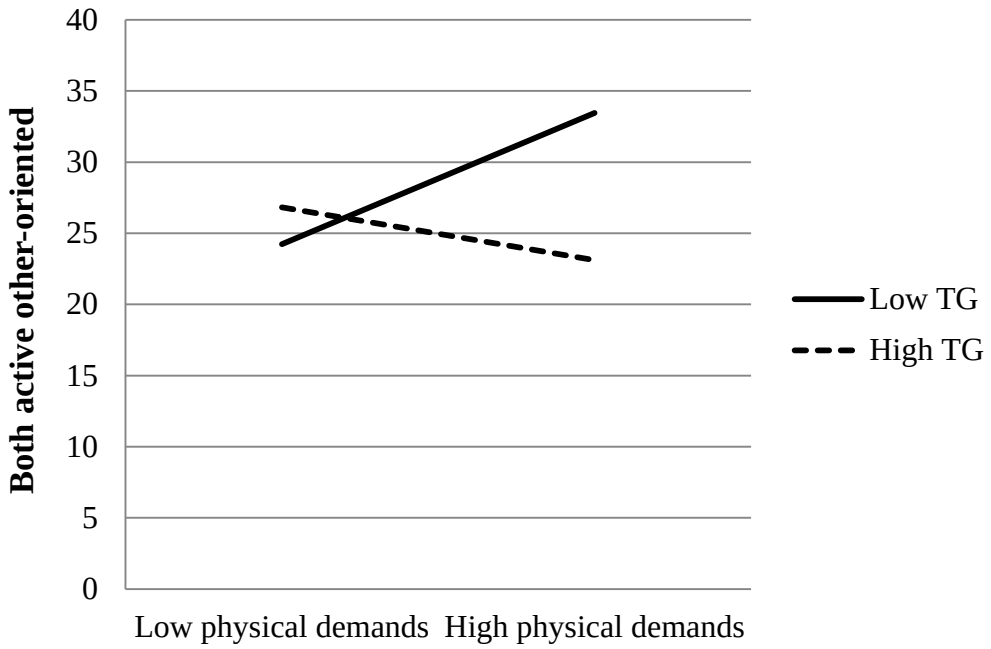

Figure 7. Interaction of Physical Demands on Both Mentally and Physically Active Other-Oriented Activities as a Function of Trait Guilt

significant relationship between daily job characteristics and off-job activities. With regard to the relationship between off-job activities and recovery experiences, mentally active activities were negatively related to psychological detachment (B = -.002, p < .01) whereas passive activities positively related to psychological detachment (B = 0.002, p < .01) as well as to relaxation (B = 0.002, p < .01). Results for the first exploratory analysis are presented in Tables 23 and 24.

Next, the relationships among daily job characteristics, off-job activities, and recovery experiences were investigated based on off-job activities grouped into objective categories. First, a categorization that consisted of ten off-job activities (housework, child care, school work supervision, dinner, shopping, exercise, leisure activities, work-related activities, social activities, and pet time) was developed based on previous research that investigated the role of off-job activities in recovery (e.g., Saxbe, Repetti, & Graesch, 2011; Sonnentag, 2001). Table 25 describes the categorization with examples for each group. Along with the categorization, two individuals (an undergraduate research assistant and myself) independently coded activities using participants' activity descriptions. Then, time spent for each category was calculated by summing time spent for each activity in a given category.

Most off-job activities (house work, child care, school work supervision, shopping, exercise, leisure activities, and social activities) did not have a significant relationship with daily job characteristics. However, there were some exceptions. Work-related activities were positively associated with job complexity (B = 4.09, p < .05), problem solving (B = 2.61, p < .05), and unpleasant work conditions (B = 5.28, p < .05). Pet time had a negative relationship with job complexity (B = -0.98, p < .05) as well as

with physical demands ($B = 1.44$, $p < .05$). Lastly, dinner was positively associated with day-specific information processing ($B = 4.18$, $p < .01$). With regard to the relationship between off-job activities and recovery experiences, psychological detachment was positively associated with leisure activities ($B = 0.002$, $p < .05$) and negatively associated with work-related activities ($B = 0.008$, $p < .05$). Next, relaxation was positively associated with dinner ($B = 0.004$, $p < .05$), exercise ($B = 0.005$, $p < .05$), leisure activities ($B = 0.002$, $p < .05$), and social activities ($B = 0.002$, $p < .05$) and negatively associated with work-related activities ($B = 0.003$, $p < .05$). Results for the second exploratory analysis are presented in Tables 26 - 27.

Lastly, direct links between job characteristics and recovery experiences were examined. With the exception of physical demands, all daily job characteristics negatively related to psychological detachment ($B = -0.16$, $p < .01$ for job complexity, $B = -0.15$, $p < .01$ for information processing, $B = -0.13$, $p < .05$ for problem solving, and $B = -0.26$, $p < .01$ for unpleasant work conditions). Relaxation was negatively associated with job complexity ($B = -0.14$, $p < .05$) and with information processing ($B = -0.15$, $p < .05$). Results for the third exploratory analysis are presented in Table 28.

Table 23

Multilevel Estimates for Models Predicting Off-Job Activities with Single Dimension (Exploratory 1)

	Mentally active		Physically active		Both active	
	B	*SE B*	*B*	*SE B*	*B*	*SE B*
Intercept	64.92**	7.94	38.50**	6.11	52.30**	14.99
Person-level						
Gender	-7.63	9.42	1.27	7.59	-17.57	15.84
Age	.81	.58	-.65	.41	.09	.62
NA	14.37	9.03	-1.70	6.73	3.45	7.82
Day-level						
Complexity	5.13	3.45	-4.59	2.67	3.27	4.08
Intercept	64.91**	7.89	38.50**	6.11	50.68**	14.28
Person-level						
Gender	-7.62	9.37	1.27	7.59	-15.70	15.09
Age	.79	.58	-.65	.41	.08	.62
NA	14.07	9.02	-1.70	6.73	3.68	8.00
Day-level						
Info. processing	2.00	3.62	-1.01	2.69	.83	2.72
Intercept	64.91**	7.89	38.50**	6.11	50.68**	14.28
Person-level						
Gender	-7.62	9.37	1.27	7.59	-15.70	15.09
Age	.79	.58	-.65	.41	.08	.62
NA	14.07	9.02	-1.70	6.73	3.68	8.00
Day-level						
Prob. solving	5.42	3.53	1.05	2.57	2.27	3.62

Note. Hypothesis was tested separately by running models with one job characteristic at a time. NA = Negative trait affect.
*$p < .05$. **$p < .01$.

Table 23 (*Continued*)

	Passive		Self-oriented		Other-oriented	
	B	*SE B*	*B*	*SE B*	*B*	*SE B*
Intercept	66.83**	15.54	115.21**	17.23	109.49**	16.78
Person-level						
Gender	24.49	16.68	-1.35	18.25	-.59	18.59
Age	1.39	1.04	2.02*	1.01	-.44	.79
NA	2.86	14.54	7.95	12.76	9.72	12.71
Day-level						
Complexity	-2.81	3.80	-3.89	4.49	3.24	6.21
Intercept	66.83**	15.54	115.21**	17.23	105.92**	15.90
Person-level						
Gender	24.49	16.68	-1.35	18.25	3.53	17.75
Age	1.39	1.04	2.02*	1.01	-.35	.81
NA	2.85	14.54	7.95	12.76	11.97	13.16
Day-level						
Info. processing	-3.65	3.72	2.39	4.32	-4.60	4.71
Intercept	66.83**	15.54	115.21**	17.23	105.92**	15.90
Person-level						
Gender	24.49	16.68	-1.35	18.25	3.53	17.75
Age	1.39	1.04	2.02*	1.01	-.35	.81
NA	2.86	14.54	7.95	12.76	11.97	13.16
Day-level						
Prob. solving	.96	4.03	3.66	4.70	6.41	5.62

Table 23 (*Continued*)

	Mentally active		Physically active		Both active	
	B	*SE B*	*B*	*SE B*	*B*	*SE B*
Intercept	64.91**	7.90	38.50**	6.11	50.68**	14.28
Person-level						
Gender	-7.57	9.38	1.30	7.59	-15.71	15.09
Age	.78	.58	-.65	.40	.09	.62
NA	14.01	9.02	-1.73	6.73	3.69	8.00
Day-level						
Physical demands	1.27	4.83	1.47	3.41	-1.00	4.62
Intercept	64.91**	7.90	38.50**	6.11	50.68**	14.28
Person-level						
Gender	-7.57	9.38	1.30	7.59	-15.70	15.09
Age	.78	.58	-.65	.40	.09	.62
NA	14.01	9.02	-1.73	6.73	3.69	8.00
Day-level						
Unpleasant work conditions	7.48	5.19	-2.18	3.11	-4.05	2.84

Table 23 (*Continued*)

	Passive		Self-oriented		Other-oriented	
	B	*SE B*	*B*	*SE B*	*B*	*SE B*
Intercept	66.84**	15.54	115.21**	17.23	105.92**	15.90
Person-level						
Gender	24.34	16.66	-1.50	18.25	3.60	17.75
Age	1.41	1.04	2.04*	1.01	-.36	.81
NA	3.01	14.52	8.12	12.75	11.90	13.17
Day-level						
Physical demands	-1.03	4.85	-1.52	4.39	2.53	5.54
Intercept	66.84**	15.54	115.21**	17.23	105.92**	15.90
Person-level						
Gender	24.34	16.66	-1.50	18.25	3.60	17.75
Age	1.41	1.04	2.04*	1.01	-.36	.81
NA	3.01	14.52	8.12	12.75	11.90	13.17
Day-level						
Unpleasant work conditions	-.30	4.35	1.53	5.85	-.53	5.86

Table 24

Multilevel Estimates for Models Predicting Detachment and Relaxation (Exploratory 1)

	Detachment		Relaxation	
	B	*SE B*	*B*	*SE B*
Intercept	3.38**	.18	3.31**	.21
Person-level				
Gender	.16	.19	-.04	.23
Age	.02	.01	.02*	.01
NA	-.19	.16	-.25	.18
Day-level				
Mentally active	-.002**	.00	-.00	.00
Intercept	3.40**	.18	3.30**	.22
Person-level				
Gender	.13	.19	-.02	.23
Age	.02	.01	.02*	.01
NA	-.23	.16	-.24	.18
Day-level				
Physically active	.00	.00	.00	.00
Intercept	3.40**	.18	3.32**	.21
Person-level				
Gender	.14	.20	-.04	.23
Age	.02	.01	.02*	.01
NA	-.22	.16	-.24	.18
Day-level				
Both active	.00	.00	.00	.00
Intercept	3.38**	.18	3.30**	.22
Person-level				
Gender	.15	.20	-.03	.23
Age	.02	.01	.02	.01
NA	-.26	.16	-.24	.17
Day-level				
Passive	.002**	.00	.002**	.00

Note. Hypothesis was tested separately by running models with one off-job activity at a time. NA = Negative trait affect.
*$p < .05$. **$p < .01$.

Table 24 (*Continued*)

	Detachment		Relaxation	
	B	*SE B*	*B*	*SE B*
Intercept	3.40**	.18	3.34**	.22
Person-level				
Gender	.14	.20	-.06	.23
Age	.02	.01	.02*	.01
NA	-.23	.16	-.27	.18
Day-level				
Self-oriented	.00	.00	.002**	.00
Intercept	3.37**	.18	3.31**	.21
Person-level				
Gender	.17	.19	-.04	.23
Age	.02*	.01	.02*	.01
NA	-.21	.16	-.25	.18
Day-level				
Other-oriented	-.00	.00	-.00	.00

Table 25

Categorization of Off-Job Activities with Examples of Each

Category	Examples
House work	Cleaning, cooking, doing the dishes, laundry, pay bill, groceries
Child care	Bathing, feeding, bedtime routine
School work supervision	Help child with school work, check homework
Dinner	All activities related to dinner except for cooking and cleaning
Shopping	All activities related to shopping except for groceries
Exercise	Run, swim, yoga
Leisure activities	Watching TV, reading, web browsing, going to the park
Work-related activities	Work-related email, catch up on work, preparing for a meeting
Social activities	Time with family, friends, and neighbors
Pet time	Walk with a pet, feed and clean up a pet/pet house

Table 26

Multilevel Estimates for Models Predicting Off-Job Activities (Exploratory 2)

	House work		Child care		School work supervision		Dinner		Shopping	
	B	*SE B*	*B*	*SE B*	*B*	*SE B*	*B*	*SE B*	*B*	*SE B*
Intercept	30.01**	4.65	31.98**	11.06	1.38	.94	15.11**	3.94	3.37**	1.05
Person-level										
Gender	18.77**	5.92	-3.98	11.36	2.17	1.36	-.86	4.25	2.07	1.44
Age	.79	.46	-1.76**	.32	.14	.09	-.30	.20	.21*	.09
NA	-.83	6.23	-3.25	4.61	.42	1.72	-3.71	3.32	2.32	1.83
Day-level										
Complexity	-5.52	3.62	.54	2.74	-.93	.62	.87	1.34	-.32	1.02
Intercept	30.64**	4.71	33.38**	12.01	1.38	.94	15.11**	3.94	3.15**	1.01
Person-level										
Gender	18.08**	5.98	-5.55	12.40	2.17	1.36	-.85	4.25	2.28	1.37
Age	.79	.47	-1.74**	.32	.14	.09	-.30	.20	.24*	.10
NA	-1.25	6.32	-2.97	4.57	.42	1.72	-3.71	3.32	2.15	1.85
Day-level										
Info. processing	-2.58	3.45	.42	1.82	.36	.42	4.18**	1.33	2.08	1.56
Intercept	30.46**	4.71	33.38**	12.01	1.38	.94	15.11**	3.94	3.19**	1.17
Person-level										
Gender	18.28**	5.99	-5.55	12.40	2.17	1.36	-.86	4.25	2.24	1.49
Age	.79	.47	-1.74**	.32	.14	.09	-.30	.20	.22*	.09
NA	-.90	6.31	-2.97	4.57	.42	1.72	-3.71	3.32	2.13	1.84
Day-level										
Prob. solving	1.33	3.06	2.10	2.38	-.36	.55	1.29	1.12	.11	1.45

Note. Hypothesis was tested separately by running models with one job characteristic at a time. NA = Negative trait affect.
*$p < .05$. **$p < .01$.

Table 26 (*Continued*)

	Exercise		Leisure activities		Work-related activities		Social activities		Pet time	
	B	*SE B*	*B*	*SE B*	*B*	*SE B*	*B*	*SE B*	*B*	*SE B*
Intercept	7.27**	2.66	84.13**	19.07	9.26*	4.46	10.39*	4.06	1.25	.84
Person-level										
Gender	.77	2.95	-30.34	19.53	5.93	5.38	-2.76	4.21	2.16*	1.03
Age	-.05	.17	1.13*	.53	.48	.37	.20	.17	.26*	.12
NA	-3.25	2.60	13.02	9.70	10.89*	4.86	-5.47*	2.13	-.44	1.78
Day-level										
Complexity	.32	1.01	2.82	2.79	3.86*	1.53	2.61	1.58	-.98*	.49
Intercept	7.27**	2.66	84.13**	19.07	9.26*	4.46	10.39*	4.06	1.25	.84
Person-level										
Gender	.77	2.95	-30.34	19.53	5.93	5.38	-2.76	4.20	2.16*	1.03
Age	-.05	.17	1.13*	.53	.48	.37	.20	.17	.26*	.12
NA	-3.25	2.60	13.02	9.70	10.89*	4.86	-5.47*	2.13	-.44	1.78
Day-level										
Info. processing	-.27	1.04	.41	2.67	.88	1.84	-.11	1.43	-.14	.41
Intercept	7.28**	2.66	84.13**	19.07	9.26*	4.46	10.39*	4.06	1.25	.84
Person-level										
Gender	.77	2.95	-30.34	19.53	5.93	5.38	-2.76	4.20	2.16*	1.03
Age	-.05	.17	1.13*	.53	.48	.37	.20	.17	.26*	.12
NA	-3.25	2.60	13.02	9.70	10.89*	4.86	-5.47*	2.13	-.44	1.78
Day-level										
Prob. solving	1.20	1.08	2.60	2.84	2.61*	1.27	1.09	1.55	-.14	.37

Table 26 (*Continued*)

	House work		Child care		School work supervision		Dinner		Shopping	
	B	*SE B*	*B*	*SE B*	*B*	*SE B*	*B*	*SE B*	*B*	*SE B*
Intercept	30.46**	4.70	33.38**	12.01	1.38	.94	15.30**	3.99	3.37**	1.05
Person-level										
Gender	18.32**	5.98	-5.59	12.40	2.17	1.36	-1.21	4.30	2.08	1.44
Age	.79	.47	-1.73**	.32	.14	.09	-.28	.19	.21*	.09
NA	-.94	6.31	-2.93	4.56	.42	1.72	-2.80	3.23	2.31	1.83
Day-level										
Physical demands	-2.83	3.98	4.43	3.01	-1.42	1.01	-.06	2.10	.12	1.06
Intercept	30.46**	4.70	33.38**	12.01	1.38	.94	15.38**	4.11	3.37**	1.05
Person-level										
Gender	18.32**	5.98	-5.59	12.40	2.17	1.36	-1.31	4.42	2.08	1.44
Age	.79	.47	-1.73**	.32	.14	.09	-.27	.19	.21*	.09
NA	-.94	6.31	-2.93	4.56	.42	1.72	-3.46	3.35	2.31	1.83
Day-level										
Unpleasant work conditions	3.03	3.68	-4.49	2.29	1.14	.94	1.13	2.37	-.91	1.36

Table 26 (*Continued*)

	Exercise		Leisure activities		Work-related activities		Social activities		Pet time	
	B	*SE B*	*B*	*SE B*	*B*	*SE B*	*B*	*SE B*	*B*	*SE B*
Intercept	7.28**	2.66	85.35**	18.48	9.26*	4.45	10.39*	4.06	1.25	.84
Person-level										
Gender	.80	2.95	-31.79	18.84	5.96	5.38	-2.74	4.21	2.16*	1.03
Age	-.06	.17	1.15*	.53	.47	.37	.19	.17	.26*	.12
NA	-3.28	2.60	12.47	9.56	10.86*	4.87	-5.49*	2.13	-.44	1.78
Day-level										
Physical demands	.22	1.10	1.74	4.65	1.34	2.31	-.69	2.36	-1.44*	.60
Intercept	7.32**	2.66	84.13**	19.07	10.16*	4.52	10.39*	4.06	1.53	.82
Person-level										
Gender	.75	2.93	-30.38	19.53	4.99	5.40	-2.75	4.21	1.84	1.00
Age	-.07	.17	1.13*	.53	.45	.36	.20	.17	.21	.12
NA	-3.62	2.59	13.05	9.70	10.17*	4.63	-5.49*	2.13	-.85	1.77
Day-level										
Unpleasant work conditions	1.00	.98	-1.30	3.09	5.28*	2.29	-2.44	2.04	-1.06	.74

Table 27

Multilevel Estimates for Models Predicting Detachment and Relaxation (Exploratory 2)

	Detachment		Relaxation	
	B	*SE B*	*B*	*SE B*
Intercept	3.40**	.18	3.31**	.21
Person-level				
Gender	.14	.20	-.04	.23
Age	.02	.01	.02*	.01
NA	-.23	.16	-.24	.18
Day-level				
House work	.00	.00	.00	.00
Intercept	3.40**	.18	3.31**	.21
Person-level				
Gender	.14	.20	-.04	.23
Age	.02	.01	.02*	.01
NA	-.23	.16	-.24	.18
Day-level				
Child care	.00	.00	.00	.00
Intercept	3.40**	.18	3.31**	.21
Person-level				
Gender	.14	.20	-.04	.23
Age	.02	.01	.02*	.01
NA	-.23	.16	-.24	.18
Day-level				
School work supervision	-.00	.00	.00	.00
Intercept	3.40**	.18	3.31**	.21
Person-level				
Gender	.14	.20	-.04	.23
Age	.02	.01	.02*	.01
NA	-.23	.16	-.25	.18
Day-level				
Dinner	.00	.00	.004*	.00

Note. Hypothesis was tested separately by running models with one off-job activity at a time. NA = Negative trait affect.
*$p < .05$. **$p < .01$.

Table 27 (*Continued)*

	Detachment		Relaxation	
	B	*SE B*	*B*	*SE B*
Intercept	3.40**	.18	3.31**	.21
Person-level				
Gender	.14	.20	-.04	.23
Age	.02	.01	.02*	.01
NA	-.23	.16	-.24	.18
Day-level				
Shopping	.00	.00	.00	.00
Intercept	3.40**	.18	3.31**	.21
Person-level				
Gender	.14	.20	-.04	.23
Age	.02	.01	.02*	.01
NA	-.23	.16	-.24	.18
Day-level				
Exercise	.00	.00	.005*	.00
Intercept	3.43**	.18	3.31**	.21
Person-level				
Gender	.10	.19	-.04	.23
Age	.02*	.01	.02*	.01
NA	-.20	.16	-.24	.18
Day-level				
Leisure activities	.002*	.00	.002*	.00
Intercept	3.40**	.18	3.31**	.21
Person-level				
Gender	.14	.20	-.04	.23
Age	.02	.01	.02*	.01
NA	-.22	.16	-.24	.18
Day-level				
Work-related activities	-.008*	.00	-.003*	.00

Table 27 (*Continued)*

	Detachment		Relaxation	
	B	*SE B*	*B*	*SE B*
Intercept	3.40**	.18	3.31**	.21
Person-level				
Gender	.14	.20	-.04	.23
Age	.02	.01	.02*	.01
NA	-.23	.16	-.24	.18
Day-level				
Social activities	.00	.00	.002*	.00
Intercept	3.40**	.18	3.31**	.21
Person-level				
Gender	.14	.20	-.04	.23
Age	.02	.01	.02*	.01
NA	-.23	.16	-.24	.18
Day-level				
Pet time	-.00	.00	.00	.00

Table 28

Multilevel Estimates for Models Predicting Detachment and Relaxation (Exploratory 3)

	Detachment		Relaxation	
	B	*SE B*	*B*	*SE B*
Intercept	3.40**	.17	3.30**	.22
Person-level				
Gender	.11	.19	-.06	.24
Age	.02	.01	.02*	.01
NA	-.23	.16	-.23	.17
Day-level				
Complexity	-.16**	.05	-.14*	.07
Intercept	3.40**	.17	3.32**	.23
Person-level				
Gender	.11	.19	-.08	.24
Age	.02	.01	.02	.01
NA	-.23	.16	-.24	.18
Day-level				
Info. processing	-.15**	.05	-.15*	.07
Intercept	3.41**	.17	3.32**	.22
Person-level				
Gender	.10	.19	-.07	.24
Age	.02	.01	.02*	.01
NA	-.21	.16	-.24	.18
Day-level				
Prob. solving	-.13*	.06	-.04	.07
Intercept	3.41**	.18	3.32**	.23
Person-level				
Gender	.10	.19	-.08	.24
Age	.02	.01	.02	.01
NA	-.23	.16	-.24	.18
Day-level				
Physical demands	-.01	.07	-.11	.07
Intercept	3.40**	.18	3.32**	.23
Person-level				
Gender	.11	.20	-.08	.24
Age	.02	.01	.02	.01
NA	-.21	.16	-.24	.18
Day-level				
Unpleasant work conditions	-.26**	.07	-.11	.07

Note. Hypothesis was tested separately by running models with one job characteristic at a time. NA = Negative trait affect.
*$p < .05$. **$p < .01$.

Chapter Four

Discussion

The objective of the current study was to broaden our understanding of recovery by examining various situational and individual factors that contribute to recovery. Using an experience sampling design, daily job characteristics and their interaction with trait guilt were investigated as predictors of off-job activities, which in turn were thought to relate to recovery experiences and well-being outcomes. This study represents an important expansion of the literature in that it captured the role of specific job characteristics in daily recovery, investigated both situational and individual factors as antecedents of recovery, and examined underlying attributes of off-job activities in relation to recovery experiences.

Main Findings

Job characteristics and off-job activities. Daily job characteristics reflect the degree of effort an employee exerted at work on a given day. Building on the effort-recovery model (Meijman & Mulder, 1998), I hypothesized that daily job characteristics would negatively relate to well-being outcomes after work, after controlling for morning levels of the well-being outcomes. Further, I proposed that daily job characteristics would relate to the choice of off-job activities based on the strength model of self-control (Muraven & Baumeister, 2000). Specifically, job characteristics were expected to negatively relate to active activities and positively relate to passive activities.

Regarding the relationship between daily job characteristics and well-being outcomes after work, hypotheses were not supported with the exception of job complexity. That is, on the workdays that involved complicated tasks, employees reported lower vitality and more physical symptoms at the end of the day. However, information processing, problem solving, physical demands, and unpleasant work conditions were not associated with the well-being indicators. Given that effort expenditure at work is known to result in negative consequences such as fatigue (Meijman & Mulder, 1998) and, demanding job tasks are thought to require a high degree of self regulation, which taxes resources (Hockey, 1997), the non-significant relationships between job characteristics and well-being indicators are perplexing. Several potential explanations exist for this result. First, daily job characteristics might have not been high enough to function as demands and have an impact on well-being. This could be particularly true for physical demands, considering that the majority of the participants held white-collar jobs. Second, although high levels of job complexity, information processing, problem solving, physical demands, and unpleasant work conditions were presumed to be effortful, it is possible that some job characteristics are regarded as challenging or interesting, which might have prevented or alleviated fatigue. For example, high levels of problem solving and information processing reflect that work involves enhanced cognitive ability (Morgeson & Humphrey, 2006), which is characteristic of jobs that are motivating and enriching (Campion, 1989). Lastly, previous research has demonstrated that recovery occurs in a work context (i.e., internal recovery; Taris et al., 2006; Trougakos, Beal, Green, & Weiss, 2008; Tucker, 2003). If participants had

opportunities for recovery during workdays, negative short-term reactions toward job demands might have been reversed before the end of workday.

Contrary to expectation, none of the daily job characteristics was a significant predictor of the time spent on various off-job activities. This suggests that daily job characteristics are not major determinants of individuals' decision about off-job activities. A study that examined the role of routines for off-job activities in the participation in leisure activities (Sonnentag & Jelden, 2009) might shed light on this finding. Routines for off-job activities refer to "the tendency to regularly pursue specific off-job activities at specific times or in specific contexts." It was found that individuals who have an established routine for off-job activities were more likely to spend time for an effortful off-job activity (sport activities) compared to those who do not have such a habit. Although this study did not investigate a wide variety of off-job activities, it raised an important point that some factors that are not day-specific play a key role in the choice of daily off-job activities. Taken together with the results of the current study, future research is warranted to understand how individuals' habitual responses as well as daily experiences influence decisions related to off-job activities.

Off-job activities and recovery experiences. Previous research on the relationship between off-job activities and recovery experiences has yielded inconsistent findings (e.g., Rook & Zijlstra, 2006; Sonnentag, 2001; Sonnentag & Bayer, 2005; Sonnentag & Natter, 2004). The present study examined underlying attributes of off-job activities to understand which off-job activities contribute to recovery. That is, participants evaluated each activity along with the dimensions of engagement and beneficiary based on the expectation that subjective experience of an activity that differs

across individuals might help elucidate the relationship between off-job activities and recovery. On the one hand, I hypothesized that active activities and self-oriented activities would promote recovery by facilitating psychological detachment and relaxation, respectively. On the other hand, I hypothesized that passive activities and other-oriented activities would hinder recovery by inhibiting psychological detachment and relaxation, respectively.

The results for the relationship between off-job activities and psychological detachment did not support the hypotheses. First, active activities, particularly mentally-active activities, negatively related to psychological detachment. A closer look at the qualitative description of mentally-active activities revealed that the majority of activities in this category were work-related activities, which lends support for the notion that work-related activities do not allow individuals to distance themselves from work (for a review, see Sonnentag, 2012). Interestingly, this negative relationship was found not only when mentally-active activities were perceived as other-oriented but also when they were considered as self-oriented. This suggests that even if an individual appraises work-related activities as self-oriented, engaging in such activities during leisure time can be detrimental because it hinders psychological detachment. Next, passive activities had a positive relationship with psychological detachment when they were self-oriented, which is contrary to my prediction that passive activities would fail to occupy individuals' attention, and therefore, allow individuals to think about their work. This positive relationship suggests that passive activities do not necessarily relate to boredom (cf., Iso-Ahola, 1997) and can help individuals to mentally switch off from work. Indeed, the most frequently reported passive self-oriented activity was 'watching TV', which is arguably

an engrossing activity. Further, the finding that passive activities facilitated psychological detachment only when they were self-oriented provides further insight as to why low-effort activities contribute to recovery. That is, passive activities that individuals engage in for their own sake promote recovery not only by not putting further demands on individuals (Rook & Zijlstra, 2006; Sonnentag, 2001; Sonnentag & Zijlstra, 2006) but also by helping them forget about their work during off-job time.

Regarding the relationship between off-job activities and relaxation, findings generally did not support hypotheses in that most off-job activities did not have a significant relationship with relaxation. An exception was a positive relationship between passive self-oriented activities and relaxation, which bolsters previous finding that activities that do not further draw on individuals' resources promote recovery (Rook & Zijlstra, 2006; Sonnentag, 2001; Sonnentag & Zijlstra, 2006). The results from the present study provide a more nuanced look at the role of passive activities in recovery such that the benefit of passive activities might differ depending on the beneficiary of the activities. Off-job activities that are carried out for others, even if it involves low-effort, might function as demands and inhibit relaxation.

Recovery experiences and well-being. Recovery experiences are psychological attributes that help employees recover from work (Sonnentag & Fritz, 2007). Psychological detachment reflects that individuals had opportunities to forget about their work, which allow them to unwind from work and restore resources that have been depleted while working (Sonnentag, 2012). Relaxation is a state of low activation accompanied with positive affect (Stone et al., 1995), which has been thought to promote recovery by preventing prolonged activation of individuals' functional systems and

negating adverse effects of negative emotions (Sonnentag & Fritz, 2007). Based on this notion and past research findings (Fritz & Sonnentag, 2006; Sonnentag, Binnewies, & Mojza, 2010; Sonnentag, Binnewies, & Mojza, 2008), I hypothesized that recovery experiences would relate to positive health outcomes at bedtime and in the next morning.

The results were consistent with the hypotheses such that both psychological detachment and relaxation were significantly associated with higher vitality and fewer physical symptoms at bedtime. This finding is in line with past research that has documented numerous gains from recovery experiences (e.g., Binnewies, Sonnentag, & Mojza, 2010; Fritz, Sonnentag, Spector, & McInroe, 2010; Fritz, Yankelevich, Zarubin, & Barger, 2010). Importantly, psychological detachment related to better sleep quality and higher vitality in the next morning. Likewise, relaxation had significant relationships with physical symptoms as well as with sleep quality and vitality in the next morning, all in the expected direction. These results underscore that the benefits of having some distance from work and being relaxed during off-job time last until the next morning, which corroborate previous research on psychological detachment and relaxation in relation to affective experiences in the next morning (Sonnentag, Binneewies, & Mojza, 2008). Taken together, recovery experiences play a significant role in employee health and well-being.

Trait guilt as a moderator. Trait guilt is a predisposition to experience guilt about personal failure (Tangney, 1990). Trait guilt is an individual difference in that people differ in their capacity to experience guilt (Leith & Baumeister, 1998; Tangney, 1990). Based on previous research demonstrating that guilt serves a corrective function by motivating individuals to monitor their behaviors and to engage in corrective actions

(Baumeister et al., 1994), it was hypothesized that trait guilt would moderate the link between daily job characteristics and off-job activities.

A significant interaction was observed in five cases, of which two are in the proposed direction. First, positive relationship between information processing and passive self-oriented activities was weaker for individuals higher on trait guilt than for those lower on trait guilt. Second, negative relationship between job complexity and physically active other-oriented activities was weaker among individuals higher on trait guilt than for those lower on trait guilt. Thus, on workdays that involved high levels of knowledge characteristics, employees lower on trait guilt spent more time for themselves engaging in low-effort activities and spent less time for others whereas the time spent on both activities did not change among more guilt-prone individuals.

Several significant interactions observed between trait guilt and contextual job characteristics were not in the expected direction. First, a positive relationship was found between unpleasant work conditions and mentally active self-oriented activities and it was stronger for those lower on trait guilt than for those higher on trait guilt. Next, a positive relationship between daily physical demands and passive self-oriented activities was stronger among individuals higher on trait guilt than for those lower on trait guilt. Lastly, positive relationship between daily physical demands and other-oriented activities that are both mentally and physically active was stronger among individuals lower on trait guilt than among those higher on trait guilt. These findings are puzzling in that the expected relationship patterns among employees higher on trait guilt were reported from individuals lower on trait guilt. One potential explanation for this finding comes from looking at guilt proneness via the lens of self-regulation. Guilt proneness is characterized

by anticipating a bad feeling about committing transgressions and is associated with empathy and perspective taking (Cohen, Panter, & Turan, 2012a; Tangney & Dearing, 2002). Perhaps thinking about the negative consequences of one's behavior and being considerate toward others involves self-regulation, which is known to consume individuals' resources and make subsequent self-regulatory tasks more strenuous (Baumeister et al., 2007; Muraven & Baumeister, 2000). That is, while being motivated to engage in corrective actions, individuals higher on trait guilt might find it difficult to carry out those intended behaviors after workdays that involved higher physical demands. More research is needed to elucidate various behavioral patterns that are instigated by trait guilt.

In many cases, the proposed interaction between job characteristics and trait guilt was not significant. There are several potential explanations for the null findings. First, it could be that off-job activities that people engage in on an everyday basis are not necessarily guilt-driven, which might have resulted in the invariant job characteristic—off-job activities links across individuals who are higher versus lower on trait guilt. Behaviors that were studied in previous research on the corrective function of guilt tend to be moral behaviors (e.g., cheating, delinquent offenses, counterproductive work behavior; Cohen, Panter, & Turan, 2012b; Stuewig & McCloskey, 2005), which are behaviors that individuals engage in accordance with standards of right and wrong. Based on the current study, it seems that the motivating force of trait guilt differs depending on the type of behaviors. Second, some researchers have suggested that guilt proneness consists of two facets (Cohen, Wolf, Panter, & Insko, 2001; Tangney, Dearing, Wagner, & Gramzow, 2000): regret and negative behavior evaluation (e.g., "I feel remorse and

uncomfortable for my mistake") and repair action tendency (e.g., "I will apologize"). Although the measure of trait guilt used in the current study did not differentiate these two facets, it is conceptually closer to regret and negative behavior evaluation because it measures the frequency of guilt feelings. It might be that repair action tendency predicts individuals' behavior better because it reflects individuals' willingness to do the right deeds and avoid committing bad behaviors. Lastly, inspection of the descriptive statistics for trait guilt revealed that the mean and standard deviation were quite small in size (M = 1.88; SD = .60), which suggests that individuals who were labeled as 'higher on trait guilt' might have been not necessarily high on this variable. Thus, the comparison of those higher versus lower on trait guilt in the current study might have been inadequate.

Exploratory analyses. Results from the exploratory analyses provided supplementary information that helps better understand the role of job characteristics and off-job activities in recovery. First, generally speaking, time spent on off-job activities, regardless of how the activities were measured, does not seem to vary as a function of daily job characteristics. Findings with regard to off-job activities based on a single attribute corroborated results from the hypotheses testing such that daily job characteristics do not predict time spent on various off-job activities. Also, when grouped into objective categories, only a few off-job activities demonstrated significant relationships with job characteristics.

Second, several objective categories of off-job activities demonstrated a significant relationship with recovery experiences. On the one hand, work-related activities were found to hurt recovery in that it negatively related to both psychological detachment and relaxation. The harm of engaging in work-related activities during leisure

time has been shown in previous research on psychological detachment (e.g., Park, Fritz, & Jex, 2011; Sonnentag & Bayer, 2005). The current study demonstrates that lack of relaxation is an additional route that work-related activities prevent recovery. On the other hand, a number of activities including leisure activities, exercise, social activities, and dinner were conducive to recovery. Given that these activities belong to various categories, it is unclear what characteristics are shared across these activities that might have contributed to recovery. One potential attribute that underlies these activities might be the experience of positive emotion. For instance, previous research has demonstrated that the amount of pleasure associated with various off-job activities related to lower levels of fatigue at bedtime, reflecting beneficial effects of enjoyable activities on recovery (van Hooff, Geurts, Beckers, & Kompier, 2011). More research is necessary to understand subjective experiences of off-job activities in relation to recovery.

Lastly, all job characteristics negatively related to psychological detachment and two knowledge characteristics negatively related to relaxation. Taken the non-significant relationships between job characteristics and off-job activities into consideration, these results suggest that daily work experiences do play an important role in recovery from work although the participation in off-job activities is not the mechanism that explains the relationship between job characteristics and recovery experiences. As the first study that investigates specific job characteristics in relation to recovery, the current study opens the door to further research to learn ways that job characteristics relate to recovery experiences.

Theoretical Implications

The findings of the present study have several theoretical implications. First, this study provides additional information regarding the effort-recovery model (Meijman & Mulder, 1998). One of the core propositions of the effort-recovery model is that expending effort at work depletes individuals' resources and produces short-term negative consequences. The current study expands the scope of occupational characteristics that function as work demands by showing that high levels of job complexity consume individuals' resource as reflected in lower vitality after work. Further, results of this study suggest that the types and degrees of demands put on individuals may vary across various job characteristics because the link between job characteristics and well-being indicators after work was not universal.

The effort-recovery model (Meijman & Mulder, 1998) also posits that recovery is a process that undoes the harmful effects of work and allows individuals to recharge their resources. Building on this idea, Sonnentag and Fritz (2007) argued that psychological attributes that underlie various off-job activities, such as psychological detachment and relaxation, play a critical role in recovery. The current study confirmed these notions such that psychological detachment and relaxation contribute to employee well-being. Further, findings that psychological detachment from work and relaxation are associated with fewer physical symptoms broaden our understanding of the benefits of recovery experiences given that well-being outcomes studied in previous research tend to be psychological in nature (e.g., positive affect, life satisfaction; for an exception see Fritz & Sonnentag, 2005).

Second, the present study found that job characteristics are antecedents of recovery experiences. Most studies about the role of occupational factors in recovery have focused on job stressors (e.g., Mojza & Sonnentag, 2010; Sonnentag, 2001; Sonnentag & Zijlstra, 2006), which have provided limited knowledge on the link between occupational characteristics and recovery. Findings in the present study suggest that daily fluctuation of job characteristics matter for recovery such that employees experience difficulty to psychologically detach from work and relax on the workdays that involve higher levels of job complexity, information processing, problem solving, physical demands, and unpleasant work conditions. Researchers have theorized that high workload inhibits psychological detachment for various reasons (e.g., Sonnentag, 2012). For example, it is likely that employees who experience time pressure think about their work during off-job time because of unfinished tasks on that day. Or, employees may attempt to have themselves ready for the next workday so that they can better deal with demands. The current study demonstrates that this explanation may also be applicable to the relationships of recovery experiences with various job characteristics beyond job demands and stressors. Furthermore, high levels of job complexity, information processing, problem solving, physical demands, and unpleasant work conditions seem to increase level of arousal, which might have made it difficult for employees to relax during the evening.

Third, the present study provides insight about the motivational force of trait guilt. Although hypotheses regarding the moderating role of trait guilt in the relationship between daily job characteristics and off-job activities were generally not supported, the current study raises an important question as to what kinds of activities are driven by

guilt. The comparison of activities that were investigated in previous research (e.g., Cohen, Panter, & Turan, 2012b; Stuewig & McCloskey, 2005) versus this study seems to suggest that trait guilt motivates individuals to engage in only certain types of activities. Future researchers would benefit from considering the types and meanings of various activities when investigating trait guilt as a motivational construct.

Finally, this study contributes to the recovery literature with a unique measure of off-job activities. Notably, subjective experience of the activities differed across individuals such that the same activity was evaluated as active versus passive or as self-oriented versus other-oriented. Thus, the current study highlights that it cannot be assumed that there are universal recovery-facilitating activities and recovery-inhibiting activities. Given that the majority of past research that has yielded inconsistent findings with regard to the role of off-job activities in recovery has measured objective categories of activities only (e.g., Ragsdale et al., 2011; Sonnentag, 2001; Sonnentag & Natter, 2004; Sonnentag & Zijlstra, 2006), the current results suggest that including personal evaluation of off-job activities on different dimensions (e.g., the required energy level, beneficiary, pleasure, etc.) might help clarify which activities are conducive to recovery.

Practical Implications

The current study provides practical implications as well. The links between job characteristics and recovery experiences suggest that redesigning jobs that involve high levels of job complexity, information processing, problem solving, physical demands, and unpleasant work conditions would facilitate employees' recovery. Doing so is expected to contribute to employee health given that recovery experiences in turn related to well-being indicators in the next morning as well as in the evening. Job redesign would be

beneficial for organizations as well because employees' mood at the beginning of a workday has been shown to be important for their performance at work (Rothbard & Wilk, 2011). Potential solutions at the organizational level include assigning job tasks that match employees' capability, training employees so that they acquire necessary knowledge and skills for job tasks, and providing a supportive work environment. At the individual level, employees are advised to be aware of job tasks that are complex, require much information processing or problem solving, or involve physical demands.

The results also suggest that certain activities should be avoided during off-job time whereas others should be pursued in the interest of maximizing benefits of recovery. On the one hand, work-related activities are detrimental for recovery. While this is consistent with previous research (Park, Fritz, & Jex, 2011; Sonnentag, 2001; Sonnentag & Bayer, 2005), findings in the current study are striking in the sense that work-related activities inhibited psychological detachment even when perceived as a self-oriented activity. Thus, no matter how an employee appraises it, engaging in work-related activities hurts their well-being by taking away opportunities to switch off from work. On the other hand, passive self-oriented activities, but not passive other-oriented activities, appeared to be helpful for employees to psychologically detach from work and relax. Therefore, employees might want to spend some time doing self-oriented activities that require low effort as a strategy to facilitate daily recovery. Taken together, findings in the current study recommend employees to be mindful about how they spend their off-job time.

Limitations

Several limitations of this study should be mentioned. The first limitation concerns the sample. The majority of the participants were highly educated, held white-collar jobs, and had a high household income. These features of the sample limit the generalizability of the results in that the degree that job characteristics fluctuate across workdays might differ across a wide range of jobs. For example, daily job complexity or problem solving could vary to a greater extent among employees in the service industry because these characteristics might change as a function of the types of customers that they encounter. Also, past research demonstrated that the patterns of leisure time use differ depending on individuals' education and income levels such that those with higher education and income tend to spend more time on active activities and less time on inactive activities (Berry, 2007; Kaleta & Jegier, 2007). Therefore, results of the current study might not be representative of the larger population.

The second limitation involves the measure of off-job activities that was developed for the present study. Although the measure provided rich information regarding various off-job activities and subjective experience of the activities by allowing participants to freely list activities that they engaged, lack of structure might have made it difficult for them to report all activities that they did. Also, the measure forced participants to put each activity to one category on the beneficiary dimension such that an activity must be either self-oriented or other-oriented. Some activities such as taking a walk with a child in the park, however, could serve the needs of the self as well as others. Lastly, the measure assessed two dimensions of the psychological attributes of off-job activities but there are multiple dimensions along which activities could differ. Given

little support found for hypotheses that involve off-job activities in this study, future research that incorporates various dimensions of off-job activities is warranted to illuminate the function of subjective experiences during off-job time in recovery.

Future Directions

Findings of the current study point out a number of interesting ideas for future research. First, more research on job characteristics and their potential for recovery is necessary. To understand the role of job characteristics in recovery is important given that previous research has shown that recovery occurs during the workday (Geurts & Sonnentag, 2006; Trougakos et al., 2008; Tucker, 2003). That is, certain job characteristics might facilitate recovery throughout the workday while other characteristics inhibit recovery. Relatedly, research that simultaneously examines internal and external recovery is needed to gain a more comprehensive picture of recovery from work. For example, it is possible that internal and external recovery has an interactive effect such that external recovery is maximized when a job allows opportunities for internal recovery.

Another important area for future research is the relationship between recovery and performance outcomes. Performance outcomes are relevant to recovery in the sense that employees perform sub-optimally as a result of insufficient recovery (Binnewies, Sonnentag, & Mojza, 2010; Fritz & Sonnentag, 2005). Alternatively, it has been argued that employees may engage in a proactive management of their resources such that they choose to exert less effort for job tasks or use less efficient strategies in order to protect their resources (Hockey, 1997). Findings of the current study that high levels of daily information processing, problem solving, physical demands, and unpleasant work

conditions do not relate to lower vitality and more physical symptoms at the end of workday suggest that employees might have used such tactics at the expense of reduced level of performance. In light of the results from the present study, future research should examine the dynamic relationship among recovery, health outcomes, and performance outcomes.

A third avenue for future research involves explanatory mechanisms among variables that were investigated in the current study. For instance, the results of this study suggest that while job characteristics relate to recovery experience in the evening, the link is not explained by participation in various off-job activities. Building on this finding, it would be fruitful to investigate other mechanisms that bridge job characteristics and recovery experiences. Past recovery research suggested that job stressors (e.g., time pressure, high workload) are detrimental for psychological detachment because employees are likely to have job tasks that are not completed, which invoke thoughts about work during off-job time (Sonnentag, 2012). High levels of job complexity, information processing, problem solving, physical demands, and unpleasant work conditions might also make it difficult for employees to finish tasks on time, which in turn increase the likelihood to engage in work-related activities or to think about unfinished tasks during the evening. Future research is warranted to clarify how and why high levels of daily job characteristics hurt recovery from work.

Similarly, further research is needed to better understand the relationship between recovery experiences and well-being outcomes. Whereas numerous studies have demonstrated the benefits of recovery experiences for employee health and well-being (Fritz & Sonnentag, 2006; Sonnentag & Fritz, 2007; Sonnentag, Binnewies, & Mojza,

2008; Sonnentag, Binnewies, & Mojza, 2010), research that depicts how recovery experiences contribute to health outcomes is rare. A recent study shows that eating behavior is one potential route through which psychological detachment relates to health (Cropley, Michalianou, Pravettoni, & Millward, 2011). Specifically, individuals who engaged in work-related rumination reported that they ate more unhealthy food compared with those who did not ruminate. Considering a solid body of literature on various behaviors that contribute to health (e.g., exercise, smoking, etc.; McGinnis, Shopland, & Brown, 1987; Penedo & Dahn, 2005), researchers are encouraged to conduct more research to understand behavioral pathways that link recovery experiences and health outcomes.

Finally, the role of other individuals (e.g., partner, family members, coworkers, and supervisor) in employee recovery deserves more attention. With the recognition that employee recovery is not entirely under the employee's discretion, recent studies have investigated how close individuals influence employee recovery (e.g., Hahn, Binnewies, & Haun, 2012; Hahn & Dormann, 2013). One way to extend the current study to better understand crossover recovery effects is to examine the off-job activities of members of dual-earner couples. For example, high levels of job complexity or problem solving that Person A experiences may require him to spend more time on work-related activities and less time on household activities, which in turn requires his partner to spend more time on household activities. To the extent that the partner finds household activities effortful, Person A's job characteristics would inhibit the partner's recovery.

Conclusion

The objective of the current study was to expand our knowledge of recovery by examining situational and individual predictors of recovery. Furthermore, psychological attributes of off-job activities were examined to gain in-depth understanding on the role of activities in recovery. The results from the study suggest that daily job characteristics of job complexity, information processing, problem solving, physical demands, and work conditions play a critical role in recovery. Specifically, the job characteristics directly relate to recovery experiences of psychological detachment and relaxation rather than having associations with the choice of off-job activities. With regard to subjective experiences of off-job activities, findings demonstrated considerable variance across individuals. These findings call into question the common practice in the literature of only assessing objective categories of off-job activities. Further, psychological attributes of off-job activities were found to relate to recovery experiences although the results were not always consistent with expectation. Next, little support was found for the moderating role of trait guilt in the relationship between job characteristics and off-job activities, calling for future research on the boundary conditions that trait guilt motivates behaviors. Finally, evidence was found for the benefits of recovery experiences, which reinforces previous research. In conclusion, this study contributes to the literature by adopting a broader conceptualization of job characteristics and providing a more nuanced look at the role of off-job activities in recovery.

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Appendices

Appendix A: Negative Trait Affect Scale Items

Instruction: Please indicate to what extent you feel this way *in general, that is, on the average.*

1. Scared
2. Nervous
3. Jittery
4. Ashamed
5. Afraid
6. Irritable
7. Hostile
8. Upset
9. Distressed
10. Tired
11. Sleepy

5-point scale from 1 (*Very slightly or not at all*) to 5 (*Extremely*).

* Watson & Clark (1994).

Appendix B: Trait Guilt Scale Items

Instruction: Please indicate how *common* the following feeling is for you.

1. Mild guilt
2. Worry about hurting or injuring someone
3. Intense guilt
4. Regret
5. Remorse
6. Feeling you deserve criticism for what you did

5-point scale from 0 (*Never experience the feeling*) to 4 (*Experience the feeling continuously or almost continuously*).

*Harder, D. W., & Zalma, A. (1990).

Appendix C: Job Characteristics

Instructions: Please indicate the degree to which you agree with the following statements.

1) Job complexity

The job requires that I only do one task or activity at a time.
The tasks on the job are simple and uncomplicated.
The job comprises relatively uncomplicated tasks.
The job involves performing relatively simple tasks.

2) Information processing

The job requires me to monitor a great deal of information.
The job requires that I engage in a large amount of thinking.
The job requires me to keep track of more than one thing at a time.
The job requires me to analyze a lot of information.

3) Problem solving

The job involves solving problems that have no obvious correct answer.
The job requires me to be creative.
The job often involves dealing with problems that I have not met before.
The job requires unique ideas or solutions to problems.

4) Physical demands

The job requires a great deal of muscular endurance.
The job requires a great deal of muscular strength.
The job requires a lot of physical effort.

5) Work conditions

The work place is free from excessive noise.
The climate at work place is comfortable in terms of temperature and humidity.
The job takes place in an environment free from health hazards (e.g., chemicals, fumes, etc.).
The job occurs in a clean environment.

5-point scale from 1 (*Strongly disagree*) to 5 (*Strongly agree*).

*Morgeson, F. P., & Humphrey, S. E. (2006).

Appendix D: Off-Job Activities

Instructions: Please think about activities that you did *today after work*. We are interested in four different types of activity. Definitions and examples of each are provided below.

- **Active and self-oriented activities**: These are activities that you primarily do for yourself that require cognitive and/or physical engagement. Examples include but are not limited to exercise or a cognitively engaging hobby.

- **Active and other-oriented activities**: These are activities that you primarily do for others that involve cognitive and/or physical engagement. Examples include but are not limited to helping a child with homework or driving a dependent to a meeting/practice.

- **Passive and self-oriented activities**: These are activities that you primarily do for yourself that require minimal physical or cognitive effort. Examples include but are not limited to watching TV show you enjoy or reading a book for pleasure.

- **Passive and other-oriented activities**: These are activities that you primarily do for others that require minimal physical or cognitive effort. Examples include but are not limited to folding the family laundry or watching a dependent's activity while not engaged in the activity yourself.

Write the activities that you did according to their characteristics and indicate the amount of time spent on each activity based on the following increments.

Here is an example.

0 – 15 mins	15 – 30 mins	30 – 45 mins	45 – 60 mins	1 – 1.5 hrs	1.5 – 2 hrs	2 – 2.5 hrs	2.5 – 3 hrs	3 – 4 hrs	4 or more hrs
EXAMPLE		Active				Passive			
Self-oriented		Exercise (Time: 30 – 45 mins)				Watching TV (Time: 1 – 1.5 hrs)			
Other-oriented		Helping child with homework (Time: 0 – 15 mins)				Folding the family laundry (Time: 15 – 30 mins)			

Appendix E: Recovery Experience

Instructions: Please indicate the degree to which you agree with the following statements based on how you feel *right now*.

Psychological detachment

1. I have forgotten about work.
2. I am not thinking about work at all.
3. I have some distance between myself and my work.
4. I have taken a break from the demands of work.

5-point scale from 1 (*Strongly disagree*) to 5 (*Strongly agree*).

*Sonnentag, S., & Fritz, C. (2007).

Instructions: Please respond to each of the following statements in terms of how you feel *right now*.

Relaxation

1. I feel rested and refreshed.
2. I feel at ease.
3. I feel at peace.
4. I feel carefree.
5. I am happy.
6. I feel joyful.
7. My mind is silent and calm.
8. My mind is quiet and still.

6-point scale from 1 (*Not at all*) to 6 (*Maximum*).

*Smith, J. C. (2001).

Appendix F: Vitality

Instructions: Please respond to each of the following statements in terms of how you are feeling *right now*.

1. At this moment, I feel alive and vital.
2. At this time, I have energy and spirit.
3. I feel energized right now.

7-point scale from 1 (*Not at all true*) to 4 (*Somewhat true*) to 7 (*Very true*).

*Ryan, R. M., & Frederick, C. M. (1997).

Appendix G: Physical Symptoms

Instructions: Do you have any of the following symptoms *right now*? Please indicate "Yes" or "No".

1. Upset stomach or nausea
2. Backache
3. Headache
4. Acid indigestion or heartburn
5. Diarrhea
6. Stomach cramps (non-menstrual)
7. Loss of appetite
8. Shortness of breath/difficulty breathing
9. Dizziness
10. Chest pain
11. Flu or cold symptoms (fever, sore throat, chills)
12. Muscle pain

*Larsen, R. J., & Kasimatis, M. (1991).

Appendix H: Sleep Quality

Instructions: Please indicate the degree to which you agree with the following statements.

1. I feel that I slept poorly last night.
2. I felt tired after waking up this morning.
3. I feel that I didn't get enough sleep last night.
4. I got up in the middle of the night.
5. I had trouble falling asleep last night.
6. After I woke up last night, I had trouble falling asleep again.
7. I tossed and turned all night last night.

5-point scale from 1 (*Strongly disagree*) to 5 (*Strongly agree*).

*Meijman, T. F., de Vries-Griever, A. H., & de Vries, G. (1988).

About the Author

Eunae Cho received a Bachelor's Degree in Psychology from Yonsei University, Seoul, Korea, in 2007 and a Master's Degree in Psychology from University of South Florida in 2010. Her research interests are employee health and well-being with a particular focus on the area of work and family. She has been coauthored articles in top-tier industrial and organizational psychology journals, including Personnel Psychology, Human Performance, and Journal of Vocational Behavior. She has also presented at several professional conferences, including the Society for Industrial and Organizational Psychology, Academy of Management, and Work, Stress, and Health.