Examining Employee Needs at Work and Home:

A Self-Determination Theory Perspective

by

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Abstract

This research study utilizes self-determination theory (SDT; Deci & Ryan, 1985, 2000) to examine employees' daily need satisfaction for autonomy, competence, and relatedness in work and nonwork domains and their association with work outcomes. Specifically, daily work-related need satisfaction and need frustration are theorized to represent resource-rich and resource-depleted states within employees that are associated with cognitive engagement or disengagement with work during nonwork time (i.e., psychological detachment, positive work reflection, negative work reflection), and subsequent next day work engagement and exhaustion. Furthermore, previous research indicates that need satisfaction and frustration exist in multiple life domains (Milyavskaya et al., 2009; Milyavskaya & Koestner, 2011). Daily experiences of need satisfaction and frustration are therefore examined in both work and nonwork domains. Participants recruited from a technology company located in the Pacific Northwest took part in a 2-week daily diary design consisting of 7 study days. Multilevel correlation analyses from a sample of forty individuals (N_{obs} = 225) demonstrated that only some unique components of need satisfaction and frustration at work were significantly related to positive and negative work reflection at the within-person level, providing only minimal support for the hypothesized relations. Specifically, work-related need satisfaction, and particularly work-related need satisfaction of competence, were positively related to positive work reflection. Work-related need frustration of competence and relatedness were positively linked to negative work reflection in the evening. Daily need satisfaction and frustration, as well as cognitive engagement and

disengagement with work during nonwork time, were both unrelated to next day work engagement and exhaustion. Low response rates and insufficient statistical power prevented analysis of more complex structural models. Given the methodological and statistical limitations of this research, a set of future research propositions are described. Additional results, as well as practical and theoretical implications, limitations, and future directions are discussed. This research contributes to a growing area of organizational research rooted in SDT, specifically by considering needs across life domains, providing initial findings, and proposing alternative models to explain interactions of needs across life domains.

Dedication

I dedicate my dissertation work to my parents. To my mom, Beth, for always knowing what to say and for sending words of encouragement and love at exactly the right time. To my dad, Doug, for just listening (even when you want to solve), being genuinely excited about my research, and always pointing out the positive. Beth and Doug are both incredible parents who, together, have inspired and cultivated my love of learning and my desire to benefit and serve those around me.

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Chapter 1: Introduction

As the area of positive organizational scholarship has grown, organizational research has focused more heavily on employees' optimal functioning, positive experiences at work, and experiences that enhance quality of life (Cameron & Spreitzer, 2012; Luthans, 2002; Seligman & Csikzentmihalyi, 2000). To achieve optimal functioning and life satisfaction, research must consider the fact that employees function in multiple life domains (Allen & Martin, 2017; Bakker et al., 2014; Edwards & Rothbard, 2000; Sonnentag, 2015). Individuals are not confined solely to experiences in the workplace but have experiences in both work and nonwork domains that shape their daily functioning. Specifically, individuals have both fulfilling and frustrating experiences at work, in social contexts, during recreational activities, while volunteering, and at home (Milyavskaya et al., 2009; Milyavskaya & Koestner, 2011). Daily experiences during nonwork time are linked to work-related well-being and performance the next day and over time (Edwards & Rothbard, 2000; Sonnentag et al., 2017). It is therefore important for organizations to concern themselves with employees' nonwork lives and how they can facilitate experiences that fulfill employees' needs, promote well-being and engagement, and prevent burnout.

According to self-determination theory (SDT; Deci & Ryan, 2000; Ryan & Deci, 2000), the key nutriments for well-being are satisfying humans' universal needs for autonomy, competence, and relatedness (Gagné & Deci, 2005; Ryan et al., 1996). Need satisfaction facilitates individual growth, internalization, intrinsic motivation, and optimal functioning, thereby providing a helpful method for organizing and interpreting ways by

which organizations can support performance and psychological adjustment at work. Work-related need satisfaction and frustration are appealing concepts within organizational research because they allow researchers and practitioners to delineate aspects of the organizational context that are linked to positive or negative employee outcomes (Baard et al., 2004). However, individuals also have experiences during their nonwork time that can contribute to need satisfaction or frustration (Deci et al., 2017; Van den Broeck et al., 2016). It is therefore important to consider needs in work and nonwork domains and whether nonwork-related need satisfaction and frustration are associated with work outcomes.

While several studies have considered nonwork processes, work engagement, and exhaustion in the context of SDT (Bakker & Oerlemans, 2019; Trépanier et al., 2015), several gaps remain. This research seeks to fill these gaps in three ways. First, most organizational research that has utilized SDT has only considered need satisfaction in one life domain, failing to consider work- *and* nonwork-related needs. The present research captures needs in both life domains and delineates associations among needs in multiple life domains. Specifically, the direct associations between daily need satisfaction and frustration in work and nonwork domains are examined, in addition to ways in which they relate to nonwork cognitive processes and next day work outcomes. The present study provides initial insight into the importance of organizations fulfilling employees' psychological needs and how that fulfillment relates to employees' needs and cognitive processes during nonwork time.

Second, the hypothesized associations capture need satisfaction (i.e., the extent to which psychological needs are fulfilled) *and* need frustration (i.e., the extent to which psychological needs are thwarted; Deci & Ryan, 2000; Gagné & Deci, 2005). Past organizational research based on SDT has frequently considered only need satisfaction. While research demonstrates a link between lower need satisfaction and reduced well-being, need satisfaction does not substantially account for variance in strain or negative forms of well-being (e.g., fatigue, exhaustion; Van den Broeck et al., 2016). This indicates that a lack of need satisfaction does not necessarily equate to actively thwarted needs (Deci et al., 2017; Van den Broeck et al., 2016). Reviews on SDT-based organizational research have emphasized the importance of considering both need satisfaction and need frustration because they are unique constructs linked to different psychological processes or reactions (Bidee et al., 2016; Gagné & Deci, 2005). For example, need satisfaction may be more closely related to positive outcomes, such as improved work engagement and performance, while need frustration may be linked to negative outcomes, such as burnout and turnover. The present research hypothesizes relationships between need satisfaction and positively valanced outcomes, as well as relationships between need frustration and negatively valanced outcomes.

Third, past research has focused on the combination of autonomy and competence needs because they are theoretically more proximal to motivational processes (Deci & Ryan, 2000; Vallerand, 2000). Relatedness is viewed as a more distal need but has been argued to play an important role in social contexts (Vallerand, 2000). The present research therefore examines all three needs. Further, scores of the three needs are

commonly aggregated to represent general need satisfaction (Mojza et al., 2011; Van den Broeck et al., 2008; 2010; van Hooff & van Hooft, 2016). While this approach is theoretically and psychometrically sound, it fails to recognize the unique variance in need-related outcomes that are explained by specific needs. Hypotheses are tested utilizing a combined score of autonomy, competence, and relatedness for both need satisfaction and frustration. However, additional analyses are included that examine the unique associations between autonomy, competence, and relatedness and nonwork cognitive processes (i.e., psychological detachment from work, positive work reflection, and negative work reflection), work engagement, and exhaustion.

This present research has several theoretical and practical contributions. First, it contributes to the development of SDT within the organizational literature by expanding upon the unique relationships between daily need satisfaction and frustration and nonwork cognitive processes in the evening, as well as next day work outcomes. Second, it tests spillover hypotheses that address the dynamics of need satisfaction and frustration across life domains. Third, it expands upon daily processes through which need satisfaction and frustration relate to cognitive engagement and disengagement with work during nonwork time, as well as next day work outcomes. Findings provide initial evidence that employees' daily experiences of need satisfaction and frustration at work may play a role in resource generating and resource depleting cognitive processes in the evening. Further, findings demonstrate that general levels of need satisfaction and frustration both at work and at home are related to employees' engagement and exhaustion levels. These initial findings – and future research propositions – may

encourage other researchers to more thoroughly examine the dynamics of individuals' various needs in various domains. Additionally, these results and propositions may demonstrate to organizations and leaders that meeting employees' human needs is linked to work-related well-being – and may therefore be subsequently linked to important organizational outcomes such as turnover, client satisfaction, profitability, and organizational performance (Bakker et al., 2014). They emphasize the importance of employee well-being and demonstrate that work-related need satisfaction may serve as an optimal point for intervention.

Chapter 2: Theoretical Background

Self-Determination Theory

According to SDT, humans have three universal needs that are essential for intrinsic motivation, internalization, and well-being (Ryan et al., 1996). The need for *autonomy* refers to the human need to feel a sense of ownership, freedom, and volition in behavior. When one has autonomy, they have ownership over their actions, rather than being controlled by external forces (deCharms, 1968). *Competence* refers to a need to feel mastery and skill within one's environment. The need to feel competent stems from humans' natural tendency to seek out challenges and interact with the environment to build self-efficacy (Bandura, 1977). Finally, the need for *relatedness* refers to the desire to be connected to close others and a sense of belonging within a community. The ability to love and care for others, as well as being loved and cared for, generates a sense of communion with others (Baumeister & Leary, 1995).

In addition to the claim that need fulfillment contributes to intrinsic motivation, SDT constitutes that motivation exists on a spectrum from non-self-determined behavior (extrinsic, controlled) to completely self-determined behavior (intrinsic, autonomous; (Deci & Ryan, 2000; Gagné & Deci, 2005; Ryan & Deci, 2000). Specifically, there are four modes of motivation (i.e., external regulation, introjected regulation, identified regulation, integrated regulation) in addition to intrinsic motivation that extend from fully extrinsically motivated behavior to more intrinsically motivated behavior. As the individual internalizes the values, attitudes, or rewards associated with a behavior, the behavior trends towards being internally regulated (i.e., autonomous) and no longer

requires external rewards. The most controlled form of extrinsic motivation is *external regulation*, in which behavior is solely motivated by a tangible reward. The most autonomous form of extrinsic motivation is *integrated regulation*. This is the fullest type of internalization in which the individual is entirely volitional and believes the behavior to be an integral part of who they are.

Need Satisfaction and Frustration

Theoretically, humans have a natural inclination and progression towards psychological growth, internalization, and well-being and therefore interact with their environments in ways that facilitate or hinder psychological growth (Van den Broeck et al., 2016). As previously mentioned, human motivation, internalization, well-being, and optimal functioning are associated with the fulfillment of three basic psychological needs: *autonomy*, *competence*, and *relatedness* (Deci & Ryan, 2000; Van den Broeck et al., 2016). The need for autonomy is fulfilled at work when an individual feels a sense of choice and freedom in their work and are also satisfied with their work-related decisions. For example, need satisfaction of autonomy might be high when an employee gets to dictate when and how their tasks are completed. They can be creative in the content of their work or the method in which it is completed and produce work that expresses their effort and pride. The need for competence is fulfilled when an individual feels confident in their ability. For example, this need may be fulfilled at work when an employee faces a long to-do list but feels entirely optimistic about their ability not just to complete their tasks, but to do them well. The need for relatedness is satisfied when an individual feels a strong sense of connectedness within their community and among the people they care

about. For example, this need may be fulfilled when an employee has positive informal interactions with coworkers or feels supported by others during a meeting or presentation. Psychological need satisfaction is therefore essential for psychological growth and well-being (Deci & Ryan, 2000; Gagné & Deci, 2005). As such, work-related need satisfaction is theorized to contribute to effective performance, job satisfaction, positive-work related attitudes, positive work behaviors (e.g., organizational citizenship behaviors), and psychological health and well-being (Gagné & Deci, 2005).

Meta-analytic research has demonstrated robust findings linking psychological needs to intrinsic motivation, psychological well-being (e.g., general well-being, positive and negative affect, life satisfaction, and work engagement), job attitudes (e.g., job satisfaction, affective commitment, and turnover intentions), and work behavior (e.g., effort, absenteeism, task performance, proactive behavior, and creativity) (Van den Broeck et al., 2016). One study found all three needs were positively related to job satisfaction, vigor, and life satisfaction, and negatively to exhaustion (Van den Broeck et al., 2010). Another found need satisfaction was related to higher job satisfaction, and subsequently stronger psychological well-being and fewer health problems (Gomez-Baya & Lucia-Casademunt, 2018). Need satisfaction has also mediated the relationships between job demands and exhaustion, as well as job resources and vigor (Van den Broeck et al., 2008). This research indicates need satisfaction can be a mechanism through which employees thrive (Deci et al., 2017).

Need satisfaction is associated with internalization, and thereby facilitates autonomous motivation and psychological adjustment. Thwarted needs undermine

motivation and have maladaptive consequences (Baard et al., 2004). Need frustration occurs not only when needs are not satisfied, but when they are actively thwarted, threatened, or frustrated (Gagné & Deci, 2005; Van den Broeck et al., 2016). Autonomy is frustrated when employees do not stand behind their actions or feel as though they must act against their will. For example, an employee might feel as though they are completing their tasks because they are being forced to, not because they want to. Competence is frustrated when employees feel ineffective and are unable to achieve their desired states. For example, an employee might feel like every effort they make at work is unsuccessful or disappointing. Finally, relatedness is frustrated when employees lack the experience of having close and meaningful relationships with others and feel disconnected from those around them (Vander Elst et al., 2012) For example, an employee might feel as though coworkers are talking about them behind their back or like they have nothing in common with their coworkers or managers.

Few studies have examined need frustration (Deci et al., 2017; Van den Broeck et al., 2016), despite theoretical and empirical evidence that need satisfaction and need frustration are unique constructs. According to SDT, need satisfaction and frustration precipitate unique psychological processes (i.e., internalization vs. externalization) that are associated with differential outcomes (Bidee et al., 2016). While low need satisfaction inhibits flourishing, need frustration promotes maladaptive behavior and ill-being (Bidee et al., 2016; Vansteenkiste & Ryan, 2013). Indeed, a meta-analysis on need satisfaction at work found that the experience of need satisfaction was more closely related to the intense experience of positive outcomes (e.g., intrinsic forms of motivation; positive

well-being), than the experience of negative outcomes (e.g., extrinsic forms of motivation; negative well-being) (Van den Broeck et al., 2016). This indicates that the absence of positive outcomes does not imply the presence of negative outcomes (i.e., need frustration) and highlights the importance of considering need satisfaction *and* need frustration (Deci et al., 2017; Van den Broeck et al., 2016).

Day-Level Needs

While the majority of research on need satisfaction and frustration is cross-sectional (Van den Broeck et al., 2016), there are several day-level studies that have examined daily fluctuations in need satisfaction. This research has found that daily fluctuations in need satisfaction can predict daily fluctuations in well-being beyond trait measures of autonomy, competence, and relatedness (Gagné & Deci, 2005; Reis et al., 2000), as well as fluctuations in daily job performance. For example, van Hooff and De Pater (2019) examined daily need satisfaction at work and positive energy throughout the workday. They found that daily experiences of competence and autonomy were related to increased feelings of energy and that these associations were significant regardless of need strength (i.e., individual differences in desire or importance of the need being met). The daily experience of relatedness was also linked to more positive energy, and this association was even stronger for those who had high need strength for relatedness (van Hooff & De Pater, 2019). This shows that daily need satisfaction for autonomy, competence, and relatedness is universally beneficial for well-being, regardless of individual perceptions of how important it is for each need to be met (Chen et al., 2015; Schüler et al., 2013).

Additional research has demonstrated that day-level job characteristics are beneficial in achieving day-level need satisfaction, as well as subsequent work engagement and job performance. For example, De Gieter and colleagues (2018) examined job resources, challenge, and hindrance stressors as antecedents of day-level experiences of autonomy and competence. Their results showed that daily job resources and challenge demands were related to the experience of higher daily satisfaction of autonomy and competence needs, which in turn were related to higher job performance and reduced strain that day (De Gieter et al., 2018). Daily job crafting (i.e., proactively shaping job demands and resources to optimize one's work environment; Wrzesniewski & Dutton, 2001) opportunities have also been associated with momentary need satisfaction and, subsequently, momentary work engagement (i.e., activity or task specific need satisfaction and work engagement; Bakker & Oerlemans, 2019). Momentary job crafting was associated with a corresponding increase in positive resources (i.e., social and structural resources, seeking variety and flexibility), which subsequently facilitated higher daily need satisfaction, demonstrating that individuals can proactively influence their own work engagement by mobilizing daily job resources and optimizing their environments for daily need satisfaction.

This research demonstrates that it may be possible for aspects of the work environment (i.e., jobs resources, job crafting opportunities) to be adjusted in order to meet employees daily work-related need satisfaction. However, these studies have not accounted for experiences in nonwork domains and how those experiences may be intrinsically fulfilling and motivating. The work context is closely tied to work-related

need satisfaction, but individuals have many fulfilling experiences outside of work. According to SDT, needs apply universally across cultures and life domains (Deci & Ryan, 2000; Milyavskaya & Koestner, 2011). However, organizational researchers rarely examine multiple life domains simultaneously, despite the importance of work-nonwork dynamics (Allen et al., 2014; Edwards & Rothbard, 2000). Consideration of work and nonwork domains would allow researchers and practitioners to help employees find balance and fulfillment across life domains, which may subsequently facilitate more positive health and well-being. The present research therefore examines associations between needs in multiple life domains. Specifically, resource-based theories are utilized to explain how need satisfaction and frustration at work invoke states that promote need satisfaction and frustration in nonwork domains.

Resource-Based Theories

The present research is rooted in resource-based theories including conservation of resources (COR) theory (Hobfoll, 1989, 2001) and the job demands-resources model (Bakker & Demerouti, 2007), in conjunction with SDT. Specifically, I argue that daily need satisfaction and need frustration represent resource-rich and resource-depleted states that are linked to nonwork cognitive processes that either facilitate or counteract resource replenishment during nonwork time. These cognitive processes during nonwork time are subsequently expected to be associated with next day work engagement and exhaustion.

Conservation of Resources Theory

The main tenets of COR theory are that individuals strive to maintain, protect, and build upon their resources (Hobfoll, 1989, 2001; Hobfoll et al., 2018) and that individuals

experience stress reactions when resources are lost, exhausted, or threatened (Hobfoll et al., 2018). According to COR theory, resources are "objects, personal characteristics, conditions, or energies that are valued in their own right, or that are valued because they act as conduits to the achievement or protection of valued resources" (Hobfoll, 2001, p. 339). Key principles of this theory additionally dictate that individuals need to invest resources in order to protect against resource loss, recover from loss, and gain new resources (resource investment principle), and that individuals enter a defensive and potentially irrational state when resources are exhausted (i.e., desperation principle; Hobfoll et al., 2018). Further, COR theory proposes the potential for resource loss and gain spirals. These corollaries dictate that as loss occurs, resource investment becomes more difficult and individuals have fewer resources to offset further loss. As resource gain occurs, individuals are better situated to invest existing resources and gain even more resources (Halbesleben et al., 2014; Hobfoll, 2001; Hobfoll et al., 2018).

Job Demands-Resources Theory

According to job demands-resources theory (JDR; Bakker & Demerouti, 2007; Demerouti et al., 2000), job demands and resources are linked to engagement and burnout through a motivational path and a health impairment path, respectively. Job demands are aspects of one's job that require physical, emotional, and cognitive effort (Bakker et al., 2014; Demerouti et al., 2001) and include stressors such as role ambiguity, role conflict, stressful events, workload, and work pressure (Lee & Ashforth, 1996). Job demands require use of employees' emotional, cognitive, and physical resources, and are linked to energy depletion or exhaustion, and subsequent health problems such as burnout

(Demerouti et al., 2000). Job demands are also associated with several negative physiological and psychological outcomes including elevated blood pressure, increased heart rate, fatigue, and psychological need frustration (Bakker et al., 2014). These conditions can develop over time into chronic exhaustion, health issues, and burnout (Bakker et al., 2000).

Job resources are physical, psychological, social, or organizational aspects of one's job that stimulate personal growth, facilitate the achievement of work goals, and reduce job demands, as well as their associated consequences (Bakker & Demerouti, 2007). Resources can be both intrinsically and extrinsically motivating because they foster growth, learning, and development, but are also instrumental in meeting work goals (Bakker & Demerouti, 2007). Job resources directly fulfill basic human needs (Deci & Ryan, 1985) and interact with job demands to mitigate the negative effects of job demands on strain reactions (e.g., Bakker et al., 2005; Xanthopoulou et al., 2007). Further, job resources are particularly influential on work engagement when demands are high, meaning that resources gain motivational potential in the face of high job demands (Bakker & Demerouti, 2007; Hobfoll, 2002).

In line with resource-based theories, demands and stressors are directly associated with burnout, which refers to feelings of exhaustion (i.e., feeling physically, cognitively, and emotionally drained) and disengagement (i.e., distancing oneself from work; Bakker et al., 2014; Demerouti et al., 2010). Conversely, resources are directly linked to work engagement, which reflects vigor (i.e., high levels of energy), dedication (i.e., feeling a sense of enthusiasm, significance and challenge), and absorption (i.e., being fully and

happily engrossed) in one's work (Bakker et al., 2008, 2014; Schaufeli et al., 2002). Decades of research indicate that the most proximal predictors of burnout and engagement are job demands and resources, respectively (Bakker et al., 2014; Lee & Ashforth, 1996).

Based on the premise that job resources contribute to need satisfaction, Van den Broeck and colleagues (2008) examined the role of needs in the motivational and strain processes, framing need satisfaction and frustration within the JDR model. They found that psychological needs partially mediated the relationship between job demands and exhaustion as well as job resources and vigor, and that needs fully accounted for the negative relationship between job resources and exhaustion. The authors argued that individuals who are rich in resources are more likely to experience higher need satisfaction, and subsequently feel less exhausted and more vigorous. Those who experience heavy job demands are more likely to experience need frustration, and subsequently higher levels of exhaustion. Need satisfaction is experienced as a psychologically energizing and resource-rich state that facilitates well-being and motivation, while need frustration is experienced as an energy- and resource-depleted state that contributes to ill-being and exhaustion (Van den Broeck et al., 2008).

Nonwork Cognitive Processes

According to research on recovery from work demands during nonwork time (i.e., processes during nonwork time through which individuals' psychophysiological systems return to their pre-stressor state; Sonnentag & Fritz, 2007), individuals have experiences during nonwork time that contribute to evening and next day recovery states. One such

experience is psychological detachment from work (i.e., mentally and emotionally letting go of work during nonwork time), which is a form of cognitive disengagement from work that contributes to replenishment of key resources that have been expended throughout the workday (Sonnentag & Fritz, 2007). While psychological detachment represents cognitive disengagement from work, work reflection refers to positively or negatively engaging with work during nonwork time (Fritz & Sonnentag, 2005, 2006). Positive work reflection is a resource generating cognitive process, while negative work reflection is resource depleting cognitive process. Processes of cognitively engaging with or disengaging from work during nonwork time provide an appropriate lens for considering how nonwork activities relate to next day work outcomes because these processes are the mechanisms through which individuals replenish their resources upon completion of each workday (Sonnentag, 2015; Sonnentag et al., 2017).

Chapter 3: Hypothesis Development

Need Satisfaction and Frustration and Nonwork Processes

To fully comprehend the work-nonwork dynamics of need satisfaction and frustration, it is important to consider how work-related needs and cognitive engagement and disengagement with work during nonwork time are related. Throughout the workday, employees invest and expend resources to meet their job demands (Bakker & Demerouti, 2007). To promote daily work engagement and prevent daily exhaustion, it is important that individuals begin each day with replenished resources from the previous day and evening (Bakker et al., 2014. Conservation of resources (COR) theory states that individuals strive to protect, maintain, and build upon their resources. Further, those who are richer in resources are better prepared to invest resources in experiences that facilitate resource replenishment and further gain (Hobfoll et al., 2018). Individuals expend resources throughout the workday and should therefore aim to replenish those resources in the evening during nonwork time. However, individuals need resources to invest in resource replenishment and further gain.

Research has shown that day-level experiences or activities during nonwork time contribute to one's resource replenishment (e.g., relaxation, mastery; Sonnentag & Frese, 2012; Sonnentag & Fritz, 2007; Sonnentag et al., 2017). However, it is also important to consider work characteristics that contribute to resource replenishment so that organizations can support employees' daily resource recovery, well-being, and next-day work engagement (van Hooff & Geurts, 2015), which may allow individuals to obtain resources necessary to invest in further resource gain. For example, research has shown

positive work events, job resources (e.g., job control, social support) and the fulfillment of psychological needs contribute to recovery from work (Daniel & Sonnentag, 2014; Kinnunen et al., 2011, 2017).

Psychological detachment refers to mentally and emotionally letting go of work during nonwork time. Resources can be replenished when the resources being used to meet demands are no longer called upon. For that reason, "letting go" of work during nonwork time increases the likelihood that individuals are not using their resources on work-related tasks or thoughts (Sonnentag & Fritz, 2007; Sonnentag et al., 2017). Psychological detachment from work has been linked to decreases in psychological strain, physical complaints, exhaustion, work-family conflict, and need for recovery, and improvements in vigor at work and life satisfaction (Sonnentag et al., 2017). Further, psychological detachment from work over the weekend has also been linked to improvements in personal initiative throughout the subsequent workweek (Binnewies et al., 2010) and has shown a curvilinear relationship with task performance and proactive work behavior (Fritz et al., 2010). Successful psychological detachment from work is closely related to job demands and resources, as well as experiences during nonwork time. Certain stressors like time pressure, workload, negative work events, and unfinished tasks have been linked to low levels of psychological detachment at the within- and between-person levels (Bono et al., 2013; Smit, 2016; Sonnentag & Fritz, 2015; Syrek et al., 2017). When employees experience high levels of stressors, work-related thoughts persist, making it difficult to mentally disengage from work. Recovery activities, such as social or physical activities, have been tied to increased psychological detachment (ten

Brummelhuis & Bakker, 2012), but there is little research focusing on job resources that positively predict psychological detachment.

In contrast to psychological detachment, work reflection involves thinking about work during nonwork time. While reflecting on work contributes resources to work-related thoughts during nonwork time, it is a process that may facilitate resource gain during nonwork time (thereby contributing to recovery, work engagement, and exhaustion). Positive work reflection refers to reflecting upon positive aspects of work during nonwork time and can be used as a process to restore resources (Fritz & Sonnentag, 2005, 2006). Specifically, positive work reflection allows individuals to reappraise daily work experiences through a positive lens, which can subsequently inhibit negative consequences of work-related stress (Binnewies et al., 2009; Lazarus & Folkman, 1984). When individuals reflect positively on their workday, they think about positive aspects of their job and why they enjoy their work (e.g., daily accomplishments, positive events, and supportive relationships). Positive work reflection therefore facilitates resources, thereby permitting resource investment in nonwork recovery experiences (Binnewies et al., 2009; Fredrickson, 2001; Fritz & Sonnentag, 2005, 2006; Hobfoll, 1989).

Research suggests that positive work reflection during nonwork time (including evenings, weekends, and vacation) is tied to employee well-being and performance. Binnewies and colleagues (2009) found that individuals who experienced higher positive work reflection experienced more proactive work behaviors throughout the following months (i.e., personal initiative and creativity). Others have found that positive work

reflection is positively associated with positive affect (e.g., serenity; Meier et al., 2016) and nonwork enrichment (Daniel & Sonnentag, 2014), and has negative associations with exhaustion and disengagement from work (Fritz & Sonnentag, 2005). Bono and colleagues (2013) conducted an intervention study intended to increase positive work reflection and found that participants in the intervention group demonstrated lower levels of stress and health complaints, as well as higher levels of psychological detachment from work post-intervention. Another intervention study involving caregivers found that daily positive work reflection was linked to increased levels of personal resources (i.e., hope, optimism) post-intervention in participants with a high need for recovery at baseline, and was additionally associated with decreased emotional exhaustion and fatigue post-intervention in all participants (Clauss et al., 2018).

Research has previously found that experiences of daily need satisfaction facilitates states and experiences at the end of the workday and in the evening that indicate high levels of resources (van Hooff & Geurts, 2014, 2015). van Hooff and Geurts (2015) found that on days in which participants experienced high need satisfaction at work, they experienced increased intrinsic motivation and lower self-control effort, which was subsequently linked to less fatigue and more vigor at the end of the day. Another study examined nonwork-related need satisfaction and found that individuals who took part in daily volunteer activities outside of work experienced greater recovery from work and need satisfaction in the evening, which subsequently facilitated well-being at work the next day (Mojza et al., 2011). Specifically, psychological detachment from work could be achieved through immersing oneself in a nonwork activity that fulfilled

one's needs. This is consistent with COR theory because resource gain or replenishment is more accessible to individuals who already possess high levels of resources (Hobfoll 1989, 2002; Hobfoll et al., 2018). Daily need satisfaction at work has also been linked to variations in daily well-being and vitality, which also indicate resource-rich states (Cangiano et al., 2019). Past research demonstrates that daily need satisfaction at work and in nonwork domains can facilitate employee well-being through nonwork processes throughout the evening. It indicates that daily need satisfaction can serve an important role in resource gain because it both provides individuals the resources necessary to invest in further resource gain and permits experiences that facilitate resource replenishment.

Based on previous research and SDT, I argue that the experience of daily work-related need satisfaction facilitates energized and resource-rich states within individuals (Ryan & Deci, 2008). Resource-rich states enhance employees' energetic resources, which subsequently facilitates resource replenishment during nonwork time. I hypothesize that daily work-related need satisfaction will be linked to increased positive work reflection and higher psychological detachment from work during nonwork time in the evening after work.

Hypothesis 1. Daily need satisfaction at work will be positively associated with (a) positive work reflection and (b) psychological detachment from work in the evening.

While need satisfaction represents a resource-rich state, need frustration represents a resource-depleted state in which individuals contain inadequate resources

recover from work. Although they examined need satisfaction as opposed to need frustration, van Hooff and van Hooft (2016, 2017) found that daily work-related boredom was associated with depressed mood at the end of the day, and that daily need satisfaction mediated the link between work characteristics and work-related boredom. Specifically, on days in which individuals experienced low need satisfaction, they experienced greater work-related boredom. Boredom subsequently spilled over to the next morning through depressed mood and decreased intrinsic motivation in the evening (van Hooff & van Hooft, 2016, 2017). As lack of daily need satisfaction was associated with increased depressed mood, it is probable that daily need frustration would further exacerbate these associations.

In contrast to positive work reflection, negative work reflection is associated with impaired well-being and decreased recovery from work (Casper et al., 2019; Fritz & Sonnentag, 2006), which can negatively impact performance. Ott and colleagues (2019) found that for employees who perceived low organizational support, daily negative work reflection in the evening related to reduced self-efficacy the next morning, which was associated with subsequent decreases in work engagement that workday. Reflecting negatively on work during nonwork time depletes resources because it keeps work stressors present during nonwork time. According to the perseverative model of stress, the prolonged activation of stress is linked to strain outcomes (Brosschot et al., 2005), indicating that negative work reflection may interfere with one's ability to recover during nonwork time, thereby facilitating increased exhaustion. In addition, because negative work reflection is negative by nature, it may increase negative affect and generate states

in which individuals' resources are depleted and threatened, thereby inhibiting their ability to invest resources in nonwork activities that would facilitate resource replenishment (Binnewies et al., 2009; Hobfoll, 1989, 2002).

Consistent with COR theory, when individuals' resources are depleted, they experience the threat of resource loss and move into a protective state, thereby inhibiting them from investing resources in positive nonwork cognitive processes (Hobfoll, 1989, 2002). Further, COR theory states that stress occurs when resources are lost. Therefore, individuals in resource-depleted states experience prolonged activation of need frustration during nonwork time further exerting them to reflect negatively on work during nonwork time (Brosschot et al., 2006; Vahle-Hinz et al., 2017). I argue that daily need frustration at work is negatively related to one's ability to replenish their resources and is associated with increased negative work reflection in the evening. I hypothesize that daily work-related need frustration will be positively associated with higher negative work reflection in the evening.

Hypothesis 2. Need frustration at work will be positively associated with negative work reflection in the evening.

Need Satisfaction and Frustration and Next Day Work Outcomes

JDR theory postulates job demands and resources are associated with work engagement and exhaustion through a motivational path and a health impairment path, respectively. Job resources facilitate growth, learning, and development, and are instrumental in achieving work goals (Bakker & Demerouti, 2007). Job resources therefore have a strong motivational potential that is linked to subsequent work

engagement. According to SDT, satisfaction of one's intrinsic needs facilitates intrinsic motivation (Deci & Ryan, 2000; Deci et al., 2017). Specifically, feeling competent, autonomous, and connected to others are nutriments required for internalization and intrinsic motivation (Deci & Ryan, 2000; Gagné & Deci, 2005). Further, need satisfaction facilitates resource rich states within employees that, according to JDR theory, initiate a motivational pathway that strengthens work engagement. Because need satisfaction acts as an energy enhancement technique (Ryan & Deci, 2008), it facilitates resource rich states that contribute to intrinsic motivation. I therefore expect that daily need satisfaction will be positively linked to work engagement and negatively linked to exhaustion the next workday.

In support of this assertion, Van den Broeck and colleagues (2008) framed need satisfaction within the JDR model and found that needs partially mediated the relationships between job resources and vigor and exhaustion. Specifically, those who had higher levels of resources (i.e., task autonomy, skill utilization, positive feedback) were more likely to experience higher need satisfaction and subsequently experienced less exhaustion and more vigor. Similarly, Trépanier and colleagues (2015) examined of the associations between demands and resources on work engagement, performance, psychological distress, and psychosomatic complaints, finding that job resources were positively related to work engagement and performance through need satisfaction. This study suggests that need satisfaction facilitates internalization because engagement is a motivational outcome characterized by a sense of vigor, dedication, and absorption in one's work. Daily need satisfaction has also been linked to heightened intrinsic

motivation in the afternoon, which was subsequently linked to improvements in daily innovative work behavior (Devloo et al., 2015). Need satisfaction can facilitate the experience of intrinsic motivation, which subsequently permits resource gain and increased willingness to invest resources. I hypothesize that high levels of daily need satisfaction indicate a resource rich state and are will therefore be positively related to higher work engagement and lower exhaustion the next day at work.

Hypothesis 3. Daily need satisfaction at work will be positively associated with (a) next-day work engagement and negatively associated with (b) next-day exhaustion.

While need satisfaction represents a resource rich state, need frustration indicates a resource depleted state. In line with JDR theory, need frustration may pose as a work-related stressor or demand that is associated with strain reactions and reductions in motivation. Because job demands require employees to use their emotional, cognitive, and physical resources, they are linked to energy depletion and exhaustion, and subsequent health problems (Demerouti et al., 2000). Trépanier and colleagues (2015) found that job demands were associated with distress and psychosomatic complaints, as well as low work engagement and performance through need frustration. Further, job resources appeared to mitigate the negative effects of need frustration. This study suggests that need frustration is negatively linked to the internalization of work experiences. Van den Broeck and colleagues (2008) found that daily need satisfaction partially mediated the relationships between job demands and exhaustion. Specifically, on days in which individuals experienced high job demands, they reported lower levels of

need satisfaction and subsequently higher levels of exhaustion. I therefore hypothesize that daily work-related need frustration and is associated with higher exhaustion and lower work engagement the day workday.

Hypothesis 4. Daily need frustration at work will be negatively associated with (a) next-day work engagement and positively associated with (b) next-day exhaustion.

Nonwork Processes and Next Day Work Outcomes

To maintain well-being and work engagement, individuals can utilize nonwork time to replenish resources that have been spent throughout the day (Sonnentag & Fritz, 2007; van Hooff & Geurts, 2014). In line with COR theory, individuals can replenish resources by avoiding effortful activities that consume resources and by partaking in activities that build new resources (Hobfoll, 1989, 2001; Sonnentag & Fritz, 2007; Sonnentag et al., 2017). When employees are able to replenish their resources during nonwork time, they are likely to experience improved work engagement during the next workday.

It is likely that on days in which individuals psychologically detach from work during nonwork time, they refrain from using resources on work-related tasks or thoughts during nonwork time (Sonnentag & Fritz, 2007; Sonnentag et al., 2017). Psychological detachment inhibits individuals from expending resources on work during nonwork time, thereby permitting them to replenish resources and/or invest resources in activities that facilitate the gain of new resources. This process becomes visible in increased well-being (e.g., vigor at work, life satisfaction) and reduced strain (e.g., psychological strain,

physical complaints, exhaustion, work family conflict) in the evening and the next day at work (Sonnentag et al., 2017). Sonnentag and colleagues (2010) found that higher levels of psychological detachment over time were linked to decreased emotional exhaustion and moderated the negative relationships between job demands and work engagement over time.

Detaching form work during nonwork time provides individuals with opportunities to engage in experiences that foster new resources that can subsequently be utilized during work. Because psychological detachment from work allows for resource replenishment, individuals enter work the next day in a more resource-rich state. Therefore, according to the JDR theory, on days in which individuals psychologically detach from work in the evening, they may experience a subsequent increase in work engagement the next day through a motivational pathway (Bakker & Demerouti, 2007). Further, these individuals may additionally experience a subsequent decrease in exhaustion the next day at work because their resources had been replenished the prior evening. I therefore hypothesize that daily psychological detachment from work in the evening is positively associated with next-day work engagement, and negatively with next-day exhaustion.

Hypothesis 5. Psychological detachment from work in the evening will be positively associated with (a) next-day work engagement and negatively associated with (b) next-day exhaustion.

Positive work reflection during nonwork time refers to reflecting upon positive aspects of work during nonwork time (Fritz & Sonnentag, 2005, 2006) and is a resource

generating experience (Binnewies et al., 2009; Fritz & Sonnentag, 2005, 2006). Consistent with COR theory, positive work reflection emphasizes daily accomplishments, positive events, and supportive relationships, placing individuals in a resource rich state that facilitates further resource gain (Binnewies et al., 2009; Fritz & Sonnentag, 2005, 2006; Hobfoll, 1989). Intervention research focused on increasing positive work reflection has demonstrated improvements in stress, health complaints, and psychological detachment from work (Bono et al., 2013), as well as reduced emotional exhaustion and fatigue (Clauss et al., 2018). Longitudinal research has linked increased positive work reflection to daily improvements in well-being (i.e., positive and negative moods; Meier et al., 2016), proactive work behaviors (i.e., personal initiative and creativity; Binnewies et al., 2009), and reduced exhaustion and disengagement from work (Fritz & Sonnentag, 2005).

Because positive work reflection during nonwork time generates resources, it facilitates resources within individuals that can be utilized the next day at work, thereby promoting work engagement and reducing exhaustion. I therefore hypothesize that higher levels of positive work reflection in the evening will be positively associated with work engagement and negatively associated with exhaustion the next workday.

Hypothesis 6. Positive work reflection in the evening will be positively associated with (a) next-day work engagement and negatively associated with (b) next-day exhaustion.

In contrast to positive work reflection and psychological detachment from work, negative work reflection refers to thinking about the negative aspects of one's job during

leisure time (Fritz & Sonnentag, 2005, 2006). Negative work reflection has been linked to impaired well-being and inability to recover from work (Casper et al., 2019; Fritz & Sonnentag, 2006), which are negatively associated with work performance. Negative work reflection is a resource-depleting experience in which individuals cognitively attend to work stressors during nonwork time. When individuals reflect negatively on work during nonwork time, they are therefore continuing to dedicate resources to work-related issues during nonwork time. This subsequently inhibits them from replenishing resources or investing resources in activities that facilitate resource gain (Brosschot et al., 2005; Casper et al., 2018). One study found that negative work reflection during vacation was linked to increased levels of burnout, disengagement, and health complaints immediately after vacation (Fritz & Sonnentag, 2006). On the day-level, Ott and colleagues (2019) found that individuals with high negative work reflection in the evening experienced lower levels of self-efficacy the next morning, and subsequently lower levels of work engagement that workday. Meier and colleagues (2016) found negative work reflection throughout the evening was linked to negative mood and reduced psychological detachment in the evening.

The experience of negative work reflection represents a resource-depleted state that inhibits individuals from replenishing resources that have been expended throughout the day and from investing resources in recovery activities that could facilitate further resource gain. Further, negative work reflection represents prolonged activation of work stressors, thereby disposing individuals to expend further resources on work-related issues, in addition to inhibiting them from investing in resource gain. On days in which

individuals experience higher negative work reflection in the evening, they may subsequently experience lower engagement and higher exhaustion the next day at work. I hypothesize that higher negative work reflection in the evening will be negatively associated with work engagement and positively associated with exhaustion the next day at work.

Hypothesis 7. Negative work reflection in the evening will be negatively associated with (a) next-day work engagement and positively associated with (b) next-day exhaustion.

Need Satisfaction and Frustration at Work and in Nonwork Domains

Organizational research rooted in SDT acknowledges that need satisfaction exists with respect to specific life domains; that is, need satisfaction at work is distinct from need satisfaction at home (Milyavskaya et al., 2009; Milyavskaya & Koestner, 2011). Although research exists that addresses the balance of need satisfaction across life domains (Milyavskaya et al., 2009; Milyavskaya & Koestner, 2011), few have examined direct associations and interactions between life domains (Hewett et al., 2017). Work-nonwork spillover refers to the transfer of experiences from one life domain to another, which may subsequently influence outcomes in the second life domain. The influence of one life domain on another generates similarities between the life domains that can be described in terms of affect, values, skills, or behaviors. Research suggests two types of work-nonwork spillover. First, work-nonwork spillover can simply represent a similarity between a construct in the work domain and a unique, but related construct in the nonwork domain (e.g., positive relationship between job and family satisfaction). Second,

work-nonwork spillover can occur when experiences are transferred between life domains (e.g., work fatigue is displayed at home) (Edwards & Rothbard, 2000).

Research on positive work-nonwork spillover has demonstrated that positive states within the work domain can spill over and facilitate positive states and processes in nonwork domains (Allen & Martin, 2017; Casper et al., 2018). This is consistent with research on work-family enrichment, which argues that experiences or resources in one role or life domain can strengthen the quality of one's life in another role or life domain (e.g., performance, affective states; Casper et al., 2018; Greenhaus & Powell, 2006; Wayne et al., 2007). In line with COR theory, it is possible that on days in which individuals experience high work-related need satisfaction, they will also experience high nonwork-related need satisfaction. Specifically, COR theory states that individuals with high levels of resources have stronger potential for further resource gain and that resource gain leads to additional resource gain (Halbesleben et al., 2014). I argue that high levels of daily work-related need satisfaction indicate resource-rich states, in which individuals contain the resources necessary to invest and build upon resources during nonwork time. I therefore hypothesize that on days in which individuals experience high work-related need satisfaction, they will be in resource rich states that subsequently facilitate high nonwork-related need satisfaction.

Hypothesis 8. Daily work-related need satisfaction will be positively associated with nonwork-related need satisfaction in the evening.

I additionally argue that need frustration will spill over from the work to nonwork domain. Specifically, daily work-related need frustration as a resource-depleted state at

the end of the workday will inhibit individuals from investing or seeking resources in nonwork domains. According to COR theory, individuals with depleted resources are more likely to experience resource loss that begets further loss (Halbesleben et al., 2014; Hobfoll et al., 2018). Thus, daily work-related need frustration as a form of resource threat or loss may beget additional resource loss in the form of nonwork-related need frustration. Similarly, work-related need frustration can be conceptualized as a work-related stressor. The activation of work-related need frustration as a threat or stressor may be prolonged and extended into nonwork domains. This prolonged activation of work-related need frustration may perpetuate negative states in which individuals also experience nonwork-related need frustration (Brosschot et al., 2005). Daily work-related need frustration experienced as a stressor or resource-depleting mechanism may therefore spill over into nonwork domains, in which individuals subsequently experience further resource loss in the form of nonwork-related need frustration. I therefore hypothesize that on days in which individuals experience high work-related need frustration, they will subsequently experience high nonwork-related need frustration in the evening.

Hypothesis 9. Daily work-related need frustration will be positively associated with nonwork-related need frustration in the evening.

Chapter 4: Method

Participants and Recruitment

Participants were recruited from a technology company located in the Pacific Northwest of the United States. Prior to recruiting participants, the proposed research was presented to organizational leaders to gain buy-in and feedback (Ohly et al., 2010). Upon coming to an agreement with organizational leaders and the organization's Human Resources team, the opportunity to participate was presented to all employees in a monthly company meeting. To incentivize participation, all participating employees were offered personalized feedback upon completion of data analyses. This intrinsic reward was offered because extrinsic and monetary incentives are suggested to be tied to careless responding (Green et al., 2006; Ohly et al., 2010).

After the research opportunity was presented, I held open office hours online to provide prospective participants with an opportunity to express questions or concerns. In addition to presenting the proposed research study in a company meeting, I worked with the Human Resources team to develop paper fliers and a recruitment video, which was shared through the company's digital app and platform. The paper fliers featured key dates and brief instructions to participate and were posted through on-site communal areas (i.e., bulletin boards, kitchen, snack room, restrooms). The recruitment video featured introductory information on the purpose of the study, how the study benefits employees and the organization, and how organization intends to use the results. The video communicated that a key purpose of the present research was to utilize scientific and psychological methods to learn about the organization and its employees. It

additionally emphasized that the study would be used to examine employees' daily well-being and that results would be used to determine opportunities for organizational intervention. The video was made available to employees for two weeks prior to the baseline launch. The baseline survey was subsequently launched using the organization's communications platform and was additionally developed into an "activity" and made available on the organization's internal engagement application. Employees were informed that this survey served as a baseline and were presented with an opt-in option for the daily surveys upon completion of the baseline. Participants were also encouraged to respond to as many daily surveys as possible but were permitted to continue regardless of how many surveys they missed.

At the start of the data collection, the organizational partner and I established a sampling frame of approximately 250 organization employees. I originally aimed to collect at least 200 participants at the baseline survey in order to maintain at least 150 throughout the daily surveys. Maintaining 150 participants for the daily surveys would have allowed for a maximum of 3,000 observations, thereby increasing the likelihood of achieving adequate statistical power to estimate multilevel structural equation models for hypothesis testing. However, as described in greater detail below, the number of daily observations collected was 244, which equates to 8.1% of the original target of 3,000 daily observations.

There were 60 initial responses to the baseline survey; however, only 49 were complete responses. Of the 11 incomplete cases, one did not provide responses to any items and 10 varied in their completion rate. Specifically, five of them completed less

than 25% of the survey, two completed approximately 50% of the survey, and three completed about 90% of the survey, only omitting contact information and interest for the daily portion of the survey. Of those 49 responses, two were repeat responders, leaving a sample of 47 individuals that were subsequently enrolled in the daily portion of the study. Of those 47 individuals, 40 responded to at least one daily survey allowing for a maximum of 560 observations (i.e., 40 participants, 2 surveys per day, 7 days), and the *Procedure* section below, I describe why only 7 of the planned daily study days were possible. The baseline sample of 47 was predominantly male (57.4%), white (89.4%), college educated (48.9%; 44.7% advanced degree), and had an average age of 35.8 years (*SD* = 8.8). The majority of the sample was married (72.3%), 48.9% reported having zero children under the age of 18 living with them, 29.8% reported having two children, and 83% reported living with at least one other individual. They worked an average of 44.4 hours per week (*SD* = 8.8) and had an average tenure within the organization of 2.8 years (*SD* = 2.0). Within this sample, 31.9% were remote workers, 63.8% were individual-level contributors (19.1% were directors or above; 12.8% were managers), and they belonged to the following teams: growth (46.8%), research and development (23.4%), marketing (12.8%), people (8.5%), product (6.4%), and legal (2.1%).

Of those 40 individuals who responded to at least one daily survey, 60.0% were female, 90.0% were white, and 55.0% were college educated (42.5% had an advanced degree). This sample had an average age of 35.0 years (*SD* = 8.4), 70.0% were married, 50.0% did not have children living with them (17.5% had one child; 32.5% had two children), and 80.0% reported living with at least one other individual. They worked an

average of 44.4 hours per week (*SD* = 9.3) and had an average tenure of 2.6 years (*SD* = 1.9). In terms of roles and responsibilities, 27.5% were remote workers, 70.0% were individual-level contributors (17.5% were directors or above; 4.0% were managers), and they belonged to the following teams: growth (50.0%), research and development (20.0%), marketing (12.5%), people (10.0%), product (5.0%), and legal (2.5%). According to my organizational liaison, the present sample was similar to the organization (i.e., population) in terms of demographics and work characteristics.

Procedure

Baseline Survey

Approximately two weeks after recruitment was completed, the baseline survey was made available through the organization's platform. Employees completed the baseline survey through the organization's communication platform or as an activity on the organization's internal engagement application that provided an external link to a Qualtrics survey. The baseline survey requested informed consent for participation in the baseline and daily surveys and was available online for two weeks prior to beginning the daily surveys. Participants were asked to complete the survey any time by 11:59PM on Sunday night in respective time zones. The baseline survey included items on employee demographics, the nature of participants' work, as well as items on work and nonwork behaviors. There were 47 complete responses at baseline, however only 40 individuals responded to at least one daily survey.

Daily Surveys

Upon completion of the baseline survey, participants were invited to enroll in the daily survey portion of the study. They were invited to complete two daily surveys for two consecutive Monday-Friday workweeks. Links to all surveys were administered via text using an automated text service called SurveySignal (Hofmann & Patel, 2015). Due to technical difficulties, links to both daily surveys on the first Monday and the second Friday of the study were not sent. Specifically, signals were not sent on the first Monday because when a setting is shifted in SurveySignal, it takes 24 hours for that setting to take effect. A setting was shifted to ensure that signals were sent properly, but because that setting had been altered less than 24 hours prior to the first survey, the signals were not sent. Signals were not sent on the second Friday because the signals that had been purchased days in advance were not applied to the administrator's account. In addition, the second Monday was a nationally recognized holiday and surveys were not sent that day. Consequently, participants were able to respond to a maximum of 14 surveys (i.e., two surveys per day across seven business days) instead of the planned 20 surveys (i.e., two surveys per day over 10 business days), thereby allowing for a maximum of 560 observations (i.e., 40 participants, 2 surveys per day, 7 days). Despite the technical difficulties, the text service automated the distribution of daily text messages that contained survey links and ensured that messages were sent at the appropriate times in participants' respective time zones.

After Work Survey. Participants completed the first daily survey near or upon completion of each workday. Non-traditional work arrangements are common within this

organization, so the window to respond was made intentionally wide. In participants' respective time zones, the link to this survey was texted daily at 2:30PM, and participants were required to respond before 7:30PM. This survey prompted participants to reflect on their workday and included day-level measures of need satisfaction and need frustration at work, work engagement, and exhaustion. A total of 119 after work surveys included in the analyses.

Before Bed Survey. Participants were asked to complete the second survey before they went to bed each night. In participants' respective time zones, the link to this survey was texted daily at 8:30PM, and participants were required to respond by 1:00AM. This survey prompted participants to reflect on their evening nonwork time and activities, and it included day-level measures of need satisfaction and need frustration in the nonwork domain, positive work reflection, negative work reflection, and psychological detachment from work. This survey also included several items pertaining to participants' daily work arrangements; specifically, participants were asked whether they were travelling for work or were on paid time off (PTO) that day, how many hours they worked that day, what percentage of work was completed from home that day, and how many hours they worked that day during nonwork time, where nonwork time included any time after an individual arrived home from work, signed off of work systems, or where an individual would not be expected by a supervisor to be signed on. A total of 106 before bed surveys were included in the analyses. Overall, there were 225 daily survey observations that were included in the analyses providing a response rate of about 40% and a missingness rate of about 60%.

Measures

All scales for the focal variables used a Likert scale ranging from one to five, unless otherwise indicated. Please refer to Appendix A for a full list of items, including those associated with baseline and potential control variable measures. Table 1 lists the variables assessed in each survey. Table 2 lists baseline descriptive statistics, correlations, and Cronbach's alphas. Tables 3.1 to 3.3 list daily variable correlations and Cronbach's alphas. Table 4 lists daily variable descriptive statistics.

Need Satisfaction at Work was examined using a day-level version of the Basic Psychological Need Satisfaction and Frustration Scale (BPNSFS; Chen et al., 2015; van der Kaap-Deeder et al., 2017). This scale included six items total with two items per component of need satisfaction (i.e., autonomy, competence, relatedness). Consistent with previous research, items were framed to reflect work-related need satisfaction (Van den Broeck et al., 2010; van Hooff & Geurts, 2015). Sample items included: "Today I felt that my work-related decisions reflected what I really wanted" (autonomy), "Today I felt confident that I could do things well at work" (competence), and "Today I felt connected with people at work who care for me, and for whom I care" (relatedness). This scale demonstrated good average reliability across days with a Cronbach's alpha of .82 (.68–.92).

Need Frustration at Work was also examined using the day-level version of the BPNSFS (Chen et al., 2015: van der Kaap-Deeder et al., 2017). This scale included six items total with two items per component of need frustration (i.e., autonomy, competence, relatedness). Similar to previous research, the items were framed to reflect

work-related need satisfaction (Van den Broeck et al., 2010; van Hooff & Geurts, 2015). Sample items included: “Today most of the things I did at work felt like ‘I had to’” (autonomy), “Today I felt disappointed with many of my performances at work” (competence), and “Today I felt excluded from the work group I want to belong to” (relatedness). This scale demonstrated adequate average reliability across days with a Cronbach’s alpha of .77 (.44–.91).

Need Satisfaction in Nonwork Domains was also examined using the day-level version of the BPNSFS (Chen et al., 2015; van der Kaap-Deeder et al., 2017) but was framed to reflect need satisfaction in nonwork domains (van Hooff & van Hooft, 2016). This scale included six items total with two items per component of need satisfaction outside of work (i.e., autonomy, competence, relatedness). Sample items included: “Today I felt a sense of choice and freedom in the things I undertook during my non-work time” (autonomy), “Today I felt capable at what I did during non-work time” (competence), and “Today I experienced a warm feeling with the people I spent time with outside of work” (relatedness). This scale demonstrated adequate average reliability across days with a Cronbach’s alpha of.78 (.47–.90).

Need Frustration in Nonwork Domains was also examined using the day-level version of the BPNSFS (Chen et al., 2015; van der Kaap-Deeder et al., 2017) but was framed to reflect need frustration in nonwork domains (van Hooff & van Hooft, 2016). This scale included six items total with two items per component of need frustration outside of work (i.e., autonomy, competence, relatedness). Sample items included: “Today I felt forced to do many things outside of work I didn’t choose to do”

(autonomy), “Today I felt insecure about my abilities outside of work” (competence), and “Today I felt that people who are important to me outside of work were cold and distant towards me” (relatedness). This scale demonstrated adequate average reliability across days with a Cronbach’s alpha of .76 (.64–.91).

Positive Work Reflection was examined using items developed by Fritz and Sonnentag (2006). This scale included three items and demonstrated good reliability across days (Cronbach’s alpha = .94; range = .90–.96). These items asked participants to reflect on their workday and included items such as, “Today after work, I realized what I like about my job.”

Negative Work Reflection was examined using items developed by Fritz and Sonnentag (2006). This scale included three items and demonstrated good reliability across days (Cronbach’s alpha = .95; range = .88–.99). These items prompted participants to reflect on their workday and included items such as, “Today after work, I considered the negative aspects of my job.”

Psychological Detachment from Work was examined using the psychological detachment from work subscale of the Recovery Experiences Questionnaire (REQ; Sonnentag & Fritz, 2007). This scale consisted of four items that prompted participants to reflect on their daily post-work experiences. A sample item is, “Today after work, I forgot about work.” This scale demonstrated good reliability across days (Cronbach’s alpha = .90; range =.83–.96).

Exhaustion was examined using three items selected from the Oldenberg Burnout Inventory (OLBI; Demerouti et al., 2003; Demerouti et al., 2010; Halbesleben &

Demerouti, 2005). Consistent with previous research, I selected and adapted three exhaustion items to the day level (Halbesleben & Wheeler, 2011; Petrou et al., 2015). This scale demonstrated good internal consistency across days (Cronbach's alpha = .90; range = .82–.95). A sample item for exhaustion is, "Today during work, I felt emotionally drained."

Engagement was examined using the shortened version of the Utrecht Work Engagement Survey (UWES; Schaufeli et al., 2006). Similar to previous research, this scale was framed to assess daily work engagement (Bakker et al., 2019; Bakker & Oerlemans, 2019; Breevaart & Bakker, 2018). It prompted participants to reflect on the present workday and included three items for each component of work engagement (i.e., vigor, dedication, absorption). Sample items included: "Today at work, I felt bursting with energy" (vigor), "Today my job inspired me" (dedication), and "Today I was immersed in my work" (absorption). This scale demonstrated good internal consistency across days (Cronbach's alpha = .94; range = .91–.96).

Control and Demographic Variables were also collected as part of the baseline survey included demographic and work background information. Details on participants' age, gender, ethnicity, marital status, education level, number of dependents, and household size were collected to examine whether any demographic based differences exist among participants. Further, I asked participants how many hours they worked in a typical week, how long they had worked at the organization, what their job levels are (e.g., manager, individual contributor), what department they worked in, and what their work arrangement were (i.e., onsite vs. remote).

As potential person-level control variables, the baseline survey also included scales to examine employees' general perceptions of organizational support, burnout, and recovery from work. A 16-item scale was used to measure employees' perceptions of **organizational support**, which is a "general perception concerning the extent to which the organization values their contributions and cares about their well-being" (Kurtessis et al., 2017, p. 2). Perceived organizational support involves employees' generalized perceptions on whether their organization cares about their well-being, recognizes their work, and values their voice (Eisenberger et al., 1986; Kurtessis et al., 2017; Rhoades & Eisenberger, 2002), and was therefore used as a proxy for baseline levels of resources. Employees' base levels of **burnout** were captured using the 16-item Oldenburg Burnout Inventory (OLBI; Demerouti et al., 2010). Finally, participants' **general recovery experiences** were examined using the 16-item Recovery Experiences Questionnaire (REQ; Sonnentag & Fritz, 2007).

As potential day-level control variables, I measured whether individuals were travelling for work (i.e., physically travelling or working in an irregular location) or were on paid time off (PTO). I also asked how many hours participants worked that day (total), what percentage of work was completed from home, and how many hours individuals worked during nonwork time.

Chapter 5: Results

Once data collection was complete, a set of preliminary analyses were conducted to determine which participants and observations should be included in the hypothesis testing portion of this study. Specifically, data were screened for normality, completion, and missingness. Group comparisons were conducted to determine inclusion of control variables and intraclass correlation coefficients (ICCs) were calculated to confirm the nested structure of the data. Next, analyses were conducted to determine systematic rationale for missingness and to assess the representativeness of the sample. Finally, confirmatory factor analyses (CFAs) were conducted to determine the factor structure of the data. All of the preliminary results were utilized to determine an appropriate analysis approach to testing hypotheses.

Preliminary Analyses

Upon completion of data collection, the baseline and daily datasets were downloaded from Qualtrics, combined using participant phone number as an ID (which was later recoded into a deidentified numerical ID), cleaned, and reshaped into a long (i.e., univariate) format. As described in greater detail above, of the 47 individuals that completed responses to the baseline survey, 40 responded to at least one daily survey. Of those individuals who responded to at least one daily survey, there were initially 128 after-work survey responses and 116 before-bed survey responses (N_{obs} = 244), which was a 43.6% response rate; Due to the low response rate, prespecified inclusion criteria were relaxed in the following ways:

1. Participants were expected to respond within particular time frames for each survey; instead of excluding all cases in which participants responded outside of the fixed time frame, I removed two after-work and four before-bed observations in which participants responded more than five hours past the time frame.
2. Three cases in which participants submitted their before-bed survey prior to submitting their after-work survey were removed.
3. One duplicate case and nine cases in which no data were available were removed.

After applying the aforementioned inclusion criteria, a total of 225 cases (116 after work surveys, 106 before bed surveys) were included for preliminary analyses and hypothesis testing, which was a final 40% response rate (of the possible 560 total daily observations). Accordingly, these participants completed an average of 5.6 daily surveys out of a possible 14 daily surveys (i.e., two surveys per day over seven study days; see Figure 3 for distribution of surveys completed). Only seven participants (18%) responded to ten or more surveys, while the remainder of the participants responded to fewer than ten surveys.

Once the aforementioned inclusion criteria were applied, the data were cleaned. Specifically, data were screened for any text responses in which numerical responses were warranted (e.g., responding “forty” years old vs. “40”) and for inconsistencies in phone number (which was used to link daily responses). The after work, before bed, and baseline surveys were combined into one file and structured in a long format (i.e., each row represented one day for each participant). Observations were then linked using phone number as participant identification and ID was then recoded into de-identified values.

Before bed survey responses were linked to after work responses on the same day so both observations were sorted in the same row. Finally, responses to the engagement and exhaustion scales were shifted to the previous day (row) because the hypothesized relationships are between experiences at time *t* and work outcomes (i.e., engagement and exhaustion) at time *t*+1.

Once data were cleaned, descriptive statistics – including means, standard deviations, and reliabilities – were computed for the baseline and daily data (see Tables 2, 3.1, 3.2, 3.3, and 4), and the focal variables were assessed for univariate normality using histograms as well as skewness and kurtosis. With respect to those 40 individuals who completed the baseline survey and at least one daily survey, they reported a mean exhaustion of 2.67 (*SD* = 0.68) and a mean disengagement of 2.42 (*SD* = 0.70). Their mean psychological detachment was 2.99 (*SD* = 1.02), relaxation was 3.82 (*SD* = 0.99), mastery was 3.68 (*SD* = 0.97), and control was 4.13 (*SD* = 0.86). Their mean perception of organizational support was 3.88 (*SD* = 0.45). For work engagement, the sample's mean vigor was 3.44 (*SD* = 0.91), dedication was 4.05 (*SD* = 0.82), and absorption was 4.00 (*SD* = 0.74).

Across all seven survey days, participants experienced a mean of 3.74 (*SD* = 0.75) for work-related need satisfaction, 2.14 (*SD* = 0.73) for work-related need frustration, 4.00 (*SD* = 0.71) for nonwork-related need satisfaction, and 1.98 for nonwork-related need frustration (*SD* = 0.80). On average across days, participants experienced a mean of 3.14 (*SD* = 1.12) for positive work reflection, 2.41 (*SD* = 1.22) for negative work reflection, and 3.22 (*SD* = 1.20) for psychological detachment from work. For work

engagement, they experienced a mean across days of 2.76 for vigor (*SD* = 1.15), 3.37 for dedication (*SD* = 1.00), and 3.32 for absorption (*SD* = 1.14). They experienced a mean exhaustion of 2.99 (*SD* = 1.29). Additional descriptive statistics for the focal daily variables are available in Table 4.

Histograms were produced for each daily variable aggregated across days to assess univariate normality (see Figures 4 through 15). Based on their histograms, nonwork-related need frustration (skewness = 1.07, *SE* = 0.24; kurtosis = 1.31, *SE* = 0.47) and negative work reflection (skewness = 0.70, *SE* = 0.24; kurtosis = -0.39, *SE* = 0.47) appeared to be skewed. Additional histograms for those variables for each day were therefore produced. After examining those histograms, it appeared the skewness was the result of low response rates on certain days because on days with higher response rates, the histograms appeared to be more normal. Finally, scatterplots and correlations were produced to visualize and examine the hypothesized direct relationships among focal variables (see Figures 16 through 29; Tables 3.1, 3.2, 3.3). Scatterplots indicate that all focal variables were related to each other in the expected directions and provide an initial indication of the strength of relationships between variables.

Group Comparisons

To inform decisions on whether to include any baseline variables as level 1 controls during hypothesis testing, a series of *t*-tests, analyses of variances (ANOVAs), and correlations were conducted to examine whether differences in the focal variables existed among the sample based on gender, age, race/ethnicity, education level, job level, work district, and organizational tenure. This is important because the hypothesized

relationships may be confounded by individual characteristics such as one's age or work arrangement. The results of many of these analyses were significant; however, there were several cases in which very small groups (e.g., $N = 2$) were being compared to much larger groups. It is therefore unlikely that the sub-groups used for comparison were representative. In addition, it is possible that many of these variables play substantive roles in the hypothesized associations. Therefore, these results are discussed here, but control variables were not included in hypothesis testing. For space considerations, only omnibus results are presented in text. See Appendix B for more detailed results (i.e., post-hoc comparisons, effect sizes).

Independent-samples *t*-tests were conducted to examine differences based on gender. Results demonstrated that women tended to experience higher need satisfaction at work ($t(112) = -2.42$, $p < .05$, $d = -0.46$) and specifically need satisfaction of relatedness at work ($t(99.86) = -4.61$, $p < .001$, $d = -0.88$). They also experience greater absorption ($t(71) = -2.91$, $p < .01$, $d = -0.69$) and overall engagement ($t(71) = -2.22$, $p < .05$, $d = -0.53$), as well as positive work reflection ($t(84.48) = -3.07$, $p < .01$, $d = -0.63$). In addition, women experience higher need satisfaction of relatedness in nonwork domains ($t(104) = -2.95$, $p < .01$, $d = -0.58$), while men tend to experience higher need frustration in nonwork domains ($t(104) = 2.14$, $p < .05$, $d = 0.42$), and specifically higher need frustration of relatedness ($t(81.49) = 2.41$, $p < .05$, $d = 0.48$). Finally, men tend to experience high need frustration of autonomy at work ($t(112) = -4.63$, $p < .001$, $d = 0.50$) and higher negative work reflection ($t(100) = 3.19$, $p < .01$, $d = 0.64$).

Multiple one-way ANOVAs with Bonferroni post-hoc comparisons were conducted to examine differences based on race/ethnicity. Results demonstrated that significant differences existed among groups in need satisfaction of autonomy at work ($F(3, 110) = 5.77$, $p < .01$, $\eta^2 = 0.14$), need frustration of autonomy at work ($F(3, 110) = 3.27$, $p < .05$, $\eta^2 = 0.08$), need satisfaction of competence at work ($F(3, 110) = 9.50$, $p < .001$, $\eta^2 = 0.21$), need frustration of competence at work ($F(3, 110) = 7.91$, $p < .001$, $\eta^2 = 0.18$), need frustration of relatedness at work ($F(3, 110) = 7.34$, $p < .001$, $\eta^2 = 0.17$), general need satisfaction at work ($F(3, 110) = 7.46$, $p < .001$, $\eta^2 = 0.17$), and general need frustration at work ($F(3, 110) = 10.44$, $p < .001$, $\eta^2 = 0.22$). Further, differences existed in need frustration of competence in nonwork domains ($F(3, 102) = 3.35$, $p < .05$, $\eta^2 = 0.09$), as well as positive and negative work reflection ($F(3, 99) = 3.80$, $p < .05$, $\eta^2 = 0.10$; $F(3, 98) = 7.02$, $p < .001$, $\eta^2 = 0.18$). See Appendix B for post-hoc comparisons.

Pearson product-moment correlations were used to examine the relationships between age, tenure, and the focal variables. Results demonstrated that both age and tenure were negatively correlated with psychological detachment from work ($r = -0.28$, $p < .01$; $r = -0.24$, $p < .05$). In addition, tenure was positively correlated with exhaustion ($r = 0.28$, $p < .05$). Although these correlations were significant, the effect sizes were considerably small (i.e., < .03). Age and tenure were therefore not included as control variables in during hypothesis testing.

Independent-samples *t*-tests were conducted to exam differences based on being a remote worker versus being an on-site worker. Results showed that there were no significant differences in the focal variables among these groups. Additional one-way

ANOVAs and post-hoc comparisons indicated that some differences in need satisfaction and need frustration exist based on level of education, as well as job level. Specifically, differences existed in need satisfaction of relatedness at work ($F(2, 111) = 5.96$, $p < .01$, $\eta^2 = 0.10$), need frustration of relatedness at work ($F(2, 111) = 4.78$, $p < .05$, $\eta^2 = 0.08$), need frustration of competence in nonwork domains ($F(2, 103) = 3.86$, $p < .05$, $\eta^2 = 0.07$), and need frustration of relatedness in nonwork domains ($F(2, 103) = 4.26$, $p < .05$, $\eta^2 = 0.08$) based on college education experience. Further, differences existed in need frustration of competence in nonwork domains ($F(2, 103) = 6.39$, $p < .01$, $\eta^2 = 0.11$), need frustration of relatedness in nonwork domains ($F(2, 103) = 6.61$, $p < .01$, $\eta^2 = 0.11$), general need frustration in nonwork domains ($F(2, 103) = 3.59$, $p < .05$, $\eta^2 = 0.07$), general need frustration at work ($F(2, 110) = 3.88$, $p < .05$, $\eta^2 = 0.07$), need satisfaction of competence in nonwork domains ($F(2, 103) = 3.44$, $p < .05$, $\eta^2 = 0.06$), negative work reflection ($F(2, 99) = 4.04$, $p < .05$, $\eta^2 = 0.08$), and exhaustion ($F(2, 70) = 3.82$, $p < .05$, $\eta^2 = 0.10$) based on job level. Finally, one-way ANOVA results demonstrated some differences based on work district.

Specifically differences existed in need satisfaction of relatedness at work ($F(5, 108) = 6.89$, $p < .001$, $\eta^2 = 0.24$), general need satisfaction in nonwork domains ($F(5, 100) = 2.81$, $p < .05$, $\eta^2 = 0.12$), and positive work reflection ($F(5, 97) = 8.79$, $p < .001$, $\eta^2 = 0.31$) based on work district. See Appendix B for post-hoc comparisons.

Many of the calculated effects sizes observing the relationships between gender, race/ethnicity, education, and various job characteristics and the focal variables were moderate to large. Some of these associations are of theoretical interest – for example,

managers, in many cases, experienced significantly stronger need frustration compared to individual contributors and directors. Although it is important to consider the unique role of a manager, it is crucial to consider whether a potential control variable is a biasing factor or a substantive factor in the observed relationships (Becker, 2005; Spector et al., 2000; Spector & Brannick, 2011). It is possible that many of the potential control variables considered play substantive roles in the observed associations. For this reason, if they were to be controlled for, substantive effects (as opposed to bias or confounding effects), would be removed for the results (Spector et al., 2000). In addition, for many groups (e.g., managers, those who did not disclose race/ethnicity), the number of observations was quite small (see Appendix B). In some post-hoc comparisons, as few as two observations were compared to greater than 50 observations. It is therefore also important to consider whether these small sub-samples were representative of the larger sub-population. Based on these considerations, the present demographic variables and job characteristics were not included as control variables in the hypothesis testing portion of this study.

Intraclass Correlation Coefficients

Intraclass correlations (ICCs) were calculated to confirm the nested structure of the data and to ensure sufficient variability exists in the focal variables at the within person level to justify using a multilevel model to investigate the focal within-level hypotheses (Bliese, 2000; Kline, 2011; Shrout & Fleiss, 1979). The ICC indicates the proportion of total score variability that is accounted for by the cluster variable (Cohen et al., 2013; Kline, 2011). In the context of this study, one minus the ICC therefore provides

an estimate of the variance in each focal variable that is explained by the within-person characteristics. Individual ICCs were calculated for each focal variable (see Table 4). There is no predetermined cutoff score for ICCs, but a common rule of thumb is that ICCs greater than or equal to .10 are sufficient to warrant multilevel modeling (Kline, 2011). The ICCs calculated for each focal variable (i.e., work-related need satisfaction and frustration, nonwork related need satisfaction and frustration, positive work reflection, negative work reflection, psychological detachment, engagement, and exhaustion) were greater than .10 and ranged from .27 to .65, and thus were sufficiently high to warrant multilevel analyses. ICCs were additionally calculated for the sub-facets of need satisfaction and frustration (i.e., one minus ICC). The ICCs for these sub-facets ranged from .31 to .95, indicating that sufficient variance existed at the within-person level to warrant multilevel analyses.

Representativeness and Missingness

Because the response rate in this study was low (40%), the level of missingness was high (60%), and the level of actual observations relative to planned observations was very low (8%), steps were taken to examine how well this sample represented the larger organization (i.e., population) and to examine whether data were missing on any systematic basis. To ascertain representativeness, results from the organizations quarterly engagement survey were obtained. The engagement survey took place in the same quarter as the present study, sampled from the entire organization, and had a response rate of 83%. At the time of this survey, the organization had an approximate total of 250 individuals, thereby providing a sample of about 208 participants. Although this sample

was not randomly selected from the organization, it serves as an adequate indicator of the population.

Sample means for a series of items intended to capture engagement were obtained from the partnering organization. Each item was matched to a baseline item in the present survey that was used to capture organizational resources, burnout, or engagement (see Table 5.1). For each item a one-sample *t*-test was conducted to examine differences between the present study's sample and the population mean (see Table 5.1 for results). Further, some of the selected items were averaged to represent the construct of engagement. Specifically, any items that were included in the disengagement subscale of the burnout measure (OLBI; Demerouti et al., 2010) or in the baseline engagement scale (UWES; Schaufeli et al., 2006) were averaged for the study sample. The item means for the corresponding population items were averaged. An additional one-sample *t*-test was subsequently conducted to examine whether the present sample differed from the organization on engagement. The *t*-test demonstrated that the present sample had significantly lower engagement compared to the population mean ($t(46) = 4.02$, $p < .001$, CI[0.20-0.61]).

Missingness within the study sample was also examined. Forty of the 47 individuals that had complete responses to the baseline survey participated in at least one daily survey. Therefore, the 7 individuals who did not respond to any daily surveys were compared to the sample of 40 on gender, age, household size, job level, department, work arrangement, organizational resources, burnout, and engagement. Examining these associations allowed me to examine possible systematic reasons why those 7 did not

participate in the daily portion of the study. A dummy code was created in which the 40 participants with a response to a daily survey were coded as 1 and the 7 participants without a response to a daily survey were coded as 0. A series of binary logistic regressions were conducted to determine whether the previously stated variables were associated with the dummy variable, the latter of which indicated whether responses were available for the daily survey. Results demonstrated that there were no systematic differences between those who took part in the daily portion of the study and those who did not (see Table 5.2).

Finally, although the entire sample of 40 was included in the hypothesis testing portion of this study, there were few participants who responded to most of the surveys. For that reason, another dummy code was created in which participants who responded to at least 10 surveys were coded as 1 and participants who responded to fewer than 10 surveys were coded as 0. This dummy code was regressed onto the same variables as described above. Results demonstrated that no significant differences existed between those who responded to fewer than ten surveys and those who responded to ten or more surveys. However, all seven individuals who responded to ten or more surveys were individual level contributors, indicating that no director or manager responded to more than nine surveys. Further, of the seven individuals who responded to 10 or more, three were a part of the R&D department and four were a part of the Growth department. It is possible that the small sample and cluster sizes limited my ability to detect smaller, but potentially meaningful differences among these groups.

These analyses did not point to a systematic rationale for any present missing data. Based on these results, maximum likelihood (ML) estimation is used for hypothesis testing because ML tends to yield unbiased parameter estimates when data are missing at random and results in higher statistical power than traditional missing data techniques (e.g., listwise or pairwise deletion, mean imputation) when data are missing completely at random (Baraldi & Enders, 2010; Enders, 2010; Graham, 2009).

Confirmatory Factor Analyses

A series of multi- and single-level confirmatory factor analyses (CFAs) were conducted to examine the overall factor structures of the hypothesized relationships. CFAs are intended to confirm decisions on whether to create superordinate factors or composite scores of certain sets of variables (i.e., need satisfaction and frustration, mediators, work engagement) or to treat them as unique factors. Multilevel CFAs (MCFAs) additionally allow for examination of whether the factor structure that exists at the within-level also exists at the between-level. Each MCFA was conducted twice – once using a maximum likelihood (ML) estimator and once allowing M*plus* to determine the proper estimation method. Maximum likelihood estimation is derived from the multivariate normal distribution and tends to yield unbiased parameter estimates when data are missing at random. It additionally results in higher statistical power than traditional missing data techniques when data are missing completely at random (Baraldi & Enders, 2010; Graham, 2009). For each instance in which the estimator was determined by the program, M*plus* defaulted to an MLR estimator. This approach to estimation produces ML parameter estimates with standard errors and a chi-square test

statistic that are robust to non-normality and non-independence of observations (Muthén & Muthén, 1998-2017). When ML estimation is used for data that are non-normal, estimates produced – specifically the chi-square value – tend to be inflated (Flora & Curran, 2004). The chi-square valued produced using MLR is scaled by a correction factor and is therefore robust to non-normality. Model fit was assessed using chi-square values, standardized root mean square residual (SRMR), root mean square error of approximation (RMSEA), comparative fit indices (CFI), and Tucker-Lewis indices (TLI). These indices assert whether each specified model fits the data adequately. I adhered to conventional cutoffs proposed by Hu and Bentler (1999): SRMR < .08, RMSEA < .06, CFI > .95, TLI > .95). See Tables 6 and 7 for a summary of multi- and single-level CFA results, respectively.

Need satisfaction and frustration are comprised of three facets each: autonomy, competence, and frustration (Deci & Ryan, 2000; Ryan & Deci, 2000). Debate exists in the literature on whether the three needs exist as unique constructs or whether they all contribute to a superordinate factor of need satisfaction or frustration (van den Broeck et al., 2016). In addition, work engagement is comprised of three components: vigor, dedication, and absorption (Demerouti et al., 2010). One multi-level CFA was modeled to represent Hypotheses 1, 3, 5, 6, and 8 and another was modeled to represent Hypotheses 2, 4, 7, and 9. The first CFA therefore modeled work-related need satisfaction, nonwork-related need satisfaction, positive work reflection, psychological detachment, engagement, and exhaustion on their own respective factors. The second modeled work-related need frustration, nonwork-related need frustration, negative work reflection,

engagement, and exhaustion on their own respective factors. These CFAs were expanded into four additional CFAs in which needs were broken down into three facets each (representing autonomy, competence, and relatedness) and engagement was broken down into three facets (vigor, dedication, and absorption). All CFAs were conducted using both ML and MLR. Many of the CFA models did not converge or produce estimates. A series of single-level CFAs were therefore conducted as an additional attempt to examine the factor structure of all hypothesized associations. This approach is less robust than MCFAs, but it does not make as many assumptions. See Table 6 for a summary of the multilevel CFA results.

None of the MCFAs and single-level CFAs converged. The error messages generated in each model indicated an identification issue and that the number of parameters was greater than both the number of clusters, as well as the sample size. Because the number of unknown parameters was greater than the number of "knowns," each of these models was under-identified. In under-identified models it is not possible to uniquely estimate all the unknown parameters (Kenny, 2011; Kline, 2011). It is also possible that the non-convergence issues are due to empirical under-identification. Several models produced a warning that stated a correlation existed between two variables that was greater than or equal to one. This indicates extreme collinearity that ultimately reduces the number of observations (because the highly correlated variables essentially represent the same variable; Kenny, 1979; Kline, 2011). In the case of empirical under-identification, the number of known parameters is therefore reduced to a number lower than the number of unknown parameters.

Despite limitations of the sample size, additional MCFAs were conducted to determine whether the theoretically multifaceted constructs (need satisfaction, need satisfaction, work engagement) should be treated as superordinate factors or multifaceted constructs in the hypothesis testing portion of this study (see Table 7). While conducting MCFAs for singular constructs reduces the number of parameters being estimated, many of these analyses still produced an error indicating under-identification. Although many of these models produced fit estimates, these results should be interpreted cautiously given the small cluster and sample sizes. Two MCFAs were conducted comparing a one-factor model of engagement to a three-factor model with the three components separated (i.e., vigor, dedication, and absorption). Both models produced errors demonstrating a potential collinearity issue, but model estimates were still generated. The one-factor model demonstrated poor fit ($\chi^2(54) = 120.21$, CFI = 0.83, TLI = 0.77, $SRMR_w = 0.18$, $SRMR_b = 0.13$, RMSEA = 0.13). The three-factor model demonstrated improved fit ($\chi^2(48) = 66.75$, CFI = 0.95, TLI = 0.93, $SRMR_w = 0.14$, $SRMR_b = 0.09$, RMSEA = 0.07). A likelihood ratio test demonstrated that the three-factor model had significantly better fit than the one-factor model ($\chi^2(6) = 53.46$, $p < .001$).

Two MCFAs were conducted to compare a one-factor model of work-related need satisfaction to a three-factor model with autonomy, competence, and relatedness as their own unique factors. The one-factor model demonstrated poor fit ($\chi^2(18) = 72.20$, CFI = 0.71, TLI = 0.52, $SRMR_w = 0.12$, $SRMR_b = 0.18$, RMSEA = 0.16). The three-factor model generated a warning indicating collinearly between two variables but demonstrated good fit ($\chi^2(12) = 6.27$, CFI = 1.00, TLI = 1.08, $SRMR_w = 0.02$, $SRMR_b = 0.04$, RMSEA

= 0.00). A likelihood ratio test demonstrated that the three-factor model had significantly better fit than the one-factor model ($\chi^2(6) = 65.93$, $p < .001$). Similarly, two MCFAs were conducted to compare a one-factor model of work-related need frustration to a three-factor model. Both the one- and three-factor models produced errors indicating high levels of collinearity between two variables. The one-factor model demonstrated poor fit ($\chi^2(18) = 63.48$, CFI = 0.73, TLI = 0.54, $SRMR_w = 0.10$, $SRMR_b = 0.24$, RMSEA = 0.15). The three-factor model demonstrated improved fit ($\chi^2(12) = 10.56$, CFI = 1.00, TLI = 1.02, $SRMR_w = 0.04$, $SRMR_b = 0.05$, RMSEA = 0.00), and was demonstrated to fit significantly better according to the likelihood ratio test ($\chi^2(6) = 52.92$, $p < .001$).

One- and three-factor models were additionally conducted to examine the factor structures of need satisfaction and frustration in nonwork domains. The one-factor model for nonwork-related need satisfaction demonstrated inadequate fit ($\chi^2(18) = 30.02$, CFI = 0.91, TLI = 0.85, $SRMR_w = 0.07$, $SRMR_b = 0.17$, RMSEA = 0.08). Similar to previous models, the three-factor model indicated an empirical under-identification issues but demonstrated good fit ($\chi^2(12) = 7.17$, CFI = 1.00, TLI = 1.09, $SRMR_w = 0.04$, $SRMR_b = 0.17$, RMSEA = 0.00). The likelihood ratio test indicated that the three-factor model fit significantly better than the one-factor model ($\chi^2(6) = 22.85$, $p < .001$). For nonwork-related need frustration, the one-factor model produced a warning indicating high levels of collinearity between two variables. The one-factor model demonstrated poor fit ($\chi^2(18) = 56.42$, CFI = 0.80, TLI = 0.67, $SRMR_w = 0.12$, $SRMR_b = 0.19$, RMSEA = 0.14). The three-factor model could not be generated due to an error in computation and a likelihood ratio test could therefore not be conducted.

Based on the MCFA results, it was determined that work engagement should be treated as three unique factors that make up the construct of work engagement. It is therefore treated as such in the hypothesis testing section. However, because many of these models were under-identified, correlations with engagement as a single construct are also provided (see Tables 3.1-3.3). The results also indicated that need satisfaction and frustration of autonomy, competence, and relatedness should be treated as unique factors. Based on these results, issues with under-identification, and the fact that debate exists in the literature on how to score this variable, hypotheses were tested both using higher order factors representing need satisfaction and frustration, and treating autonomy, competence, and relatedness as unique factors.

Analytical Approach

An increasingly popular analytic approach to multilevel designs is multilevel structural equation modeling (MSEM). MSEM offers several benefits compared to the more traditional technique of hierarchical linear modeling (HLM; Lüdke et al., 2008). When data have a hierarchical structure, HLM provides a more suitable alternative to ordinary least squares (OLS) regression because HLM allows intercepts and slopes to vary between people and parses out variance across levels of analysis (Raudenbush & Bryk, 2002). However, MSEM has emerged as an alternative to HLM and is especially useful in computing multilevel path models.

MSEM integrates SEM into a multilevel modeling framework and therefore permits the modeling of latent means for between-level variables for predictor and outcome variables. Within-level observed variables can also be operationalized at the

between-level using latent variables, which corrects for sampling error (Preacher et al., 2011). Further, the variance of within-level observed variables are portioned into within and between variance components, which allows focal relationships to differ across levels (Preacher et al., 2011; Preacher et al., 2010). The MSEM approach is also beneficial because causal steps approaches tend to have lower power compared to SEM approaches (Fritz & MacKinnon, 2007), which reduces the likelihood of detecting indirect effects when they exist. Finally, MSEM can be used to simultaneously estimate the path and measurement models, thereby correcting for attenuation due to measurement error (Marsh et al., 2009). As such, all relevant direct effects can be estimated in a single model, as opposed to estimating multiple models.

I attempted to specify MSEMs in M*plus* to produce parameter estimates for the hypothesized associations (see Table 8). However, MSEM requires large sample sizes and that the number of known values is greater than or equal to the number of unknown parameters. This sample size is required because full MSEMs require both structural and measurement components to be estimated, while other multilevel approaches (e.g., multilevel path analysis, multilevel correlation) estimate structural components only. If the sample size requirement is not met, the model is deemed under-identified and it becomes impossible to estimate all of its parameters (Kenny, 2011; Kline, 2011). For these reasons, the MSEMs specified in this study produced errors indicating nonidentification. This nonidentification, specifically under-identification occurred because the number of unknown parameters was greater than the number of clusters or sample size. In order to estimate multiple direct effects in one model, MSEM requires a

larger number of observations. Under conditions in which statistical power is not high enough to specify MSEMs, it is possible to use other approaches to multilevel modeling.

To conduct MSEMs, most would advise a sample size of at least 100 at level 2 (i.e., between-person level; Hox, 2013; Preacher et al., 2010). In addition, a common rule of thumb is that multilevel models require at least 30 clusters (i.e., individuals) with at least 30 observations within each cluster (Huang, 2018). However, simulation evidence has shown that in multilevel regression modeling, the sample size can be as low as 20 in order to estimate regression coefficients and standard errors accurately (Maas & Hox, 2005). In addition, when one's sample is relatively small or the data are non-normal, there are alternative approaches to model estimation that can be utilized. Maximum likelihood (ML) estimation is the most commonly used approach in SEM analysis and is often preferred because it results in higher statistical power than traditional missing data techniques when data are missing completely at random (Baraldi & Enders, 2010; Graham, 2009). An alternative to ML estimation that is particularly useful for non-normal data or small samples is ML with robust standard errors (MLR). This approach to estimation produces ML parameter estimates with standard errors and a chi-square test statistic that are robust to non-normality and non-independence of observations (Muthén & Muthén, 1998-2017). When ML estimation is used for data that are non-normal, estimates produced – specifically the chi-square value – tend to be inflated (Flora & Curran, 2004). The chi-square valued produced using MLR is scaled by a correction factor and is therefore robust to non-normality. However, depending on the complexity of the model, the is a risk of overcorrection when using MLR with smaller samples

(Newsom, 2018; Satorra & Bentler, 1994). Although MLR offers chi-square and standard error corrections for non-normal or skewed data, the histograms and descriptive statistics produced in this study indicated that the focal variables were normally distributed. In addition, the CFA results demonstrated that the use of an MLR estimator did not substantially alter results compared to using an ML estimator. Therefore, correlations were specified at the within- and between-person level using an ML estimator. See Appendix C for a summary on why this approach was taken.

To reduce the number of unknown parameters and to avoid under-identification, multilevel correlational analyses were utilized as an alternative to MSEM to estimate individual hypothesized direct effects. Multilevel correlation provides a benefit above basic correlational analyses because it partitions the within- and between-person variance (Cohen et al., 2013; Singer & Willet, 2003). It therefore reduces the standard error for each estimate and allows for interpretation of relations due to within-person variance, as well as those due to between-person variance.

Chapter 6: Hypothesis Testing

Hypotheses were tested using M*plus* Version 8.1 (Muthén & Muthén, 1998-2017) and an ML estimator. Multilevel correlations were conducted to examine the hypothesized direct associations. Given my focus on day level, within correlations from the multilevel correlation models were used for hypothesis testing. See Figures 1 and 2 for the conceptual models. See Table 9 for a summary of hypothesis testing results.

Hypotheses 1a and 1b examined whether the experience of daily need satisfaction at work was associated with higher levels of positive work reflection and psychological detachment in the evening. Hypothesis 1a was supported, such that there was a significant positive correlation between need satisfaction at work and positive work reflection at the within person level ($r = .26$, $p < .05$). In other words, on days in which individuals experienced stronger need satisfaction at work, they reflected more positively on work that evening during nonwork time. Specifically, results demonstrated that work-related need satisfaction of competence was associated with positive work reflection ($r = .40$, $p < .001$), while autonomy and relatedness were not. Results did not support Hypothesis 1b and work-related need satisfaction was unrelated to psychological detachment. Hypothesis 2 examined the association between daily work-related need frustration and negative work reflection. Daily need frustration at work was unrelated to negative work reflection in the evening; however, daily work-related need frustration of competence and relatedness were both positively related to negative work reflection ($r = .27$, $p < .05$; $r = .29$, $p < .05$). This indicates that on days in which participants experienced greater frustration of competence and relatedness at work, they experienced

increased negative work reflection that evening. Thus, partial support was found for Hypothesis 2.

Hypotheses 3a and 3b examined the associations between daily need satisfaction at work and work engagement and exhaustion the next workday. Daily experiences of need satisfaction at work were unrelated to next day work engagement, as well as next day exhaustion. However, the daily experience of work-related need satisfaction of relatedness was related to next day dedication, though this association was in the unexpected direction ($r = -.40$, $p < .01$). Therefore, Hypothesis 3 was not supported. Hypotheses 4a and 4b examined whether daily work-related need frustration was associated with next day work engagement and exhaustion. Daily work-related need frustration was not associated with any facet of work engagement, nor was it associated with exhaustion, thereby failing to provide support for Hypothesis 4.

Hypotheses 5, 6, and 7 examined the associations between psychological detachment from work, positive work reflection, and negative work reflection and next day work engagement and exhaustion. These three cognitive processes in the evening were all unrelated to the next day outcomes of work engagement and exhaustion. Thus, hypotheses 5a, 5b, 6a, 6b, 7a, and 7b were all unsupported.

Hypotheses 8 and 9 examined the direct associations between daily need satisfaction and frustration at work and daily need satisfaction and frustration in nonwork domains. Experiences of daily need satisfaction at work were unrelated to experiences of need satisfaction after work in nonwork domains. The only exception was that daily work-related need satisfaction of competence was significantly linked to daily nonwork-

related need satisfaction of relatedness ($r = .25$, $p < .05$). Similarly, experiences of daily need frustration at work were unrelated to experiences of need frustration in nonwork domains in the evening. Thus, results did not provide support for Hypotheses 8 or 9. In summary, Hypothesis 1a (i.e., daily need satisfaction at work will be positively associated with positive work reflection) and Hypothesis 2 (i.e., daily need frustration at work will be positively associated with negative work reflection) were supported.

Post-Hoc Power Analysis

Post-hoc power analyses were conducted using M*plus* version 8.1 (Muthén & Muthén, 1998-2017) to examine whether sufficient statistical power existed to detect effects for each hypothesis. These analyses were conducted using Monte Carlo simulations with 1,000 repetitions and the ML estimator. Monte Carlo simulations generate data using observed parameter values that allow one to determine power using a pre-specified sample size. This approach to ascertaining statistical power is particularly useful when data are missing (present data were 60% missing) and/or non-normal (Muthén & Muthén, 2002; Schoemann et al., 2014).

The components included in a power analysis are power, alpha level, sample size, and effect size. In this study, power is an unknown estimate, while the alpha level, sample size, and effect size are all known values. Start values for each estimated parameter and variance component were generated using multilevel correlation analyses and subsequently inputted along with the number of observations, number of clusters and cluster sizes, and the two-tailed alpha level of .05 to calculate power. Power was computed for each hypothesized relation. Results demonstrated that while sufficient

power existed to examine nearly all between-person associations, all of the within-person correlations were substantially underpowered (see Table 10). Specifically, all of the power estimates for within-person associations were below the conventional cut-off of .80. This indicates that findings and non-findings should be interpreted with caution.

Hypotheses 1a and 1b examined the association between work-related need satisfaction and positive work reflection, as well as psychological detachment from work. Correlational analyses for both relationships were underpowered (power = .76; power = .18). The next hypothesis (Hypothesis 2) examined the association between work-related need frustration and negative work reflection and was also underpowered (power = .63). Hypotheses 3a and 3b tested the relationship between daily work-related need satisfaction and next day work engagement and exhaustion. The correlations were underpowered for vigor, dedication, and absorption (power = .05; power = .59; power = .07), as well as exhaustion (power = .76). Likewise, Hypothesis 4a and 4b examined associations between work-related need frustration and next day work outcomes, which were also underpowered (power = .04; power = .04; power = .20; power = .15). Hypotheses 5a and 5b examined associations between psychological detachment from work and next day engagement and exhaustion. These analyses were also substantially underpowered (power = .07; power = .05; power = .06; power = .08). Similarly, Hypotheses 6a and 6b examined correlations between positive work reflection and next day engagement and exhaustion, which lacked sufficient statistical power (power = .77; power = .05; power = .05; power = .71). Hypotheses 7a and 7b considered the association between negative work reflection and engagement, as well as exhaustion. Similar to

previous analyses, these correlations were underpowered (power = .04; power = .24; power = .34; power = .04). Finally, Hypotheses 8 and 9 examined the relationships between work-related need satisfaction and nonwork-related need satisfaction and between work-related need frustration and nonwork-related need frustration. Both analyses were underpowered (power = .19; power = .24).

Chapter 7: Discussion

The present research sought to build on self-determination theory and provide evidence for resource-based processes by examining daily need satisfaction and frustration in work and nonwork domains, as well as the cognitive processes and work well-being outcomes they are associated with. Despite challenges associated with a low participant response rate, the high level of data missingness, and low statistical power at the within level, multilevel correlations revealed initial evidence for some of the proposed processes – but should be interpreted with caution. First, results demonstrated partial support for Hypothesis 1a. Specifically, there was a positive within-person correlation between need satisfaction at work in general, as well as need satisfaction of competence at work, and positive work reflection in the evening. This indicates that on days in which individuals experienced higher work-related need satisfaction, namely need satisfaction of competence, they experienced higher positive work reflection in the evening. Hypothesis 1b, which proposed a positive within-person correlation between need satisfaction at work and psychological detachment, was not supported.

Similarly, Hypothesis 2 proposed a positive association between need frustration at work and negative work reflection in the evening. Results provided partial support for this hypothesis. Specifically, need frustration at work in general was not significantly associated with negative work reflection, however, need frustration of competence and relatedness at work were associated with higher negative work reflection in the evening. These findings indicate that need satisfaction and need frustration may respectively

represent resource-facilitating and resource-depleting experiences that can relate to the way individuals process work-related thoughts during nonwork time each day.

Hypothesis 3 proposed that work-related need satisfaction would be positively associated with work engagement the next day and negatively associated with exhaustion the next day. Results did not support this hypothesis, such that daily work-related need satisfaction in general was unrelated to both engagement and exhaustion the next day. However, need satisfaction of relatedness at work was significantly associated with next day dedication in the unexpected direction. This indicates that on days in which employees experience strong levels of relatedness at work, they experience less dedication at work the following day. It is possible that on days in which employees experience stronger relatedness, they are experiencing higher levels of stress and are therefore in need of more social support. This stress, although met with higher feelings of relatedness, may be associated with decreased engagement the next day (Semmer & Beehr, 2014). Hypothesis 4 proposed that need frustration at work would be negatively associated with next day engagement and positive associated with next day exhaustion. Associations between work-related need frustration and next day engagement, as well as exhaustion were non-significant, and Hypothesis 4 was therefore unsupported.

Hypotheses 5 and 6 proposed that psychological detachment from work and positive work reflection in the evening would be positively linked to next day work engagement and negatively to next day exhaustion. Similarly, hypothesis 7 proposed that negative work reflection in the evening would be negatively associated with next day engagement and positively associated with next day exhaustion. Results did not provide

any support for hypotheses 5, 6, and 7, such that psychological detachment, as well as both positive and negative work reflection, were all unrelated to next day engagement and exhaustion.

Finally, Hypothesis 8 examined the spillover of need satisfaction from work and nonwork domains, while Hypothesis 9 examined the spillover of need frustration from work to nonwork domains. Specifically, it was hypothesized that on days in which individuals experienced stronger need satisfaction at work, they would also experience higher need satisfaction in nonwork domains. Conversely, need frustration at work was hypothesized to be associated with need frustration in nonwork domains. Hypotheses 8 and 9 were not largely supported, however, there was a significant and positive association between need satisfaction of competence at work and need satisfaction of relatedness in nonwork domains that evening. This indicates that on days in which individuals experience competence at work, they tend to experience stronger relatedness with those around them outside of work.

Although many of the hypothesized relationships were not supported at the within-person level, the between-person correlational results provide some support for the hypothesized associations (see Tables 3.1-3.3). Further, post-hoc power analyses indicated that sufficient power existed to detect most of these effects at the between-person level (see Table 10). Generally, these findings indicate that those who experienced strong need satisfaction at work tended to experience stronger psychological detachment from work during nonwork time and reflect more positively on work during nonwork time. They also experienced stronger work engagement and lower work-related

exhaustion. Finally, they experienced stronger need satisfaction in nonwork domains. On the other hand, individuals who experienced strong need frustration at work tended to reflect negatively on work, had lower work engagement, and higher exhaustion. They were also more likely to experience need frustration in nonwork domains.

In addition to the hypothesized findings, there were non-hypothesized significant within-person correlations. Specifically, frustration of all work-related needs were negatively associated with positive work reflection in the evening, indicating that on days in which individuals experienced frustration of autonomy, competence, and/or relatedness at work, they experienced less positive work reflection. This may demonstrate that in instances in which individuals experience need frustration at work, although they may not necessarily experience increased negative work reflection that evening, they are likely not partaking in positive work reflection.

Further, although work-related need satisfaction was not related to psychological detachment, need satisfaction in nonwork domains, and specifically need satisfaction of autonomy in nonwork domains were positively linked to detachment. This indicates that on days in which employees experience need satisfaction and autonomy at home, they are more likely to experience a sense of detachment during nonwork time. In addition, positive work reflection was positively related to psychological detachment, indicating that on days in which individuals reflect positively on work during nonwork time, they also experience higher levels of psychological detachment. In line with these findings, need frustration in nonwork domains (specifically autonomy and competence) were negatively related to psychological detachment at the within-person level, demonstrating

that on days in which individuals experienced frustrated autonomy and competence in nonwork domains, they experienced less psychological detachment in the evening.

Although need frustration during nonwork time was linked to lower levels of psychological detachment in the evening, it was also positively linked to next day work engagement. Specifically, need frustration in nonwork domains was positively associated with next day vigor, dedication, and absorption. Further, frustration of autonomy was positively related to next day vigor and frustration of relatedness was linked to next day dedication. This indicates that on evenings in which individuals experience need frustration outside of work, they feel more strongly engaged at work the next day. This demonstrates that while nonwork-related need frustration may represent a resource depleted state outside of work, it may still be possible for individuals to seeks resources (e.g., seek social support, craft their work time) and experience positive work outcomes the following day.

Contributions

One of the aims of this study was to contribute to SDT by examining how needs function in multiple life domains. Previous research has indicated that needs exist in unique domains such as work, home, volunteering, extracurricular activities, etc. (Deci et al., 2017; Milyavskaya et al., 2009; Milyavskaya & Koestner, 2011). However, existing organizational literature tends to capture only work-related need satisfaction, thereby disregarding the work-nonwork dynamics of need satisfaction and frustration. The present study provides additional evidence that needs indeed exist in unique domains (i.e., work and nonwork). Specifically, the present research found that at the within-

person level, need satisfaction and frustration at work were generally unrelated to need satisfaction and frustration in nonwork domains. While this fails to support Hypotheses 8 and 9, it demonstrates that one can experience high need satisfaction at work and low need satisfaction in nonwork domains. Further, the present research found that work-related and nonwork-related needs showed unique associations with the outcomes observed. For example, results demonstrated that some work-related needs (satisfaction and frustration) were associated with positive and negative work reflection during nonwork time, but not psychological detachment, while nonwork-related needs were associated with psychological detachment, but not work reflection. It is possible that while all needs are necessary components of well-being (Deci & Ryan, 2000; Deci et al., 2017; Ryan & Deci, 2000), needs in different domains relate to different aspects of well-being or work outcomes. For example, similar to the matching hypothesis (de Jonge & Dormann, 2006), it is possible that work-related need satisfaction of relatedness is essential for organizational citizenship behaviors, while need satisfaction of relatedness in nonwork domains is essential for life satisfaction.

Beyond examining need satisfaction and frustration in multiple domains, this research contributes to SDT by examining both need satisfaction and need frustration. SDT dictates that the lack of need satisfaction does not necessarily indicate actively thwarted needs (Deci et al., 2017; Van den Broeck et al., 2016). For this reason, reviews on SDT-based organizational research have emphasized the importance of measuring both need satisfaction and need frustration, as well as the unique constructs they relate to (Bidee et al., 2016; Gagné & Deci, 2005). This research captured both need satisfaction

and need frustration, as well as the positive and negative cognitive processes and work-related well-being outcomes they relate to. Need satisfaction and frustration were also conceptualized as distinct constructs. Specifically, work-related need satisfaction was conceptualized as a resource-generating experience that was associated with positive processes in the evening, while work-related need frustration is conceptualized as a resource-depleting experience that was linked to negative cognitive processes in the evening. In addition to the conceptualization of needs in this study, results provided some evidence that lack of need satisfaction does not necessarily equate to need frustration and vice versa. For example, at the within-person level, need frustration at work was significantly and negatively correlated with positive work reflection, and frustration of competence and relatedness were positively linked to negative work reflection. Need satisfaction (specifically competence) was related to positive work reflection but was unrelated to negative work reflection. If need satisfaction and frustration were opposite sides of the same coin, then need satisfaction and frustration should have been correlated with both positive and negative work reflection at the within-person level. These findings not only indicate that need satisfaction and frustration represent unique constructs, but also that need frustration may not only relate to negative outcomes but may also mitigate positive processes and outcomes. This further emphasizes the importance of examining both need satisfaction and need frustration.

This research additionally sought to examine the daily occurrence of need satisfaction and frustration. There have been few studies demonstrating that daily variations of need satisfaction and frustration are related to variations in well-being and

other outcomes (van den Broeck et al., 2016). The ICCs calculated in this study indicated that sufficient variance existed at the within-person level to warrant multilevel analyses. Although some evidence existed for links between daily need satisfaction and frustration and their hypothesized outcomes, the multilevel analyses conducted were underpowered. However, some of the proposed associations were supported at the between-person level. It is possible that certain needs, such as competence, are important for day to day functioning, while general levels of other needs, such as autonomy, are more critical for longer-term outcomes such as burnout.

Limitations and Future Directions

The present study faces several limitations that will be important to reconcile in future research. The most pressing limitation in this study is the small sample size, small cluster sizes, low response rate, and high data missingness. Speaking with my organizational liaison illuminated several potential explanations for the low response rate at baseline, some of which include organizational transitions that had been taking place at the time, widely shared apathy and/or cynicism, and an increase in hiring that took place prior to the study. Based on this information, it is possible that some employees did not believe in the purpose of the present study and subsequently chose not to participate. Regardless of why there was such a low response rate, the fact that only 16% of the organization participated in the daily surveys severely limits my ability to make inferences about or generalize to the organization as a whole. To examine whether the present sample differed from the organization, a sample was obtained from the organization's quarterly engagement survey. Comparisons of the present sample to the

organizational population sample indicated that the present sample was lower in engagement at baseline compared to the population. It is possible that some participants opted into the present study due to dissatisfaction with the organization or hope that this study would bring about positive change. However, engagement was the only construct on which I was able to compare the two samples. For that reason, I am not able to determine exactly why so many employees opted to not participate in the study. Further, not everyone that completed the baseline survey took part in the daily surveys. In addition, only 18% of the sample responded to at least ten daily surveys and 60% of the possible 560 surveys for the 40 individual participants were missing. The high levels of missingness in the data can bias results (Enders, 2010). One explanation for high levels of missing data may be that only intrinsically motivating incentives were used to reward participants. Specifically, participants were given feedback upon completion of the study. Previous research has found that monetary incentives may be linked to higher response rates in experience sampling studies (Gabriel et al., 2019). Future researchers should therefore consider using monetary incentives when using experience sampling methods (Gabriel et al., 2019).

To further examine potential systematic reasons for missing data, missingness was also coded into a dummy variable and was regressed on to various baseline measurements. The demographic and work variables tested (e.g., age, burnout) were unrelated to missingness, however it is unlikely that sufficient power existed to detect smaller, potentially meaningful explanations for missing data. I was therefore unable to come to any conclusion on why so many data points were missing. Maximum likelihood

estimation was therefore utilized as it tends to yield unbiased parameter estimates when data are missing at random. This limitation highlights the importance of future researchers closely attending to representativeness and missingness issues in their data, as well as approaches they can take to reduce bias and maximize generalizability in their findings, such as increasing sample and cluster size. Past research has indicated that it is possible for sample sizes to be as small as 20 (Mass & Hox, 2005) or 30 (Huang, 2018), but that if samples are small, there should be at least 30 observations (i.e., surveys) per cluster (i.e., person; Huang, 2018).

There were also several technological difficulties that influenced the number of observations collected. There were two entire observation days that were skipped based on challenges with the survey texting service. Specifically, surveys were not texted on the first Monday of the study because of a minor setting error on the service's website. Surveys were not texted on the second Friday of the study because the service had not applied signal purchases to the account being used to send signals. Although this study had been piloted twice, minor errors in the survey setup resulted in 4 survey losses per participant. Because it is important to maximize the number of survey responses in daily survey methods, future researchers who are interested in using similar technique should seek out reliable technology that increases the ease of administering daily surveys. Ohly and colleagues (2010), Fisher and To (2012), and Beal (2015) offer some useful guidance around using daily and experience sampling methods in organizational research.

Several methodological and analytical limitations were faced based on the small sample size. Because there were so few total observations, I was unable to conduct

multilevel structural equation models (MSEMs) to test the proposed hypotheses and instead utilized multilevel correlations. MSEMs would have been preferred because they generate simultaneous estimates for all direct paths involved. Nearly all the models specified produced a non-positive definite error indicating under-specification. In these cases, the number of unknown parameters was greater than the number of clusters (i.e., people) and trustworthy model estimates were therefore not possible to produce (Kenny, 2011; Kline, 2011). Multilevel correlations were conducted using an ML estimator in order to examine direct effects; however, correlations do not account for shared variance between various predictors and outcomes (e.g., I was unable to simultaneously predict positive work reflection and psychological detachment).

In addition, many of the analyses (i.e., multilevel correlations, missing data analyses) that were conducted were underpowered, which subsequently increases the probability of making a type II error (i.e., failing to reject the null hypothesis when the null is not true). Specifically, post-hoc power analyses demonstrated that power for each analysis fell below the conventional threshold of .80, indicating more than a 20% likelihood of committing a type II error for each hypothesis. Many researchers have cited issues with post-hoc power analyses (Hoenig & Heisey, 2001), arguing that using parameter estimates to calculate power provides poor, and sometimes inflated power estimates. Scholars often use post-hoc power to rationalize that the only reason their hypotheses were not supported was inadequate power. However, inadequate power does not provide any indication that statistical relationships do or do not exist. Inadequate power only indicates that findings should be interpreted with caution and that non-

findings may or may not exist. In the context of this study, this means that replication with adequate sample and cluster sizes is necessary to substantiate significant results. Further, these power analyses indicate that it is entirely impossible to say whether nonsignificant associations really do or do not exist within the population. Many researchers who oppose post-hoc analyses advise a priori power analyses that help researchers determine exactly how many participants they need in order to detect effects. In this study, an a priori power analysis was not conducted because an exorbitant number of parameters and variance components would have had to be estimated and the source of these estimates would have been ambiguous. For that reason, I utilized previous research with analyses similar to the those I had proposed. In the future, researchers should consider utilizing both previous research and a priori power analyses to ascertain necessary sample and cluster sizes.

Beyond limitations based on the sample size, there are some other methodological and design-based limitations. First, although all the focal constructs were measured using validated scales, the data collected are all survey data, which puts this study at risk for common method bias (Podsakoff et al., 2003). Further, the scales used to measure need satisfaction and frustration include only two items per need. Typically, a minimum of three items is recommended to yield convergence in CFAs and to adequately and reliably capture a construct (Fisher et al., 2016; Marsh et al., 1998; Robinson, 2018). However, debate exists on whether single- or two-item scales can or should be used to measure psychological constructs. In some cases, including daily designs, fewer items may be appropriate because they improve participants reactions and may mitigate survey fatigue

(Fisher et al., 2016; Gabriel et al., 2019; Robinson, 2018). Future researchers should seek to use at least three items per construct if permissible but should also keep the length of their survey or observation in mind, particularly when using repeated-measures designs.

While examination of needs in multiple domains is a contribution of this study, it only distinguishes needs between work and nonwork. Individuals exist within numerous networks, communities, and systems and I hope that future researchers will seek to understand how various domains and contexts fulfill and thwart individuals' needs. In addition, the present study only examines work-related well-being as engagement and exhaustion. While these constructs are crucial for organizational performance (Bakker et al., 2019), it will be important for future researchers to demonstrate links between need satisfaction and frustration and outcomes that even further demonstrate why organizations, executives, and other stakeholders should care (e.g., task performance, productivity, organizational performance). This will help organizations understand why it is important to fulfill employees' needs and invest in their well-being. In the future, researchers should consider the many sources of need satisfaction and frustration and how they interact to facilitate optimal human functioning in all aspects of life.

Finally, the present study only examines direct associations among the focal variables; however, it is possible that there are additional indirect effects, sequential mediations, and moderated indirect effects that should be examined in the future. First, I propose that daily experiences of need satisfaction and frustration at work are related to cognitive processes in the evening during one's nonwork time, that are subsequently related to engagement and exhaustion the next day at work. I also propose two possible

models in which daily need satisfaction and frustration at work possibly (a) spillover into nonwork domains thereby facilitating need satisfaction and frustration outside of work; or (b) interact with need satisfaction and frustration in nonwork domains to mitigate or exacerbate negative outcomes and to facilitate even stronger positive outcomes. These propositions can be further explored in Appendix D.

Practical Implications

There are several practical implications to highlight from this study. Overall, findings indicate that one's daily experiences at work can be related to their experiences during nonwork times and in some cases, may relate to outcomes at work the next day. Findings demonstrated that on days in which employees experienced need satisfaction at work, and specifically competence, they reflected more positively on work during nonwork time. Further, on days in which individuals experienced higher need frustration of competence and relatedness at work, they experienced higher negative work reflection in the evening, as well as significantly lower positive work reflection. An employee's experience of need satisfaction or frustration is related to the way they cognitively interact with work outside of work. Although these experiences were unrelated to next-day work outcomes in the present study, they have been linked to well-being and performance in previous research. Specifically, positive work reflection can promote resource recovery during nonwork time (Fritz & Sonnentag, 2006). Positive work reflection and psychological detachment were positively correlated at the within-person level in this study, indicating that it may be possible that feeling good about one's work day may facilitate one's ability to mentally detach from work later on in the evening. In

addition, negative work reflection has been previously suggested to impede recovery experiences, thereby impairing well-being (Fritz & Sonnentag, 2006). Based on this, it is important that organizations, and specifically managers, attend to their employees' needs. They should seek to provide autonomy, competence, and relatedness at work (Deci et al., 2017). To do this, managers can look for ways to employees to craft their work time or tasks (e.g., assigning the 'what' for a task, but not necessarily the 'how'; Wrzesniewski & Dutton, 2001), recognizing employees for a job well-done, and creating accepting spaces or moments in meetings in which employees can informally connect with each other.

Managers and organizations should seek to fulfill employees' needs daily recognizing that employees' needs are unique. That is, fulfilling one need may not necessarily counter the frustration of another need (Van den Broeck et al., 2016). Results demonstrated that while need satisfaction at work and need frustration at work were negatively related at the within-person level, some needs were unrelated. Specifically, need satisfaction of competence and need frustration of relatedness were unrelated. Likewise, need satisfaction of relatedness and need frustration of competence were unrelated. This indicates that it is possible for an employee to feel extremely confident in their abilities while also feeling isolated from their coworkers or teams. This emphasizes that organizations should provide a range of resources to their employees in order to meet various need. Because managers often oversee a number of employees, they may not be able to attend to each individual employee's needs on a daily basis. Therefore, managers could schedule regular check-ins with employees to ensure they are not experiencing

need frustration. They might ask employees about their goals, which skills they feel are being underutilized, or whether they feel confident and comfortable in their team.

It is also important to acknowledge that findings pointed to need satisfaction and frustration existing in unique domains. At the within-person level, need satisfaction at work was unrelated to need satisfaction in nonwork domains and need frustration at work was unrelated to need frustration in nonwork domains. This provides support for previous research that has indicated that an individual can experience high need frustration at work, but strong need satisfaction in nonwork domains (Milyavskaya et al., 2009; Milyavskaya & Koestner, 2011). In addition, need satisfaction and frustration in nonwork domains were related to work-related outcomes that need satisfaction and frustration at work were not related to. Specifically, need satisfaction in nonwork domains (namely autonomy) was positively related to detachment. This indicates that on days in which individuals feel a stronger sense of control and freedom over how they use their nonwork time, they are better situated to mentally disconnect from work. For this reason, managers should refrain from contacting or asking their employees to complete work tasks during nonwork time (Barber & Santuzzi, 2015). Individuals who do not feel required to focus on work during nonwork time will likely feel a stronger sense of autonomy in how they use their nonwork time (Barber et al., 2019).

Need frustration of autonomy and competence in nonwork domains were also negatively related to detachment at the within-person level, indicating that on days in which individuals feel as though their actions outside of work are controlled by external forces or like their abilities are lacking, they experience less psychological detachment

from work. In addition to work infringing upon nonwork time, it is possible that there are sources in nonwork domains that constrict an individual's autonomy or competence (e.g., hassles, social stressors; Sonnentag & Frese, 2012). It is important for individuals to find solutions for need frustration of autonomy and competence during nonwork time because detachment plays an importance role in resource recovery during nonwork time (Fritz et al., 2010). Individuals can seek autonomy (and prevent need frustration of autonomy) outside of work by setting aside time for themselves to relax or partake in activities that they care about. For example, even when an individual is inundated by nonwork responsibilities, they might take a half an hour right after work or right before bed to meditate, read, or journal. Taking a moment for oneself should help to create a sense of autonomy or control. Individuals can seek competence outside of work by partaking in an activity that utilizes skills they feel confident in or by learning something new. For example, an individual might try a new recipe for dinner or spend nonwork time using artistic, creative, or mechanical skills (i.e., painting, playing an instrument, work on one's car). These activities should bolster confidence in one's abilities outside of work.

Finally, results demonstrated that on days in which individuals experienced high need frustration in nonwork domains, they experienced stronger work engagement the next workday. This indicates that even when an individual is experiencing need frustration in one domain, they may expend more effort or seek to build resources in another. Specifically, although need frustration outside of work may be a resource depleting experience, an individual may be able to choose to re-focus their resource expenditure and replenishment processes to another domain that might provide more

resource-generating experiences (Edwards & Rothbard, 2000). It is therefore important for individuals to be cognizant of ways in which their environments are and are not fulfilling their needs. For example, an individual may recognize their need frustration and, if they are unable to seek fulfillment, “cut their losses.” In domains in which one is experiencing need frustration that cannot be dissolved and shifted to fulfillment, one might seek fulfillment and replenishment in other domains.

Table 1

List of Variables in Baseline, After Work, and Before Bed Surveys

	Variable Name	Measure	Sample Item
Baseline Survey	Organizational Support	Perceived Organizational Support Scale (Eisenberger et al., 1986)	" [My organization] strongly considers my goals and values."
	Burnout	OLBI (Demerouti et al., 2010)	" I feel emotionally drained from my work."
	Recovery from Work	REQ (Sonnentag & Fritz, 2007)	" During my nonwork time, I do relaxing things."
Daily Survey: After Work	Need Satisfaction (W)	BPNSFS (Chen et al., 2015)	" Today I felt capable at what I did at work."
	Need Frustration (W)	BPNSFS (Chen et al., 2015)	" Today I felt disappointed with many of my performances at work."
	Engagement	UWES (Schaufeli et al., 2006)	" Today at my job, I felt strong and [illegible]"
	Exhaustion	OLBI (Demerouti et al., 2003)	" Today during work, I felt emotionally [illegible]"
Daily Survey: Before Bed	Need Satisfaction (NW)	BPNSFS (Chen et al., 2015)	" Today I felt capable at what I did during non-work time."
	Need Frustration (NW)	BPNSFS (Chen et al., 2015)	" Today I felt disappointed with many of my performances outside of work."
	Psychological Detachment	REQ (Sonnentag & Fritz, 2007)	" Today after work, I forgot about work."
	Positive Work Reflection	(Fritz & Sonnentag, 2005, 2006)	" Today after work, I considered the positive aspects of my job."
	Negative Work Reflection	(Fritz & Sonnentag, 2005, 2006)	" Today after work, I realized what I did not like about my job."

Note. Baseline demographic variables included: age, gender, marital status, ethnicity, dependents, household size, education level; Baseline job details included: hours worked per week, job tenure, job level, department, work arrangement; Daily job details were included in the before bed survey and included: travelling for work, paid time off, hours worked, working during nonwork time.

Table 2
Descriptive Statistics for Baseline Variables

	M	*SD*	*1.*	*2.*	*3.*	*4.*	*5.*	*6.*	*7.*	*8.*	*9.*	*10.*	*11.*	*12.*	*13.*	*14.*
1. Org Support	3.88	0.45	(.83)													
2. Vigor	3.44	0.91	.62**	(.78)												
3. Dedication	4.05	0.82	.55**	.62**	(.86)											
4. Absorption	4.00	0.74	.43**	.69**	.69**	(.70)										
5. Disengagement	2.42	0.70	-.63**	-.48**	-.67**	-.55**	(.80)									
6. Exhaustion	2.67	0.68	-.65**	-.52**	-.36*	-.24	.52**	(.83)								
7. Detachment	2.99	1.02	.39*	0.08	.05	-.04	-.22	-.47**	(.86)							
8. Relaxation	3.82	0.99	.24	.32*	.13	.15	.02	-.48**	.31	(.90)						
9. Mastery	3.68	0.97	.42**	.27	.05	.11	-.08	-.37*	-.03	.53**	(.91)					
10. Control	4.13	0.86	.12	.28	.15	.07	-.04	-.36*	.05	.52**	.45**	(.88)				
11. Age	35.00	8.44	-.17	.05	.19	.17	-.06	-.04	-.09	-.11	-.22	-.05	-			
12. Gender	0.60	0.50	.39*	.02	-.10	-.05	-.09	-.18	.34*	-.05	.06	-.11	-.29	-		
13. Tenure	2.63	1.86	-.10	-.05	-.19	.00	.20	.15	-.23	-.25	-.06	-.26	.16	.00	-	
14. Job Level	2.54	0.79	.20	-.04	.07	-.07	-.14	.01	.25	.03	.00	.06	-.28	.24	-.30	-
15. Work Hours	44.39	9.32	-.03	.13	.22	.32*	.02	.16	-.27	-.14	-.13	-.06	.17	-.11	.22	-.38*

Note. $N = 47$. Parenthetical values on the off-diagonal represent Cronbach's alpha values.

Table 3.1
Daily Correlation Matrix

	1.	*1a.*	*1b.*	*1c.*	*2.*	*2a.*	*2b.*	*2c.*	*3.*	*3a.*	*3b.*	*3c.*	*4.*	*4a.*	*4b.*	*4c.*
1. NS (W)	(.82)	.90**	.87**	.77**	-.85**	-.98**	-.62**	-.44*	.76**	.97**	.60**	.26	-.72**	-.97**	-.64**	-.57**
1a. NSA (W)	.80**	-	.71**	.45**	-.65**	-.82**	-.51**	-.14	.42	.89**	.20	.05	-.45	-.96*	-.41	-.23
1b. NSC (W)	.71**	.35**	-	.57**	-.97**	-.86**	-.87**	-.50*	.77**	.98**	.73**	.19	-.83**	-.97*	-.68**	-.61**
1c. NSR (W)	.68**	.39**	.16	-	-.61**	-.53**	-.28	-.64**	.80**	.84**	.68**	.52*	-.57**	-.68	-.54**	-.71**
2. NF (W)	-.67**	-.60**	-.53**	-.32**	(.77)	.86**	.87**	.69**	-.91**	-.99**	-.76**	-.38	.99**	.99**	.89**	.75**
2a. NFA (W)	-.54**	-.70**	-.35**	-.22*	.71**	-	.64**	.30	-.69**	-.97**	-.34	-.29	.64*	.98**	.51*	.33
2b. NFC (W)	-.46**	-.31**	-.60**	-.08	.77**	.29**	-	.50*	-.66**	-.97**	-.65**	-.10	.95**	.99**	.78**	.52*
2c. NFR (W)	-.39**	-.25*	-.19	-.43**	.68**	.21	.34**	-	-.74**	-.66	-.72**	-.55*	.79**	.86	.68**	.90**
3. NS (NW)	.11	.04	.18	.07	-.10	-.06	-.20	-.03	(.78)	.93**	.90**	.89**	-.84**	-.68	-.88**	-.79**
3a. NSA (NW)	.08	.03	.04	.13	-.13	-.07	-.13	-.12	.81**	-	.71*	.95	-.78*	-.98	-.89**	-.45
3b. NSC (NW)	.03	.01	.11	-.05	.01	-.03	-.08	.10	.75**	.42**	-	.71**	-.99**	-.36	-.99**	-.99**
3c. NSR (NW)	.15	.06	.25*	.06	-.14	-.06	-.26*	.01	.69**	.27*	.44**	-	-.60**	-.41	-.43	-.53*
4. NF (NW)	-.05	-.01	-.03	-.12	-.14	-.06	-.10	-.13	-.66**	-.50**	-.53**	-.55**	(.76)	.28	.99**	.97**
4a. NFA (NW)	-.00	.12	-.02	-.12	-.18	-.14	-.15	-.11	-.55**	-.54**	-.33**	-.29**	.80**	-	.64	.17
4b. NFC (NW)	-.03	.12	-.22	-.01	-.06	-.04	.08	-.12	-.48**	-.33**	-.33**	-.36**	.59**	.53**	-	.99**
4c. NFR (NW)	-.13	-.18	-.01	-.19	-.03	.10	-.07	-.04	-.32**	-.25*	-.16	-.36**	.57**	.23*	.15	-

Note. $N = 40$. Day-level observations = 225. N_{obs} ranges from 113-146 for each association. Estimator: maximum likelihood. Parenthetical values on the off-diagonal are average estimates of Cronbach's alpha across days. Values in the lower diagonal represent the day-level (within) correlations. Values in the upper diagonal represent person-level (between) correlations.

Table 3.2
Daily Correlation Matrix

	1.	*1a.*	*1b.*	*1c.*	*2.*	*2a.*	*2b.*	*2c.*	*5.*	*6.*	*7.*	*8.*	*9.*	*10.*	*11.*	*12.*
1. NS(W)	(.82)	.90**	.87**	.77**	-.85**	-.98**	-.62**	-.44*	.72**	.72**	-.77**	.95**	.95**	.98**	.83**	-.77**
1a. NSA (W)	.80**	-	.71**	.45**	-.65**	-.82**	-.51**	-.14	.60**	.64**	-.80**	.94**	.90**	.99**	.86**	-.83**
1b. NSC (W)	.71**	.35**	-	.57**	-.97**	-.86**	-.87**	-.50*	.45*	.59**	-.62**	.79**	.86**	.88**	.61**	-.78**
1c. NSR (W)	.68**	.39**	.16	-	-.61**	-.53**	-.28	-.64**	.73**	.59**	-.48*	.69**	.72**	.62**	.66**	-.44*
2. NF (W)	-.67**	-.60**	-.53**	-.32**	(.77)	.86**	.87**	.69**	-.43*	-.58**	.65**	-.85**	-.89**	-.88**	-.70**	.77**
2a. NFA (W)	-.54**	-.70**	-.35**	-.22*	.71**	-	.64**	.30	-.58**	-.75**	.74**	-.99**	-.99**	-.99**	-.84**	.84**
2b. NFC (W)	-.46**	-.31**	-.60**	-.08	.77**	.29**	-	.50*	.07	-.20	.35	-.60**	-.65**	-.66**	-.45*	.67**
2c. NFR (W)	-.39**	-.25*	-.19	-.43**	.68**	.21	.34**	-	-.49*	-.32	.43	-.51*	-.56**	-.45*	-.46*	.34
5. PWR	.26*	.17	.40**	.06	-.39**	-.25*	-.35**	-.28*	(.94)	.64**	-.56**	.70**	.75**	.72**	.56**	-.38
6. Detachment	.10	-.03	.15	.13	-.06	-.02	-.09	-.05	.25*	(.90)	-.63**	.61**	.74**	.61**	.40	-.50
7. NWR	-.20	-.08	-.22	-.18	.23	-.02	.27*	.29*	-.33**	-.22	(.95)	-.96**	-.91**	-.98**	-.88**	.88**
8. Engagement	-.05	-.07	.13	-.23	-.08	.18	-.19	-.12	-.00	-.12	.15	(.94)	.95**	.99**	.96**	-.80**
9. Vigor	.02	.03	.06	-.08	-.01	.21	-.11	-.10	-.04	-.28	.01	.77**	-	.95**	.83**	-.89**
10. Dedication	-.23	-.16	-.08	-.40**	.01	.12	-.06	-.05	.00	.03	.16	.77**	.39**	-	.95**	-.82**
11. Absorption	.05	-.04	.23	-.12	-.12	.05	-.20	-.10	.04	.04	.17	.78**	.33*	.49**	-	-.65**
12. Exhaustion	.01	-.11	-.03	.21	.10	-.10	.18	.10	.06	.28	.02	-.74**	-.66**	-.43**	-.56**	(.90)

Note. $N = 40$. Day-level observations = 225. N_{obs} ranges from 113-146 for each association. Estimator: maximum likelihood. Parenthetical values on the off-diagonal are average estimates of Cronbach's alpha across days. Values in the lower diagonal represent the day-level (within) correlations. Values in the upper diagonal represent person-level (between) correlations.

Table 3.3
Daily Correlation Matrix

	3.	*3a.*	*3b.*	*3c.*	*4.*	*4a.*	*4b.*	*4c.*	*5.*	*6.*	*7.*	*8.*	*9.*	*10.*	*11.*	*12.*
3. NS (NW)	(.78)	.93**	.90**	.89**	-.84**	-.68	-.88**	-.79**	.37	.41	-.50*	.61**	.67**	.66**	.45*	-.40
3a. NSA (NW)	.81**	-	.71*	.95	-.78*	-.98	-.89**	-.45	.42	.65	-.63	.83**	.98*	.91**	.52	-.63
3b. NSC (NW)	.75**	.42**	-	.71**	-.99**	-.36	-.99**	-.99**	.24	.13	-.43*	.48*	.46	.59**	.46*	-.34
3c. NSR (NW)	.69**	.27*	.44**	-	-.60**	-.41	-.43	-.53*	.24	.47	-.49*	.32	.49	.30	.17	-.26
4. NF (NW)	-.66**	-.50**	-.53**	-.55**	(.76)	.28	.99**	.97**	-.26	-.03	.68**	-.83**	-.86**	-.85**	-.61**	.80**
4a. NFA (NW)	-.55**	-.54**	-.33**	-.29**	.80**	-	.64	.17	-.58	-.63	.76	-.91*	-.97*	-.93*	-.55	.93*
4b. NFC (NW)	-.48**	-.33**	-.33**	-.36**	.59**	.53**	-	.99**	-.25	-.11	.43*	-.68**	-.60**	-.74**	-.60**	.58**
4c. NFR (NW)	-.32**	-.25*	-.16	-.36**	.57**	.23*	.15	-	-.45	-.13	.62**	-.64**	-.60*	-.59*	-.65**	.52*
5. PWR	.22	.20	.07	.16	-.05	-.22*	-.11	.20	(.94)	.64**	-.56**	.70**	.75**	.72**	.56**	-.38
6. Detachment	.42**	.46**	.22	.14	-.31**	-.36**	-.35**	-.03	.25*	(.90)	-.63**	.61**	.74**	.61**	.40	-.50
7. NWR	-.12	-.19	-.06	.01	.13	.14	.11	-.11	-.33**	-.22	(.95)	-.96**	-.91**	-.98**	-.88**	.88**
8. Engagement	.10	-.05	.24	.02	.31*	.18	.04	.26*	-.00	-.12	.15	(.94)	.95**	.99**	.96**	-.80**
9. Vigor	-.00	-.16	.17	-.04	.39**	.28*	.21	.25	-.04	-.28	.01	.77**	-	.95**	.83**	-.89**
10. Dedication	-.08	-.13	-.05	-.07	.35*	.20	.12	.26*	.00	.03	.16	.77**	.39**	-	.95**	-.82**
11. Absorption	.27	.15	.29*	.09	-.00	-.12	-.26	.12	.04	.04	.17	.78**	.33*	.49**	-	-.65**
12. Exhaustion	-.09	.00	-.21	.01	-.21	-.16	-.20	-.13	.06	.28	.02	-.74**	-.66**	-.43**	-.56**	(.90)

Note. $N = 40$. Day-level observations = 225. N_{obs} ranges from 113-146 for each association. Estimator: maximum likelihood. Parenthetical values on the off-diagonal are average estimates of Cronbach's alpha across days. Values in the lower diagonal represent the day-level (within) correlations. Values in the upper diagonal represent person-level (between) correlations.

Table 4
Daily Descriptive Statistics for Focal Variables

	M (*SD*)	N_{obs}	*ICC*	*Skew*	M_1 (*SD*)	N_1	M_2 (*SD*)	N_2	M_3 (*SD*)	N_3	M_4 (*SD*)	N_3	M_5 (*SD*)	N_5	M_6 (*SD*)	N_6	M_7 (*SD*)	N_7
Need Satisfaction (W)	3.74 (0.75)	114	0.61	-0.49	3.81 (0.67)	26	3.95 (0.69)	24	3.51 (0.90)	13	3.88 (0.80)	12	3.48 (0.88)	15	3.70 (0.64)	11	3.64 (0.71)	13
Autonomy	3.31 (1.10)		0.69	-0.46	3.23 (1.13)		3.50 (1.14)		3.15 (1.26)		3.67 (1.09)		3.10 (1.09)		3.36 (1.07)		3.12 (0.96)	
Competence	3.97 (0.83)		0.39	-1.26	4.19 (0.69)		4.23 (0.42)		3.62 (1.14)		3.83 (0.69)		3.60 (1.21)		3.82 (0.64)		4.12 (0.82)	
Relatedness	3.94 (0.86)		0.55	-0.59	4.02 (0.88)		4.13 (1.00)		3.77 (0.88)		4.13 (0.91)		3.73 (0.82)		3.91 (0.70)		3.69 (0.66)	
Need Frustration (W)	2.14 (0.73)	114	0.51	0.95	2.09 (0.62)	26	1.89 (0.51)	24	2.35 (0.76)	13	1.97 (0.71)	12	2.51 (1.07)	15	2.09 (0.60)	11	2.28 (0.83)	13
Autonomy	2.85 (1.10)		0.55	0.21	3.00 (1.09)		2.58 (1.08)		2.96 (1.16)		2.54 (1.05)		3.13 (1.33)		2.73 (0.88)		2.96 (1.09)	
Competence	2.04 (0.95)		0.38	1.22	1.88 (0.77)		1.67 (0.70)		2.23 (1.15)		2.08 (0.95)		2.53 (1.33)		2.05 (0.72)		2.23 (1.01)	
Relatedness	1.54 (0.83)		0.44	1.66	1.38 (0.74)		1.42 (0.94)		1.85 (0.83)		1.29 (0.62)		1.87 (1.09)		1.50 (0.71)		1.65 (0.66)	
Need Satisfaction (NW)	4.00 (0.71)	106	0.35	-0.79	3.82 (0.68)	24	4.13 (0.48)	21	3.90 (1.01)	15	4.11 (0.64)	12	3.93 (0.82)	14	4.25 (0.68)	12	4.17 (0.60)	8
Autonomy	3.72 (0.95)		0.10	-0.55	3.38 (0.91)		3.81 (0.75)		3.57 (1.05)		4.04 (0.86)		3.75 (1.17)		4.04 (0.94)		3.75 (1.00)	
Competence	4.18 (0.86)		0.42	-1.07	4.21 (0.88)		4.23 (0.68)		4.03 (1.20)		4.13 (0.71)		3.93 (1.02)		4.42 (0.76)		4.44 (0.56)	
Relatedness	4.14 (0.85)		0.34	-0.99	3.88 (0.92)		4.33 (0.78)		4.10 (1.14)		4.17 (0.78)		4.11 (0.81)		4.29 (0.66)		4.31 (0.70)	
Need Frustration (NW)	1.98 (0.80)	106	0.36	0.81	2.13 (0.69)	24	1.79 (0.54)	21	2.17 (0.99)	15	1.90 (0.96)	12	2.06 (0.78)	14	1.67 (0.66)	12	1.75 (0.36)	8
Autonomy	2.46 (1.11)		0.06	0.47	2.92 (1.26)		2.21 (1.02)		2.80 (1.18)		2.21 (1.08)		2.43 (0.92)		2.04 (0.96)		2.19 (0.96)	
Competence	1.92 (0.99)		0.52	1.00	2.00 (0.77)		1.69 (0.62)		2.07 (1.32)		1.88 (1.15)		2.36 (1.39)		1.71 (0.92)		1.69 (0.75)	
Relatedness	1.47 (0.75)		0.33	1.93	1.48 (0.76)		1.48 (0.68)		1.63 (0.97)		1.63 (1.03)		1.39 (0.49)		1.25 (0.72)		1.38 (0.52)	

Table 4 cont.

Positive Work Reflection	3.14 (1.12)	103	0.57	-0.60	3.20 (1.09)	23	3.35 (0.93)	20	2.80 (1.33)	15	3.18 (0.89)	11	2.76 (1.26)	14	3.50 (1.12)	12	3.00 (1.08)	8
Detachment	3.23 (1.20)	103	0.40	-0.28	3.00 (1.29)	23	3.29 (1.18)	20	3.08 (1.22)	15	3.41 (1.17)	11	3.14 (1.11)	14	3.46 (1.05)	12	3.28 (1.44)	8
Negative Work Reflection	2.41 (1.22)	102	0.63	0.70	2.42 (1.11)	22	2.25 (1.00)	20	2.82 (1.36)	15	2.12 (1.19)	11	2.43 (1.39)	14	1.97 (1.15)	12	2.75 (1.29)	8
Engagement	3.15 (0.99)	73	0.74	-0.27	3.45 (0.93)	22	2.80 (1.22)	13	3.31 (1.13)	12	3.17 (0.24)	2	3.05 (0.87)	11	2.89 (0.88)	12	3.22 -	1
Vigor	2.76 (1.15)		0.60	0.10	3.21 (1.09)		2.44 (1.36)		2.92 (1.27)		3.00 (0.47)		2.55 (0.83)		2.31 (1.12)		2.33 -	
Dedication	3.37 (1.00)		0.70	-0.64	3.64 (0.91)		3.05 (1.21)		3.50 (1.12)		3.50 (0.24)		3.39 (0.99)		3.06 (0.89)		3.67 -	
Absorption	3.32 (1.14)		0.64	-0.26	3.52 (1.15)		2.92 (1.31)		3.53 (1.23)		3.00 (0.47)		3.21 (1.12)		3.31 (1.07)		3.67 -	
Exhaustion	2.99 (1.29)	73	0.56	-0.10	2.73 (1.18)	22	3.33 (1.40)	13	2.97 (1.55)	12	2.83 (1.18)	2	2.97 (1.20)	11	3.08 (1.36)	12	4.00 -	1

Note. Days 1 and 5 were Tuesdays; Days 2 and 6 were Wednesdays; Days 3 and 7 were Thursdays; Day 4 was a Friday. ICC = intraclass correlation coefficient; proportion of variance within persons.

Table 5.1
Sample Population Comparison

Survey Scale	Survey Item	Organization Survey Item	M_{sample}	$M_{population}$	*M* diff.	*t*(df)	*p*-value	CI Lower	CI Upper
Engagement – Dedication	I am proud of the work that I do.	I am able to have an impact.	1.70	1.66	0.04	0.33(46)	.75	-0.22	0.30
Burnout – Disengagement	I always find new and interesting aspects in my work.	I am able to learn new things in my job.	1.98	1.69	0.29	2.59(46)	.01	0.06	0.61
Engagement – Dedication	I am proud on the work that I do.	I am contributing to something that matters at work.	1.70	1.64	0.06	0.48(46)	.63	-0.20	0.32
Burnout – Disengagement	I feel more and more engaged in my work.	I feel personally engaged in my work.	2.49	1.73	0.76	5.47(46)	.00	0.48	1.04
Organizational Support	[Organization] takes pride in my accomplishments at work.	I feel valued by my employer.	2.09	1.92	0.17	1.65(46)	.11	-0.04	0.37
Engagement – Absorption	I feel immersed in my work.	I get into a place of deep concentration and focus when I'm doing work.	2.17	1.90	0.27	1.97(46)	.06	-0.01	0.55
Engagement – Absorption	I get carried away when I am working.	I give my work my all.	2.17	1.50	0.67	4.47(46)	.00	0.37	0.97
Burnout – Disengagement	I find my work to be a positive challenge.	I have challenging yet achievable goals.	2.11	1.98	0.13	1.00(46)	.32	-0.13	0.38
Burnout – Disengagement	This is the only type of work that I can imagine myself doing.	I identify with my work.	3.49	1.80	1.69	8.91(46)	.00	1.31	2.07
Burnout – Exhaustion	Usually, I can manage the amount of my work well.	I work a reasonable number of hours.	1.87	2.00	-0.13	-1.14(46)	.26	-0.35	0.10

Table 5.1 cont.

Survey Scale	Survey Item	Organization Survey Item	M_{sample}	$M_{population}$	*M* diff.	*t*(df)	*p*-value	CI Lower	CI Upper
Engagement – Vigor	I feel bursting with energy.	Most days, I feel energized by my work.	2.72	2.05	0.67	4.55(46)	.00	0.38	0.97
Organizational Support	[Organization] cares about my opinions.	My concerns are listened to in this organization.	2.04	2.00	0.04	0.36(46)	.72	-0.19	0.28
Burnout – Disengagement	This is the only type of work that I can imagine myself doing.	My skills and abilities fit well with my job.	3.49	1.70	1.79	9.44(46)	.00	1.41	2.17
Burnout – Exhaustion	Usually, I can manage the amount of my work well.	My time at work is spent wisely.	1.87	2.04	-0.17	-1.49(46)	.14	-0.39	0.06
Engagement – Dedication	I am proud on the work that I do.	My work has purpose.	1.70	1.71	-0.01	-0.06(46)	.95	-0.27	0.25
Engagement – Dedication	I feel enthusiastic about my job.	Overall, I like my job.	2.02	1.67	0.35	2.62(46)	.01	0.08	0.62
Organizational Support	[Organization] really cares about my well-being.	Overall, this organization supports my well-being.	1.81	1.70	0.11	1.00(46)	.32	-0.11	0.33

Note. Items were recoded to match the population survey response scale (1 = strongly agree; 5 = strongly disagree). Lower scores therefore represent stronger engagement. A composite engagement score was created using the item means. The survey sample's average 'engagement' ($M = 2.31$) was compared to that of the population ($M = 1.90$). There was a significant difference in engagement. Specifically, the population had stronger engagement compared to the sample ($t(46) = 4.02$, $p < .001$, CI[0.20-0.61]).

Table 5.2
Missingness Results Comparing Daily Survey Participants and Nonparticipants

Variable	β	SE	Wald	p-value
Engagement				
Vigor	-0.04	0.46	0.00	.96
Dedication	0.16	0.51	0.09	.76
Absorption	0.54	0.55	0.96	.33
Burnout				
Disengagement	0.14	0.62	0.05	.82
Exhaustion	-0.03	0.59	0.00	.96
Organizational Resources	-0.27	0.93	0.08	.77
Gender	-0.69	0.83	0.70	.40
Age	-0.07	0.05	2.13	.15
Household Size	-0.65	0.30	1.37	.24
Work Arrangement	1.26	0.84	2.23	.14
Job Level			3.29	.19
Director and Above	-1.39	1.09	1.63	.20
Manager	-1.95	1.13	2.95	.09
Department			2.20	.82
Legal	19.59	40192.97	0.00	1.00
People	19.59	20096.49	0.00	1.00
Product	-0.92	1.64	0.31	.58
Growth	0.69	1.32	0.28	.60
R&D	-0.63	1.29	0.24	.63

Note. Reference groups for categorical variables were Man, Remote, Individual Contributor, Marketing. Categorical variables were coded as follows: Gender: 0 = Man, 1 = Woman; Remote: 0 = local, 1 = remote; Job Level: 1 = Director and Above, 2 = Manager, 3 = Individual Contributor; Department: 1 = Legal, 2 = People, 3 = Product, 4 = Growth, 5 = R&D, 6 = Marketing. All individuals who were in the Legal or People departments took part in the daily surveys.

Table 5.3
Missingness Results Comparing High and Low Daily Survey Response Rate

Variable	β	SE	Wald	p-value
Engagement				
Vigor	-0.16	0.46	0.12	.73
Dedication	1.35	0.84	2.59	.11
Absorption	0.11	0.59	0.04	.85
Burnout				
Disengagement	-0.95	0.75	1.61	.20
Exhaustion	0.23	0.62	0.13	.72
Organizational Resources	-0.22	0.92	0.06	.82
Gender	0.85	0.85	1.01	.34
Age	0.05	0.05	1.05	.31
Household Size	-0.33	0.33	1.02	.31
Work Arrangement	-0.85	0.87	0.97	.33
Job Level			0.00	1.00
Director and Above	-20.10	15191.52	0.00	1.00
Manager	-20.10	20096.49	0.00	1.00
Department			0.91	.97
Legal	0.00	44029.19	0.00	1.00
People	0.00	26965.26	0.00	1.00
Product	0.00	33627.85	0.00	1.00
Growth	19.82	17974.84	0.00	1.00
R&D	20.69	17974.84	0.00	1.00

Note. Reference groups for categorical variables were Man, Remote, Individual Contributor, Marketing. Categorical variables were coded as follows: Gender: 0 = Man, 1 = Woman; Remote: 0 = local, 1 = remote; Job Level: 1 = Director and Above, 2 = Manager, 3 = Individual Contributor; Department: 1 = Legal, 2 = People, 3 = Product, 4 = Growth, 5 = R&D, 6 = Marketing. All seven people who responded to 10+ surveys were Individual Contributors. Three of the seven people were in the R&D department and 4 were in the Growth department.

Table 6
Confirmatory Factor Analysis Results

Full Positive Model (Multilevel)									
	$\chi^2(df)$	SRMR	RMSEA	CFI	TLI	Loglikelihood	AIC	BIC	Convergence
5-factor	-	-	-	-	-	-	-	-	Did not terminate; did not converge
5-factor MLR	-	-	-	-	-	-	-	-	Did not terminate; did not converge
8-factor	-	-	-	-	-	-	-	-	Did not terminate; did not converge
8-factor MLR	-	-	-	-	-	-	-	-	Did not terminate; did not converge
12-factor	-	-	-	-	-	-3385.33	7344.65	8216.26	Did not converge
12-factor MLR	-	-	-	-	-	-3385.33	7344.65	8216.26	Did not converge
Full Negative Model (Multilevel)									
	$\chi^2(df)$	SRMR	RMSEA	CFI	TLI	Loglikelihood	AIC	BIC	Convergence
5-factor	-	-	-	-	-	-3045.65	6401.30	6872.03	Did not converge
5-factor MLR	-	-	-	-	-	-3045.65	6401.30	6872.03	Did not converge
7-factor	-	-	-	-	-	-3005.14	6364.28	6901.82	Did not converge
7-factor MLR	-	-	-	-	-	-3005.14	6364.28	6901.82	Did not converge
11-factor	-	-	-	-	-	-2918.67	6327.33	7071.39	Did not converge
11-factor MLR	-	-	-	-	-	-2918.67	6327.33	7071.39	Did not converge
Single-Day CFAs Full Positive Model									
	$\chi^2(df)$	SRMR	RMSEA	CFI	TLI	Loglikelihood	AIC	BIC	Convergence
Day 1	-	-	-	-	-	-	-	-	Did not converge
Day 2	-	-	-	-	-	-	-	-	Did not converge
Day 3	-	-	-	-	-	-	-	-	Did not converge
Day 4	-	-	-	-	-	-	-	-	One or more variables with variance of zero
Day 5	-	-	-	-	-	-	-	-	Did not converge
Day 6	-	-	-	-	-	-	-	-	Did not converge
Day 7	-	-	-	-	-	-	-	-	One or more variables with variance of zero

Note. SRMR = standard root mean square residual. RMSEA = root mean square error of approximation. CFI = comparative fit index. TLI = Tucker-Lewis index. AIC = Akaike's information criterion. BIC = Bayesian information criterion.

Table 2
Single-Scale Confirmatory Factor Analysis Results

							Likelihood ratio test	
	$\chi^2(df)$	$SRMR_{within}$	$SRMR_{between}$	RMSEA	CFI	TLI	$\chi^2(df)$	p-value
Engagement								
1-factor	120.21(54)	0.18	0.13	0.13	0.83	0.77		
3-factor	66.75(48)	0.14	0.09	0.07	0.95	0.91	53.46(6)	<.001
Need Satisfaction (W)								
1-factor	72.20(18)	0.12	0.18	0.16	0.71	0.52		
3-factor	6.27(12)	0.02	0.04	0.00	1.00	1.08	65.93(6)	<.001
Need Frustration (W)								
1-factor	63.48(18)	0.10	0.24	0.15	0.73	0.54		
3-factor	10.56(12)	0.04	0.05	0.00	1.00	1.02	52.92(6)	<.001
Need Satisfaction (NW)								
1-factor	30.02(18)	0.07	0.17	0.08	0.91	0.85		
3-factor	7.17(12)	0.04	0.17	0.00	1.00	1.09	22.85(6)	<.001
Need Frustration (NW)								
1-factor	56.42(18)	0.12	0.19	0.14	0.80	0.67		
3-factor	-	-	-	-	-	-	-	-

Note. SRMR = standard root mean square residual. RMSEA = root mean square error of approximation. CFI = comparative fit index. TLI = Tucker-Lewis index. All single-scale models terminated normally, except for the 3-factor model of need frustration in nonwork domains. Although the models terminated normally, many (all except for the single-factor models of need satisfaction at work and in nonwork domains) produced a positive nondefinite error, indicating nonidentification.

Table 3
Model Summary

Model	Maximum Likelihood Estimator	M*plus* Default Estimator (MLR)
Positive Sequential Mediation	Non-positive definite error indicating nonidentification	Non-positive definite error indicating nonidentification
Just Identified	Non-positive definite error indicating nonidentification	Non-positive definite error indicating nonidentification
Sub-facets of Engagement	Non-positive definite error indicating nonidentification	Non-positive definite error indicating nonidentification
Sub-facets of Needs and Engagement	Non-positive definite error indicating nonidentification	Non-positive definite error indicating nonidentification
Negative Sequential Mediation	Model estimation terminated normally	Model estimation terminated normally
Just Identified	Non-positive definite error indicating nonidentification	Non-positive definite error indicating nonidentification
Sub-facets of Engagement	Non-positive definite error indicating nonidentification	Non-positive definite error indicating nonidentification
Sub-facets of Needs and Engagement	Non-positive definite error indicating nonidentification	Non-positive definite error indicating nonidentification

Note. Models were specified using manifest variables in a 1-1-1 mediation approach with 20,000 iterations in M*plus.* The positive path modeled the effect of work-related need satisfaction to nonwork-related need satisfaction, and subsequently to positive work reflection and psychological detachment, followed by next-day work engagement and exhaustion. The negative path modeled the effect of work-related need frustration on nonwork-related need frustration, and subsequent negative work reflection, followed by next-day work engagement and exhaustion. In each case in which the ML estimator was not utilized, M*plus* defaulted to MLR. Model nonidentification likely occurred because in each case, there were more parameters being estimated (unknowns) than number of clusters or sample size (knowns). The negative serial mediation path estimation was the only model that terminated normally ($\chi^2(10) = 8.39$; RMSEA = 0.00; $SRMR_{within} = 0.11$; $SRMR_{between} = 0.06$; CFI = 1.00; TLI = 1.05). Conventional cutoffs for these indices proposed by Hu and Bentler (1999) are RMSEA < .06, SRMR < .08, CFI > .95, and TLI > .95.

Table 4
Hypothesis Testing Results

	Hypothesis	Support	Within-Person Association	*r*
Hypothesis 1	Daily need satisfaction at work will be positively associated with (a) positive work reflection and (b) psychological detachment from work in the evening.	Partial	Need satisfaction Positive work reflection Need satisfaction – Competence Positive work reflection	 .26* .40***
Hypothesis 2	Need frustration at work will be positively associated with negative work reflection in the evening.	Partial	Need frustration – Competence Negative work reflection Need frustration – Relatedness Negative work reflection	 .27* .29*
Hypothesis 3	Daily need satisfaction at work will be positively associated with (a) next day work engagement and negatively associated with (b) next day exhaustion.	No	Need satisfaction – Relatedness Dedication	 -.40**
Hypothesis 4	Daily need frustration at work will be negatively associated with (a) next day work engagement and positively associated with (b) next day exhaustion.	No	-	-
Hypothesis 5	Psychological detachment from work in the evening will be positively associated with (a) next day work engagement and negatively associated with (b) next day exhaustion.	No	-	-
Hypothesis 6	Positive work reflection in the evening will be positively associated with (a) next day work engagement and negatively associated with (b) next day exhaustion.	No	-	-
Hypothesis 7	Negative work reflection in the evening will be negatively associated with (a) next day work engagement and positively associated with (b) next day exhaustion.	No	-	-
Hypothesis 8	Daily work-related need satisfaction will be positively associated with nonwork-related need satisfaction in the evening.	No	Need satisfaction – Competence Need satisfaction (NW) – Relatedness	 .25*
Hypothesis 9	Daily work-related need frustration will be positively associated with nonwork-related need frustration in the evening.	No	-	-

Table 10
Power Analysis Results

	Within-Person Power (1-β)	Between-Person Power (1- β)		Within-Person Power (1- β)	Between-Person Power (1- β)
Work-Related Need Satisfaction			Positive Work Reflection		
Nonwork-Related Need Satisfaction	0.19	0.94	Engagement	0.05	0.95
Positive Work Reflection	0.76	0.96	Vigor	0.07	0.95
Psychological Detachment	0.18	0.92	Dedication	0.05	0.95
Engagement	0.07	1.00	Absorption	0.06	0.73
Vigor	0.05	1.00	Exhaustion	0.08	0.33
Dedication	0.59	1.00	Psychological Detachment		
Absorption	0.07	0.99	Engagement	0.20	0.77
Exhaustion	0.04	0.98	Vigor	0.77	0.90
			Dedication	0.05	0.75
Work-Related Need Frustration			Absorption	0.05	0.34
Nonwork-Related Need Frustration	0.24	1.00	Exhaustion	0.71	0.51
Negative Work Reflection	0.63	0.88	Negative Work Reflection		
Engagement	0.12	1.00	Engagement	0.24	1.00
Vigor	0.04	1.00	Vigor	0.04	1.00
Dedication	0.04	1.00	Dedication	0.24	1.00
Absorption	0.20	0.94	Absorption	0.34	1.00
Exhaustion	0.15	0.97	Exhaustion	0.04	1.00

Note. The conventional threshold for power is .80.

Figures

Figure 1

Positive Hypothesized Paths

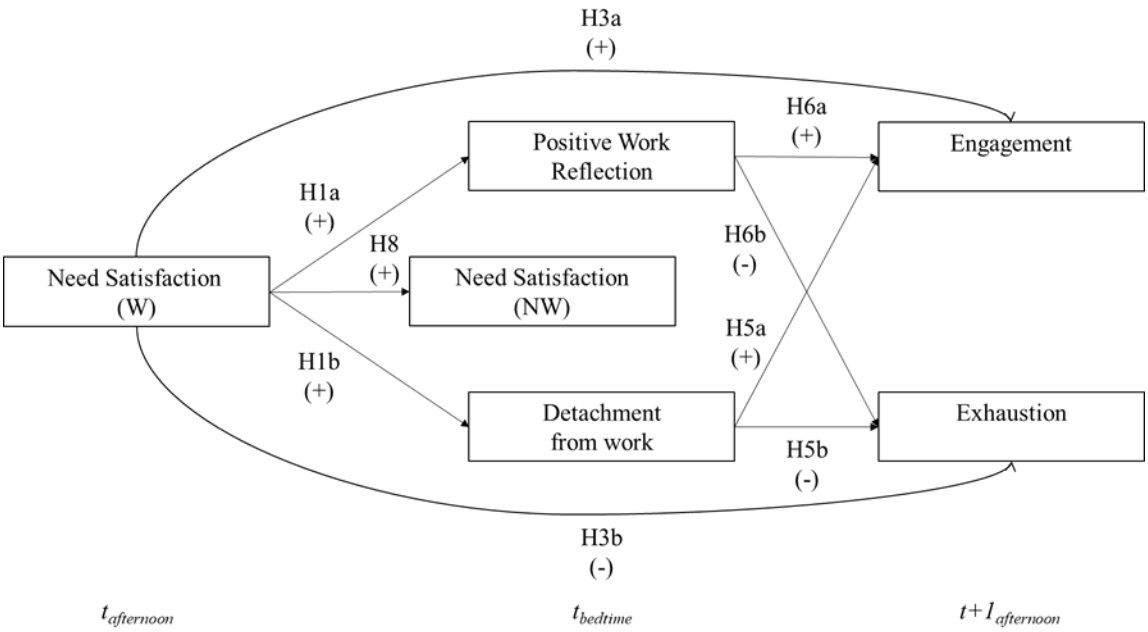


Figure 2

Negative Hypothesized Paths

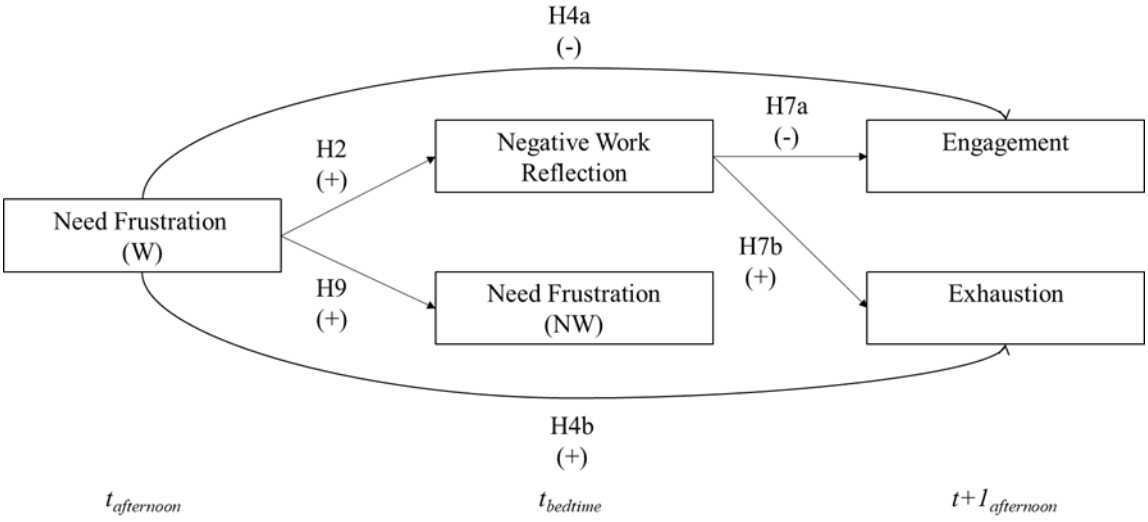
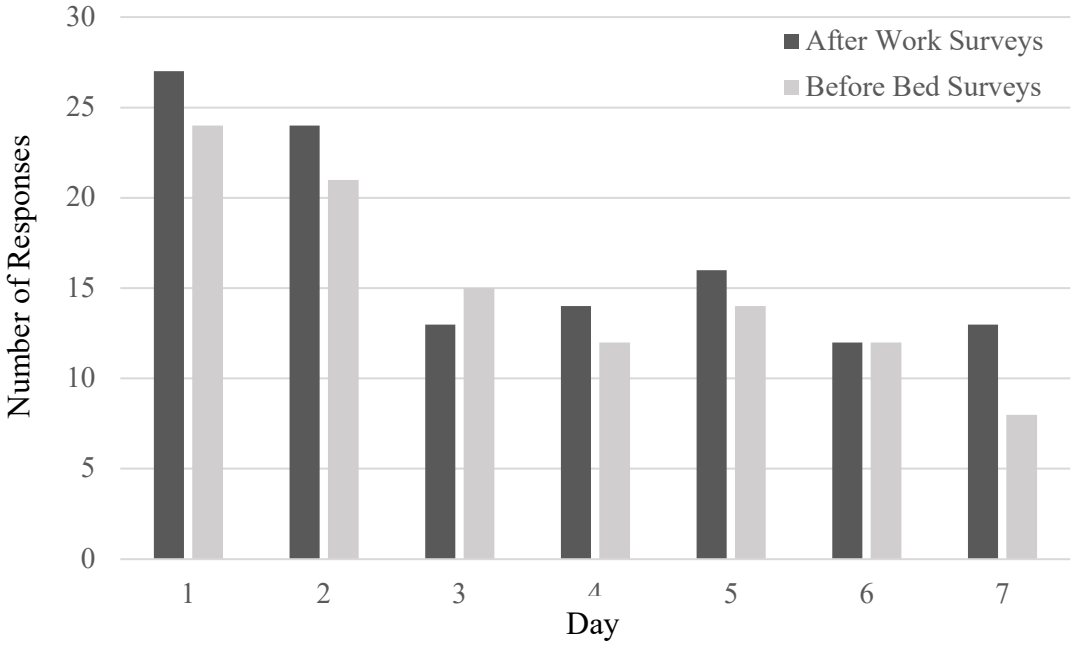


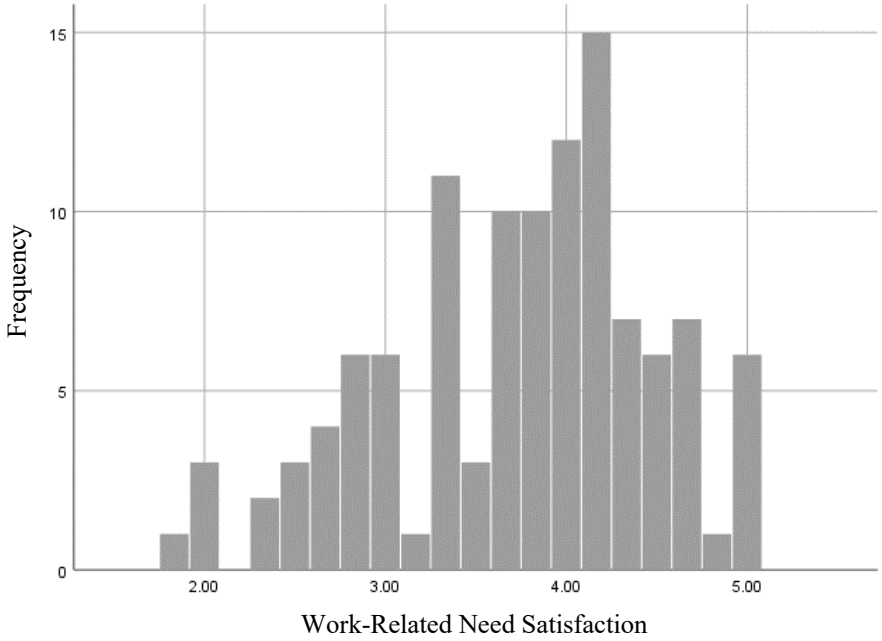
Figure 3

Distribution of Survey Responses Across Days



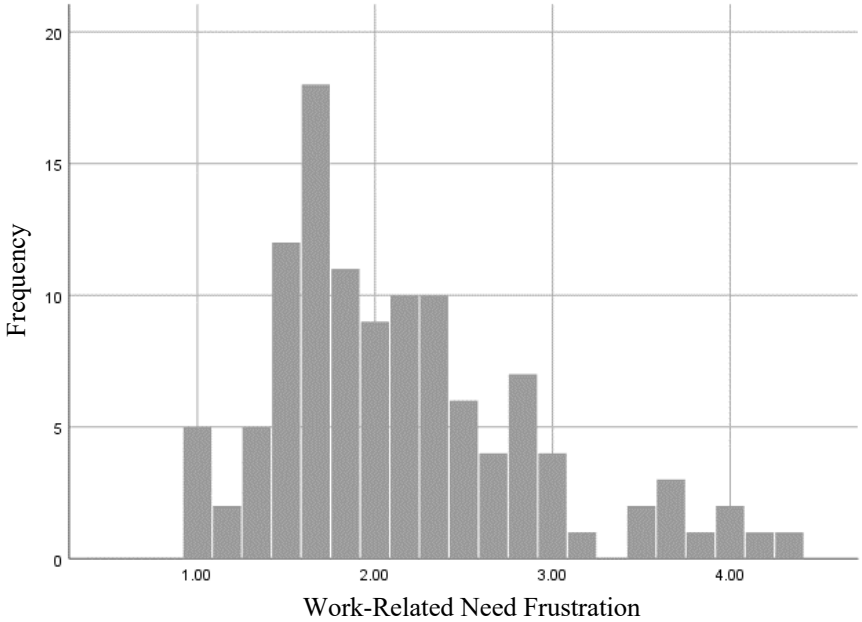
Note. $N = 40$; $N_{obs} = 225$; $N_{afterwork} = 119$; $N_{beforebed} = 106$. Days 1 and 5 were Tuesdays; Days 2 and 6 were Wednesdays; Days 3 and 7 were Thursdays; Day 4 was a Friday.

Figure 4
Histogram for Work-Related Need Satisfaction



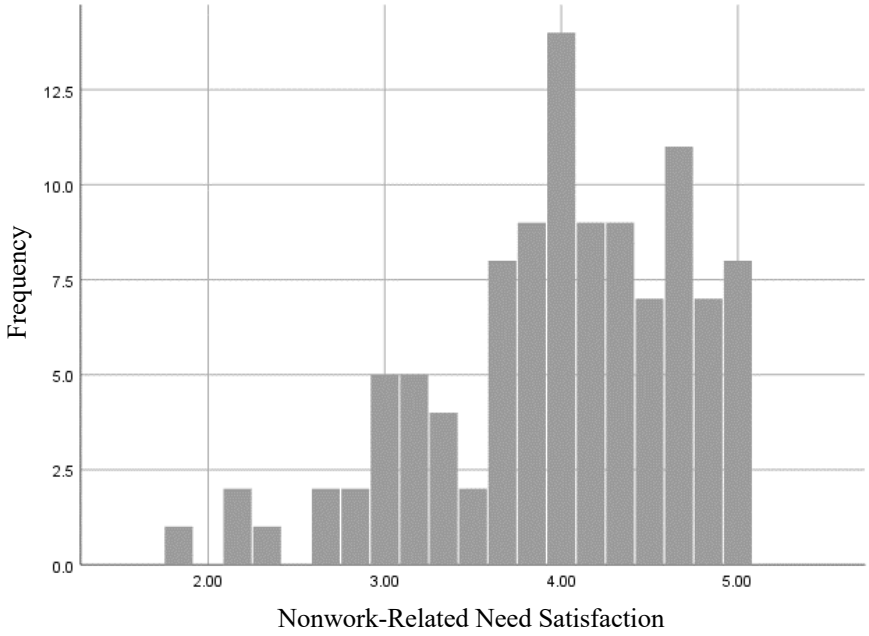
Note. $M = 3.74$; $SD = 0.75$; $N = 114$.

Figure 5
Histogram for Work-Related Need Frustration



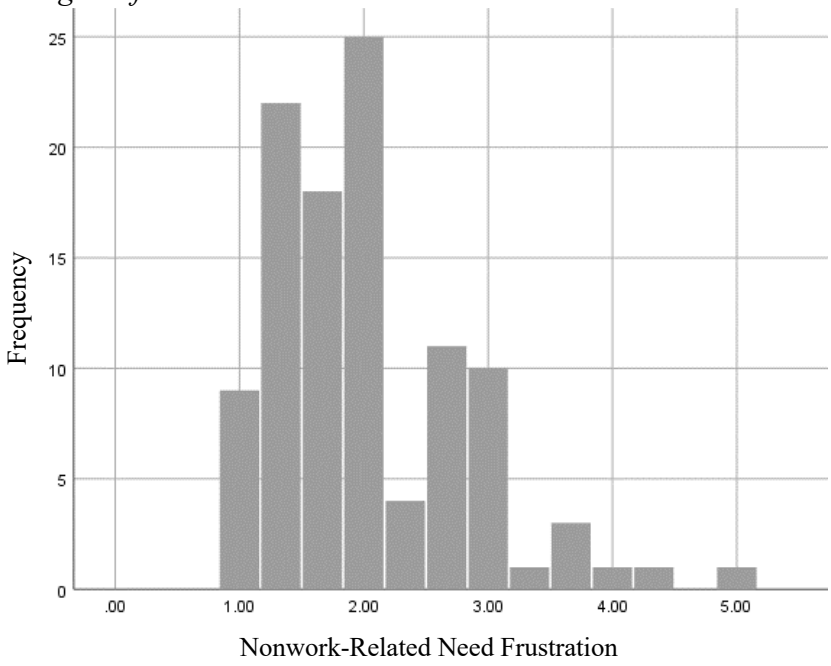
Note. $M = 2.14$; $SD = 0.73$; $N = 114$.

Figure 6
Histogram for Nonwork-Related Need Satisfaction



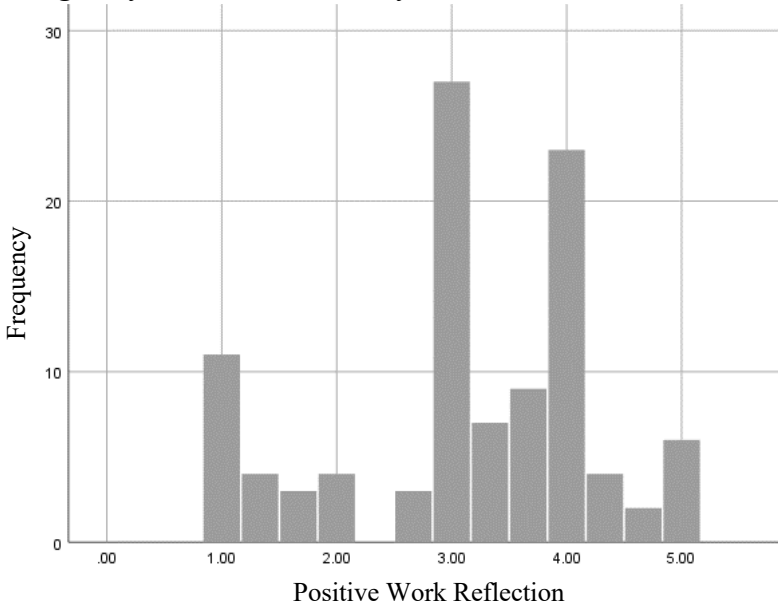
Note. $M = 4.00$; $SD = 0.71$; $N = 106$.

Figure 7
Histogram for Nonwork-Related Need Frustration



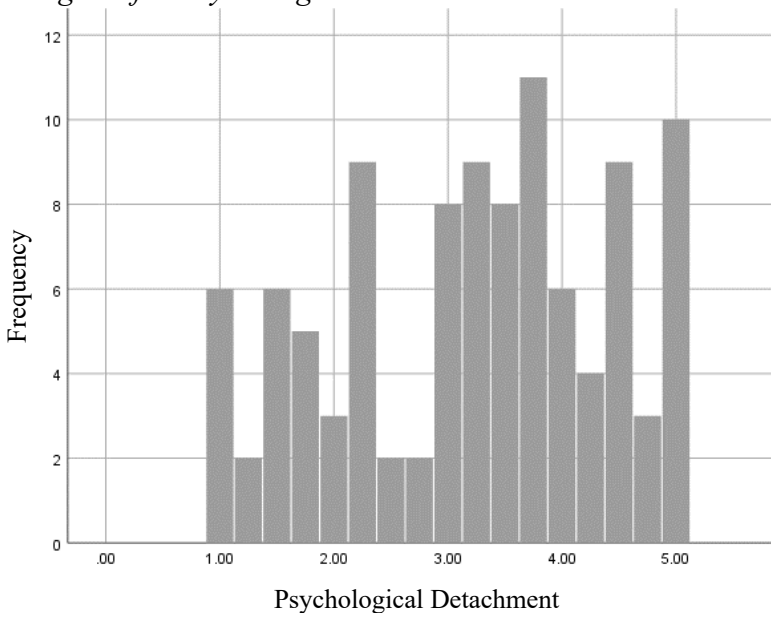
Note. $M = 1.98$; $SD = 0.80$; $N = 106$.

Figure 8
Histogram for Positive Work Reflection



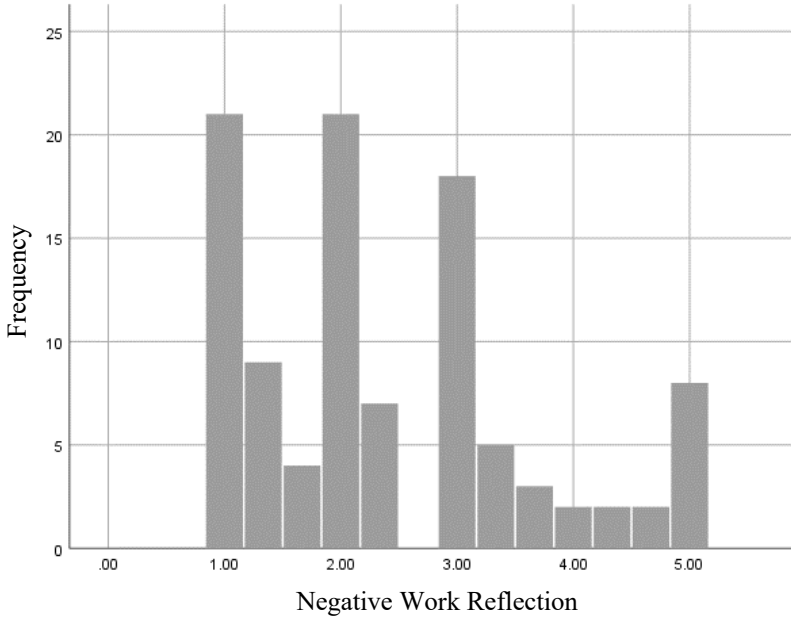
Note. $M = 3.14$; $SD = 1.12$; $N = 103$.

Figure 9
Histogram for Psychological Detachment



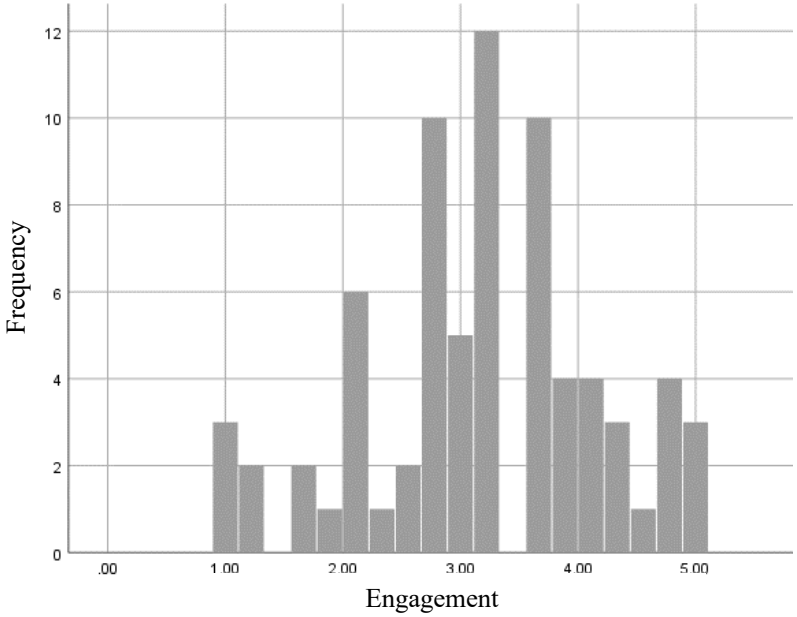
Note. $M = 3.22$; $SD = 1.20$; $N = 103$.

Figure 10
Histogram for Negative Work Reflection



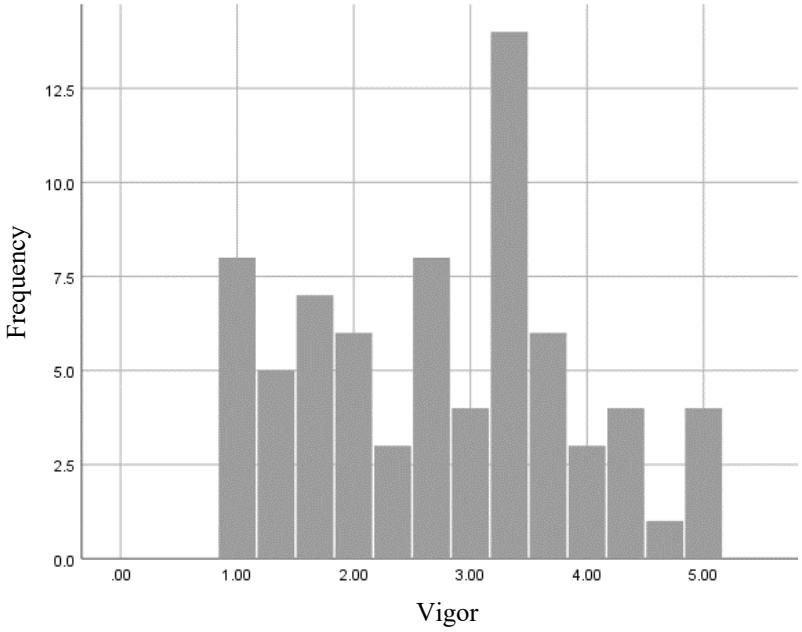
Note. $M = 2.41$; $SD = 1.22$; $N = 102$.

Figure 11
Histogram for Engagement



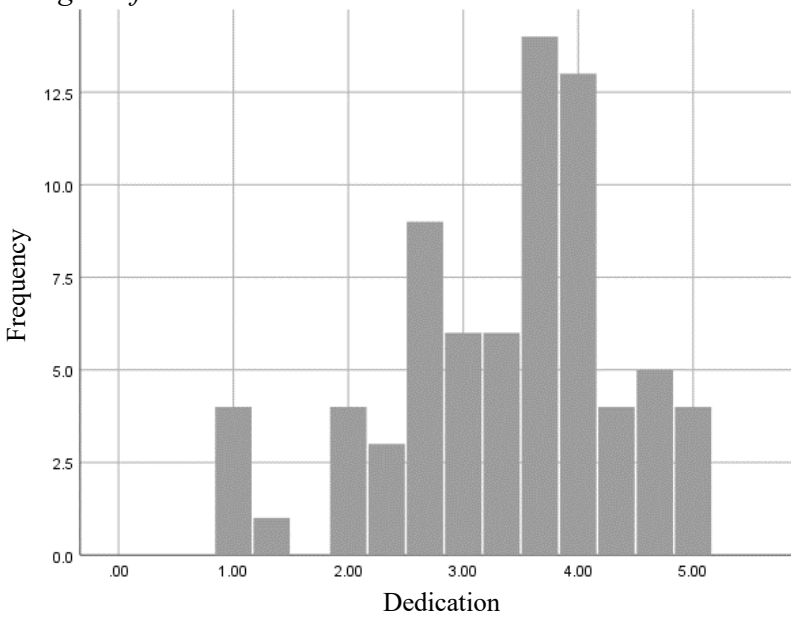
Note. $M = 3.15$; $SD = 0.99$; $N = 73$.

Figure 12
Histogram for Vigor



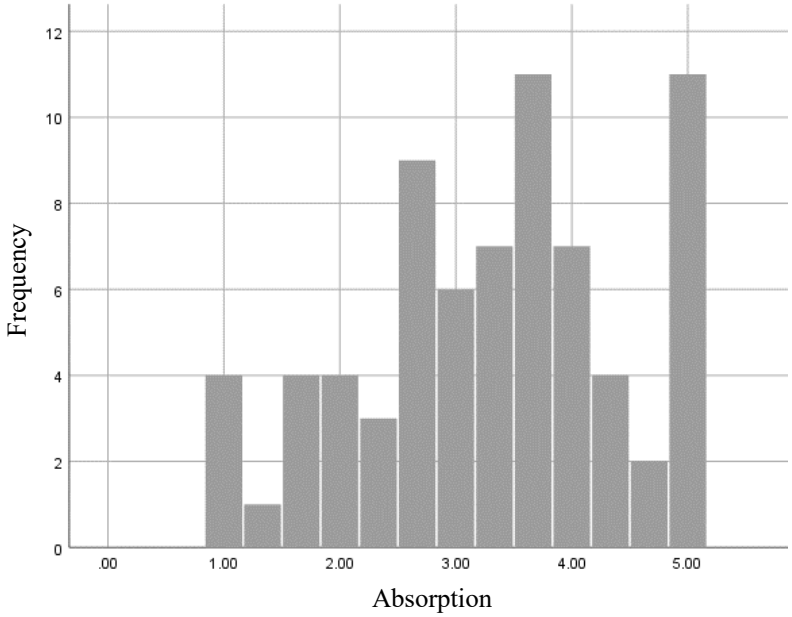
Note. $M = 2.76$; $SD = 1.15$; $N = 73$.

Figure 13
Histogram for Dedication



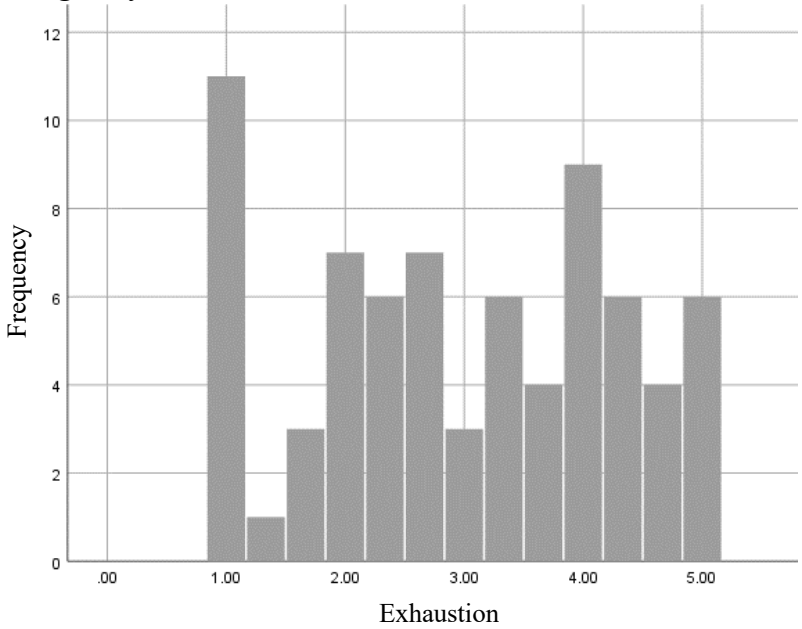
Note. $M = 3.37$; $SD = 1.00$; $N = 73$.

Figure 14
Histogram for Absorption



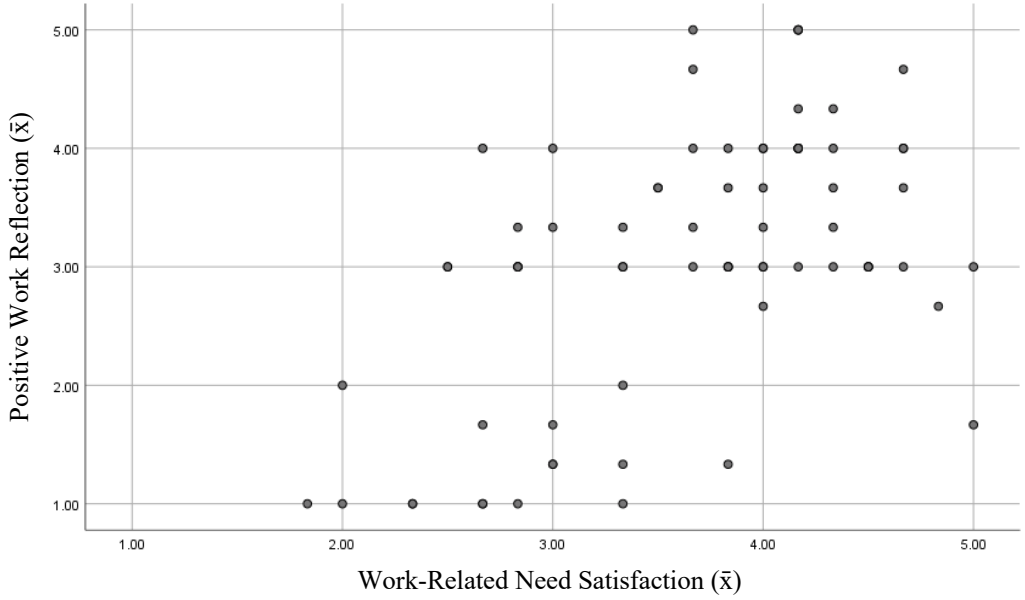
Note. $M = 3.32$; $SD = 1.14$; $N = 73$.

Figure 15
Histogram for Exhaustion



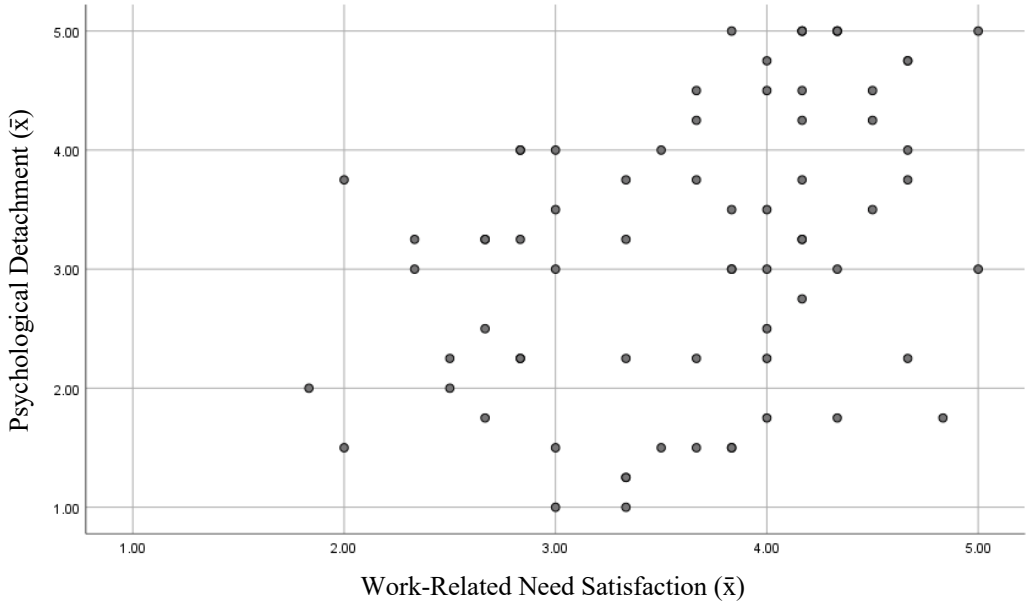
Note. $M = 2.99$; $SD = 1.29$; $N = 73$.

Figure 16
Scatterplot Between Work-Related Need Satisfaction and Positive Work Reflection



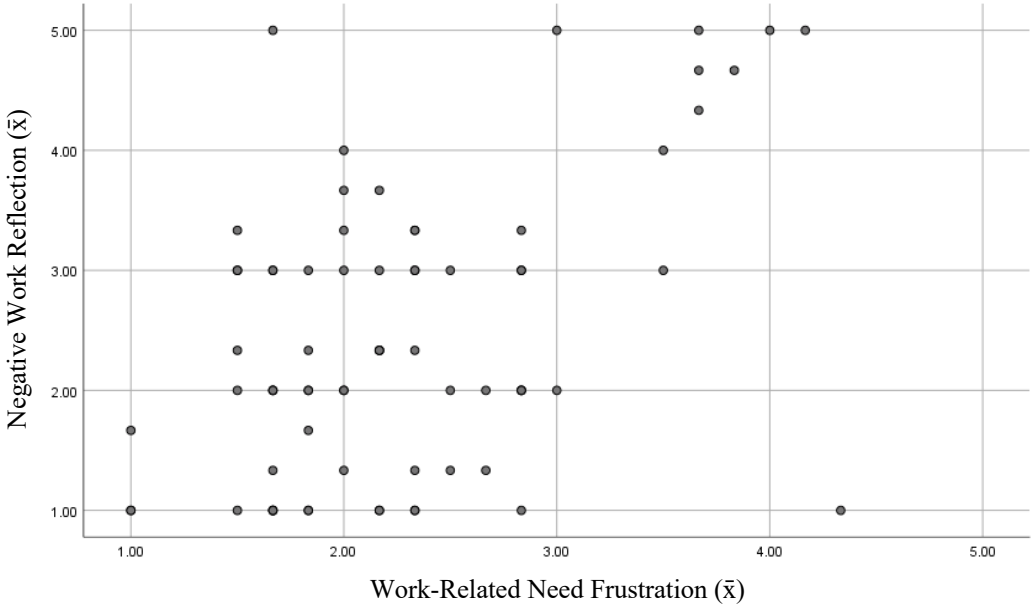
Note. Scatterplot represents a visualization of Hypothesis 1a.

Figure 17
Scatterplot Between Work-Related Need Satisfaction and Psychological Detachment



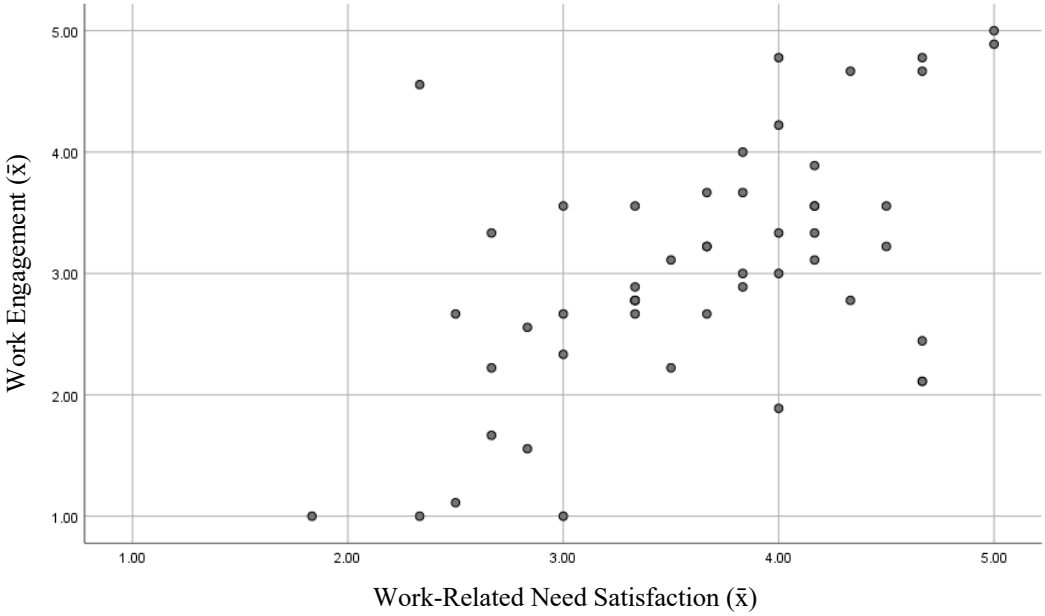
Note. Scatterplot represents a visualization of Hypothesis 1b.

Figure 18
Scatterplot Between Work-Related Need Frustration and Negative Work Reflection



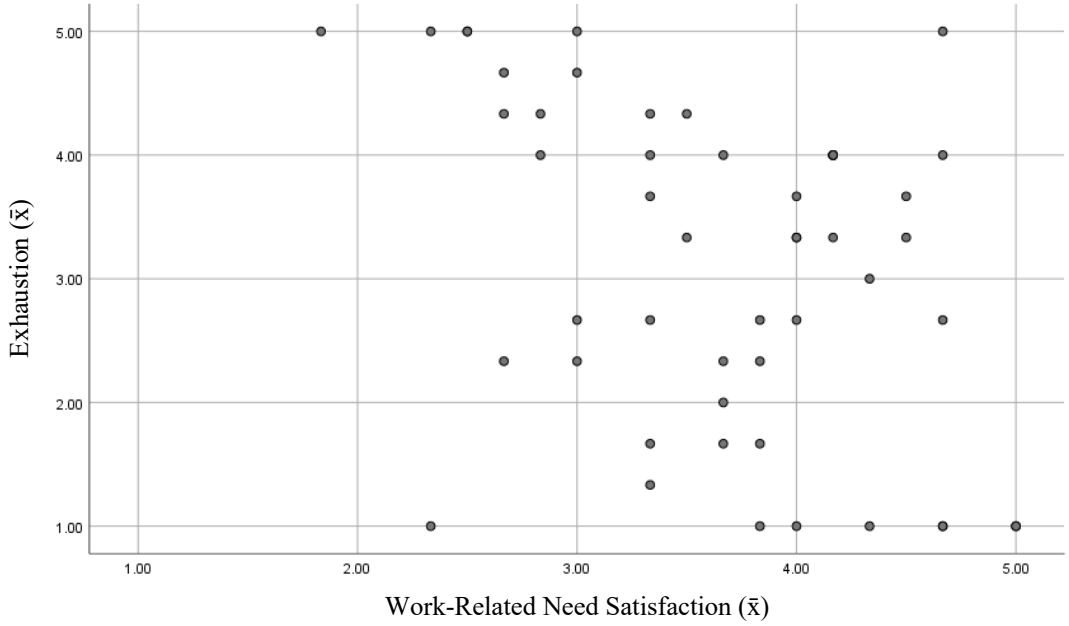
Note. Scatterplot represents a visualization of Hypothesis 2.

Figure 19
Scatterplot Between Work-Related Need Satisfaction and Work Engagement



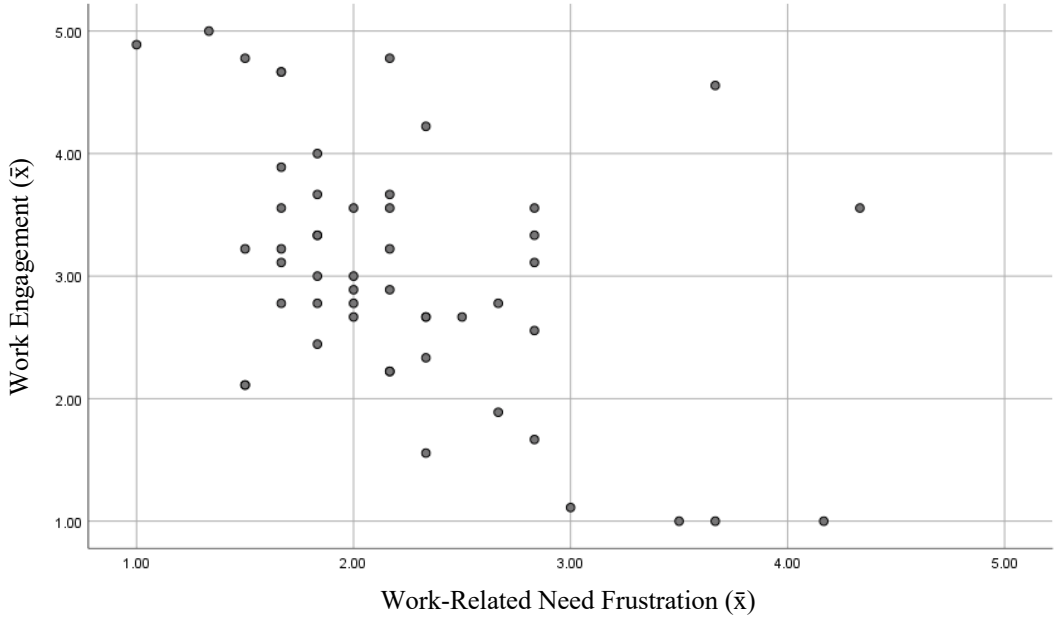
Note. Scatterplot represents a visualization of Hypothesis 3a.

Figure 20
Scatterplot Between Work-Related Need Satisfaction and Exhaustion



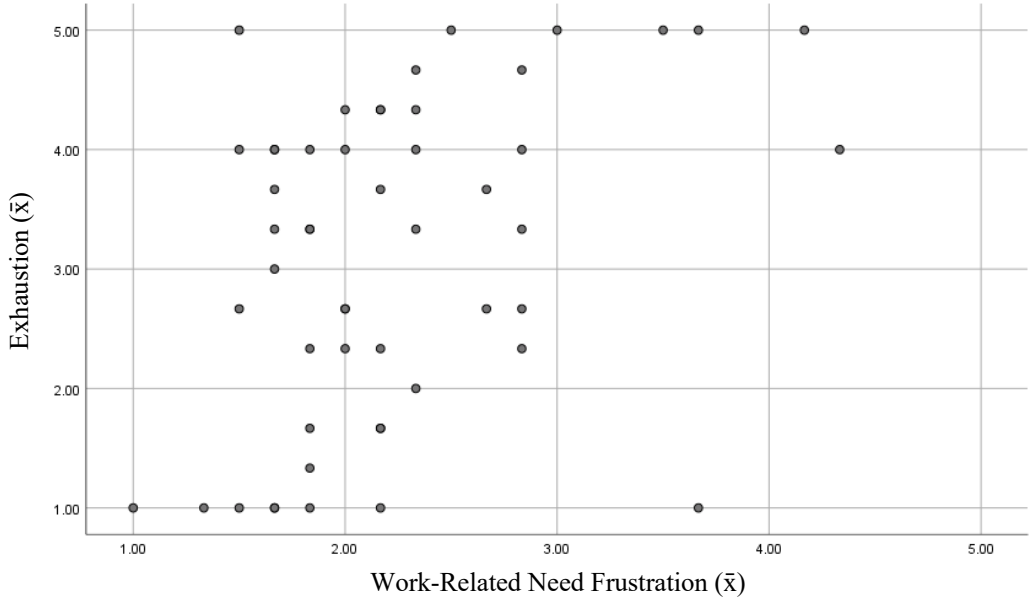
Note. Scatterplot represents a visualization of Hypothesis 3b.

Figure 21
Scatterplot Between Work-Related Need Frustration and Work Engagement



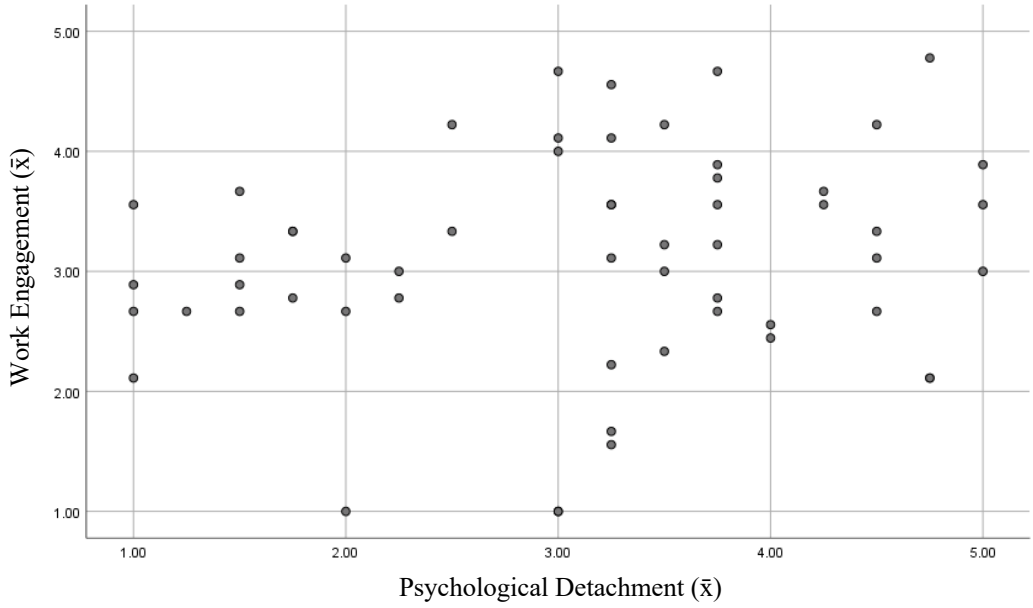
Note. Scatterplot represents a visualization of Hypothesis 4a.

Figure 22
Scatterplot Between Work-Related Need Frustration and Exhaustion



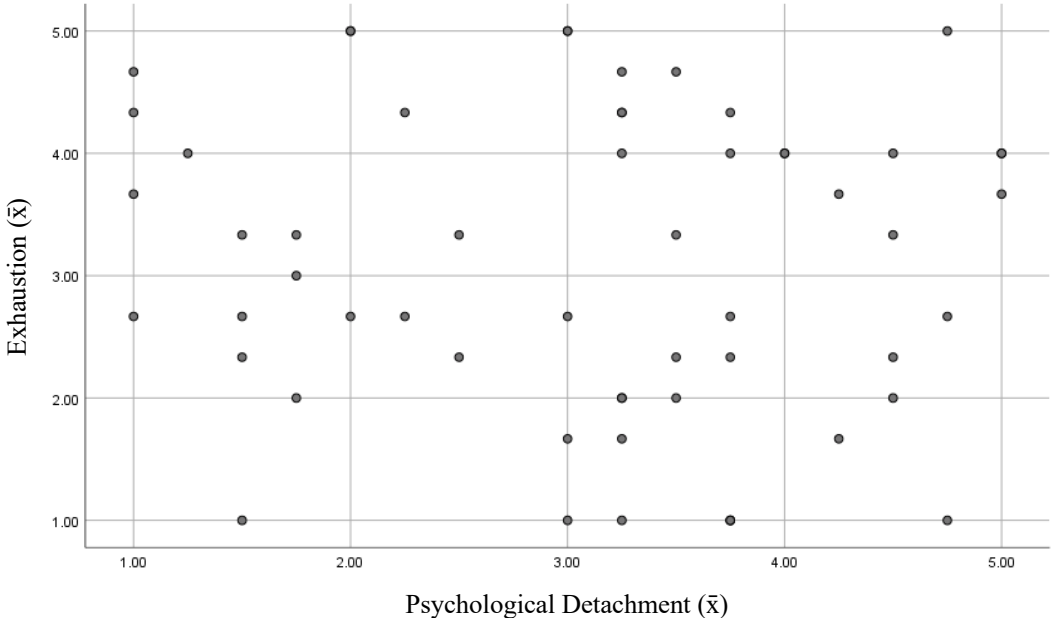
Note. Scatterplot represents a visualization of Hypothesis 4b.

Figure 23
Scatterplot Between Psychological Detachment and Work Engagement



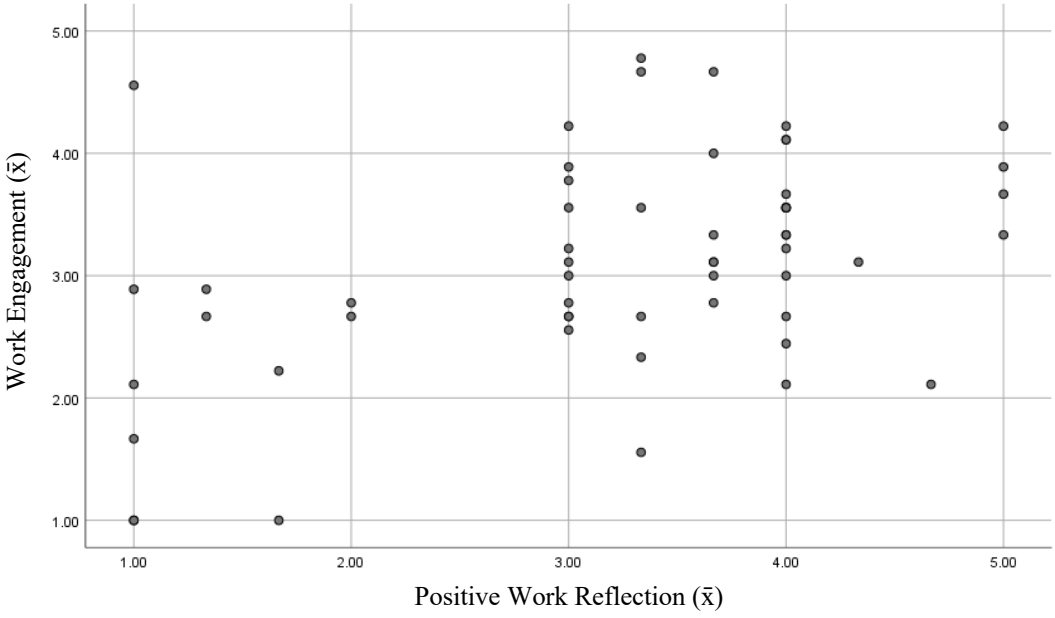
Note. Scatterplot represents a visualization of Hypothesis 5a.

Figure 24
Scatterplot Between Psychological Detachment and Exhaustion



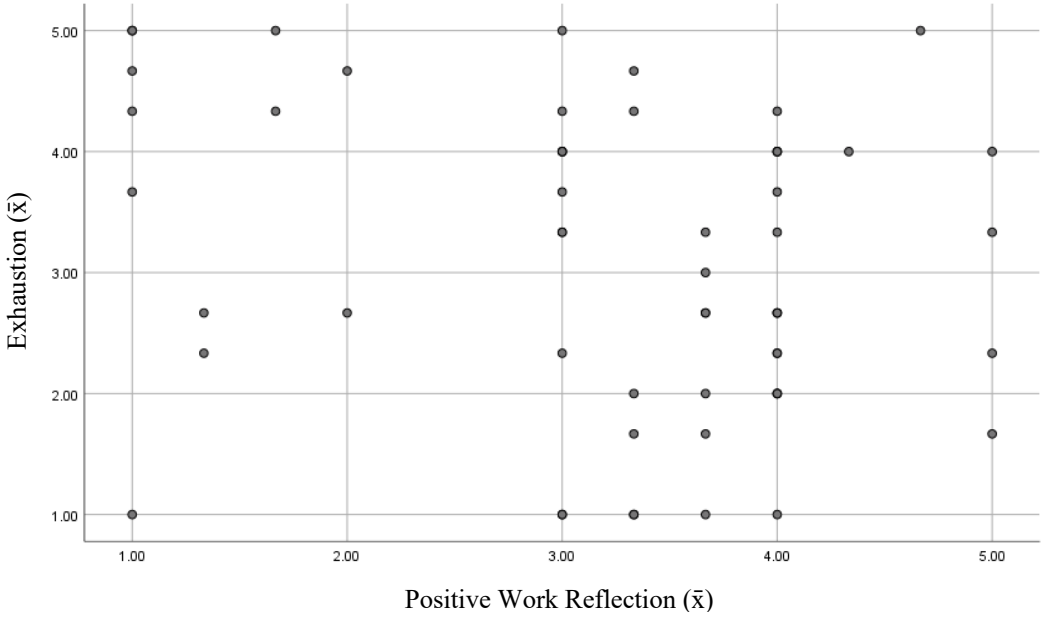
Note. Scatterplot represents a visualization of Hypothesis 5a.

Figure 25
Scatterplot Between Positive Work Reflection and Work Engagement



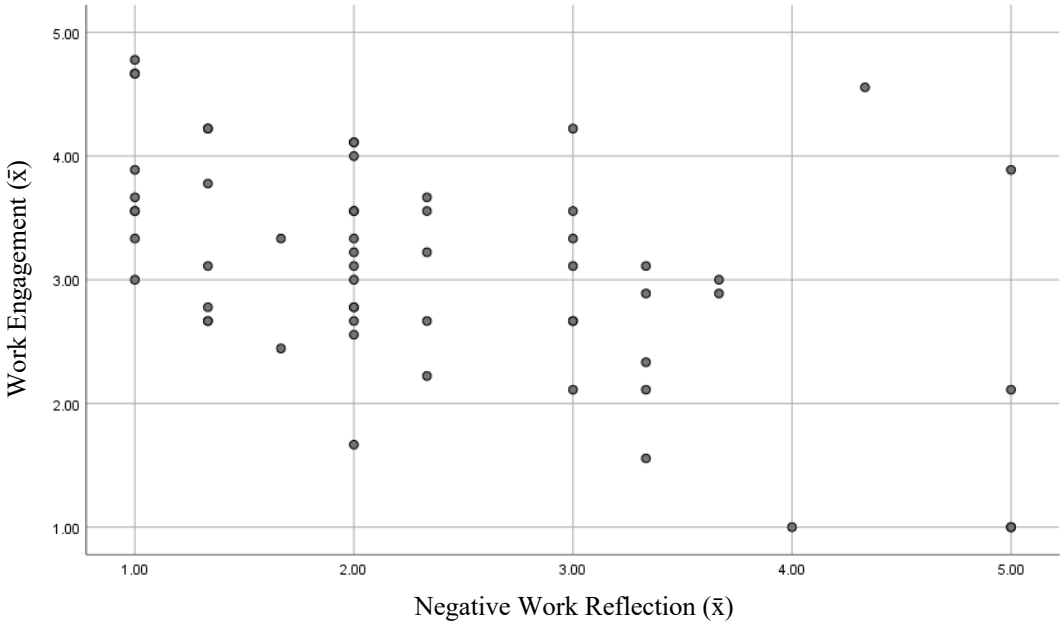
Note. Scatterplot represents a visualization of Hypothesis 6a.

Figure 26
Scatterplot Between Positive Work Reflection and Exhaustion



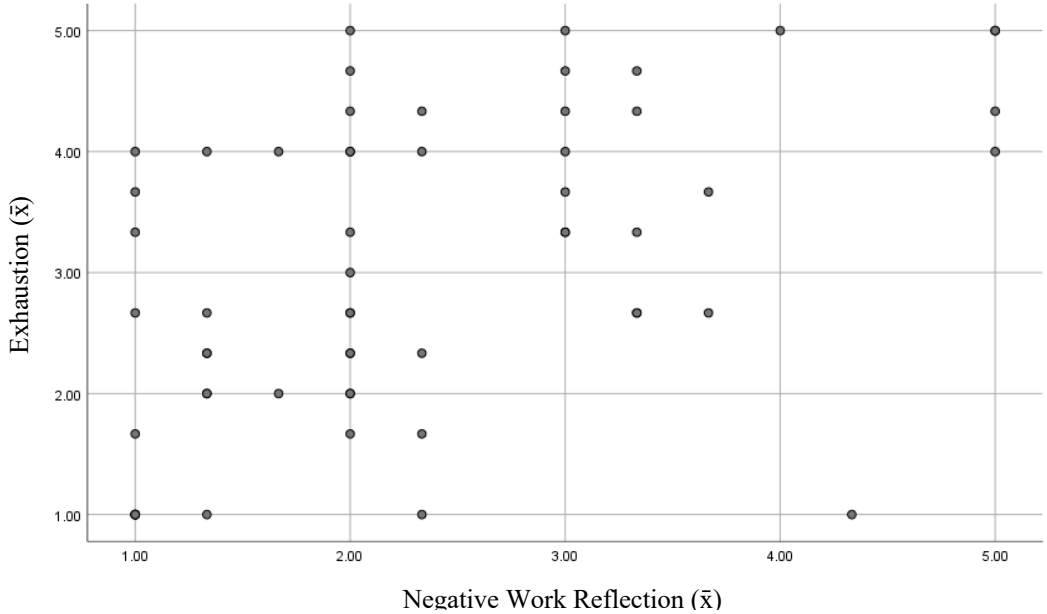
Note. Scatterplot represents a visualization of Hypothesis 6b.

Figure 27
Scatterplot Between Negative Work Reflection and Work Engagement



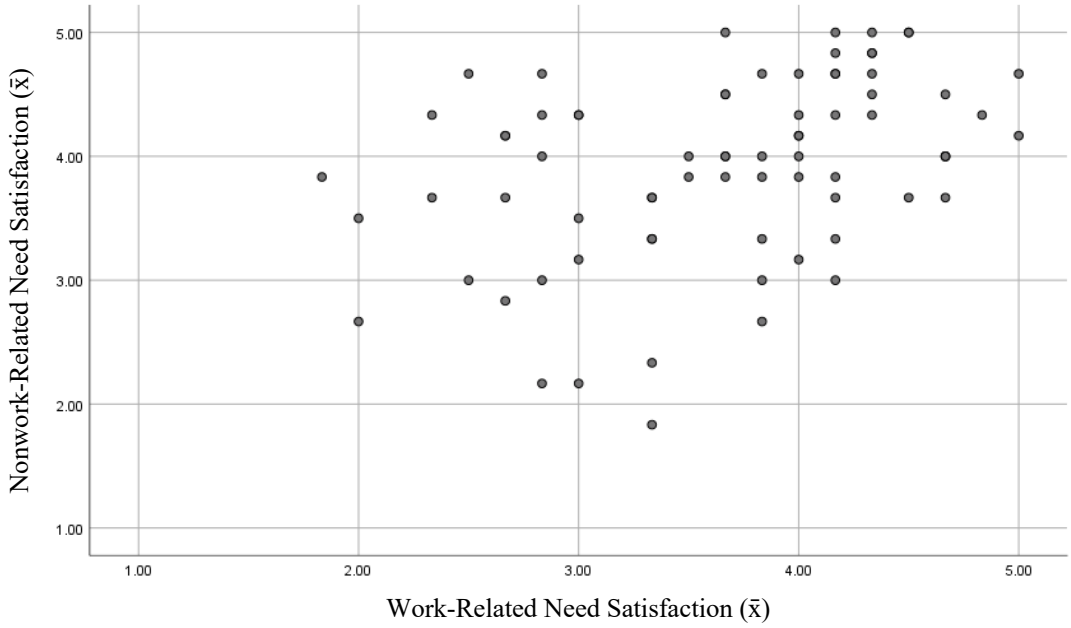
Note. Scatterplot represents a visualization of Hypothesis 7a.

Figure 28
Scatterplot Between Negative Work Reflection and Exhaustion



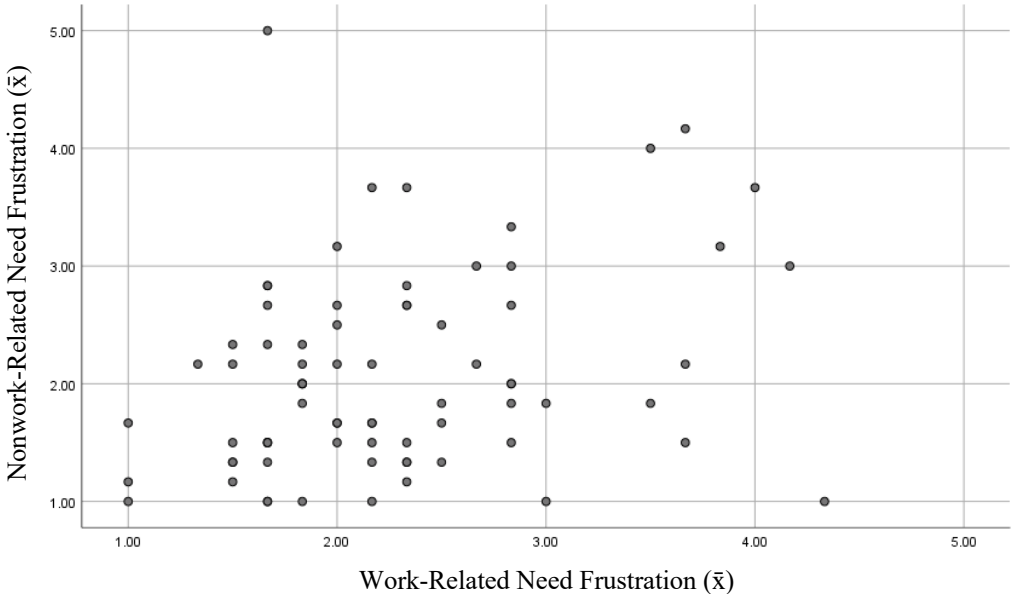
Note. Scatterplot represents a visualization of Hypothesis 7b.

Figure 29
Scatterplot Between Work-Related Need Satisfaction and Nonwork-Related Need Satisfaction



Note. Scatterplot represents a visualization of Hypothesis 8.

Figure 30
Scatterplot Between Work-Related Need Frustration and Nonwork-Related Need Frustration



Note. Scatterplot represents a visualization of Hypothesis 9.

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Appendix A: Survey Items and Instructions

All response scales include response of 1 to 5; *(1) strongly disagree, (2) somewhat disagree, (3) neither agree nor disagree, (4) somewhat agree, (5) strongly agree* – unless otherwise indicated.

Antecedents

Need Satisfaction and Frustration at Work (Chen et al., 2015; van der Kaap-Deeder et al., 2017)

Please think about the experiences you had **today at work.** Please indicate your agreement with each of the statements below.

1. Today I felt a sense of choice and freedom in the things I undertook during work. (AS)
2. Today I felt disappointed with many of my performances at work. (CF)
3. Today I felt that people who are important to me at work were cold and distant towards me. (RF)
4. Today most of the things I did at work felt like "I had to". (AF)
5. Today I felt confident that I could do things well at work. (CS)
6. Today I felt that my work-related decisions reflected what I really wanted. (AS)
7. Today I felt connected with people at work who care for me, and for whom I care. (RS)
8. Today I felt excluded from the group at work I want to belong to. (RF)
9. Today I felt forced to do many things at work I didn't choose to do. (AF)
10. Today I felt capable at what I did at work. (CS)
11. Today I experienced a warm feeling with the people I spent time with at work. (RS)
12. Today I felt insecure about my abilities at work. (CF)

Need Satisfaction and Frustration During Nonwork Time (Chen et al., 2015; van der Kaap-Deeder et al., 2017)

Please think about the experiences you had today **after work, during your non-work time** (i.e., during home, recreational, volunteering experiences, etc.). Please indicate your agreement with each of the statements below.

1. Today I felt a sense of choice and freedom in the things I undertook during my non-work time. (AS)
2. Today I felt disappointed with many of my performances outside of work. (CF)
3. Today I felt that people who are important to me outside of work were cold and distant towards me. (RF)
4. Today most of the things I did during nonwork time felt like "I had to". (AF)
5. Today I felt confident that I could do things well outside of work. (CS)
6. Today I felt that my non-work-related decisions reflected what I really wanted. (AS)
7. Today I felt connected with people outside of work who care for me, and for whom I care. (RS)

8. Today I felt excluded from the group outside of work I want to belong to. (RF)
9. Today I felt forced to do many things outside of work I didn't choose to do. (AF)
10. Today I felt capable at what I did during non-work time. (CS)
11. Today I experienced a warm feeling with the people I spent time with outside of work. (RS)
12. Today I felt insecure about my abilities outside of work. (CF)

Mediators

Psychological Detachment – Recovery Experiences Questionnaire (Sonnentag & Fritz, 2007)
Please think about the experiences you had today **after work, during your non-work time** (i.e., during home, recreational, volunteering experiences, etc.). Please indicate your agreement with each of the statements below.
In thinking about today **during your nonwork time**, to what extent do you agree with the following statements?
Today after work…

1. …I forgot about work.
2. …I didn't think about work at all.
3. …I distanced myself from work.
4. …I got a break from the demands of work.

Positive Work Reflection (Fritz & Sonnentag, 2006)
In thinking about today **during your nonwork time**, to what extent do you agree with the following statements?

1. Today after work, I realized what I like about my job
2. Today after work, I thought about the positive points of my job
3. Today after work, I considered the positive aspects of my job

Negative Work Reflection (Fritz & Sonnentag, 2006)
In thinking about today **during your nonwork time**, to what extent do you agree with the following statements?

1. Today after work, I realized what I did not like about my job
2. Today after work, I thought about the negative points of my job
3. Today after work, I considered the negative aspects of my job

Outcomes

Engagement; Utrecht Work Engagement Survey – Shortened Version (Schaufeli et al., 2006)
Please think about the experiences you had **today at work.** Please indicate your agreement with each of the statements below.

In thinking about **your workday today**, to what extent do you agree with the following statements?

1. Today at work, I felt bursting with energy (VI01).
2. Today at my job, I felt strong and vigorous (VI02).
3. Today when I got up in the morning, I felt like going to work (VI03).
4. Today I felt enthusiastic about my job (DE02).
5. Today I was proud of the work that I do (DE04).
6. Today my job inspired me (DE03).
7. Today I felt immersed in my work (AB04).
8. Today I got carried away when I was working (AB05).
9. Today I felt happy when I was working intensely (AB03).

Exhaustion; OLBI – selected items (Demerouti et al., 2010)
In thinking about **your workday today**, to what extent do you agree with the following statements?

1. Today I felt tired before I even arrived at work.
2. Today during work, I felt emotionally drained.
3. Today during work, I felt worn out and weary.

Day-Level Work Characteristics

Hours Worked
How many hours did you work today in total?
Fill-in: _____ hours

Working from Home
Approximately what percent of your work was done from home today (if any)?
(0-100 slider)

Working during Nonwork Time
Approximately how many hours of work did you do during nonwork time (if any)?
Fill-in: _____ hours

Were you travelling for work today? Y/N

Were you on PTO today? Y/N

Baseline Variables

Organizational Support (**Resources;** Eisenberger et al., 1986)
Listed below are statements that represent how you feel about working at [Organization]. Please indicate the degree of your agreement or disagreement with each statement that best represents your point of view about [Organization]. Please choose from the following answers:

1. [Organization] values my contribution to its well-being.
2. If [Organization] could hire someone to replace me at a lower salary it would do so.
3. [Organization] fails to appreciate any extra effort from me. (R)
4. [Organization] strongly considers my goals and values.
5. [Organization] would ignore any complaint from me. (R)
6. [Organization] disregards my best interests when it makes decisions that affect me. (R)
7. Help is available from [Organization] when I have a problem.
8. [Organization] really cares about my well-being.
9. Even if I did the best job possible, [Organization] would fail to notice. (R)
10. [Organization] is willing to help me when I need a special favor.
11. [Organization] cares about my general satisfaction at work.
12. If given the opportunity, [Organization] would take advantage of me. (R)
13. [Organization] shows very little concern for me. (R)
14. [Organization] cares about my opinions.
15. [Organization] takes pride in my accomplishments at work.
16. [Organization] tries to make my job as interesting as possible.

Burnout; Oldenburg Burnout Inventory (Demerouti et al., 2010)
The following questions ask you to think about how **you feel when you are at work** in general. Please respond as accurately as possible by indicating your agreement with each statement.

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

14. Usually, I can manage the amount of my work well.
15. I feel more and more engaged in my work.
16. When I work, I usually feel energized.

Recovery Experiences (**REQ**; Sonnentag & Fritz, 2007)
The following questions ask you to think about how **you feel during your nonwork time** in general. Please indicate your agreement with each statement.
When I leave work at the end of each day…
Psychological Detachment

1. I forget about work.
2. I don't think about work at all.
3. I distance myself from work.
4. I get a break from the demands of work.

Relaxation

1. I kick back and relax.
2. I do relaxing things.
3. I use the time to relax.
4. I take time for leisure.

Mastery

1. I learn new things.
2. I seek out intellectual challenges.
3. I do things that challenge me.
4. I do something to broaden my horizons.

Control

1. I feel like I can decide for myself what to do.
2. I decide my own schedule.
3. I determine for myself how I spend my time.
4. I take care of things the way that I want them done.

Engagement; Utrecht Work Engagement Survey – Shortened Version (Schaufeli et al., 2006)
The following questions ask you to think about how you feel **when you are at work in general**. Please respond as accurately as possible by indicating your agreement with each statement.

1. I feel bursting with energy (VI01).
2. I feel strong and vigorous (VI02).
3. When I get up in the morning, I feel like going to work (VI03).
4. I feel enthusiastic about my job (DE02).
5. I am proud on the work that I do (DE04).
6. My job inspires me (DE03).
7. I feel immersed in my work (AB04).
8. I get carried away when I am working (AB05).
9. I feel happy when I am working intensely (AB03).

Work Arrangement
Do you typically work out of an office (e.g., Bellevue or Denver), or do you work from home?
2 options – office/from home

Department
Which district do you work in?
Finance
Legal
Admin
People
Product
Growth
R&D
Marketing

Baseline Demographics

Hours worked per week
On average in the past month, how many hours did you work per week?
Fill-in: _____ hours

Job Tenure
How many years have you been working in your current organization?
Fill-in: _____ years

Job Level
Which best describes your job level (select one):
Director and above
Manager
Individual Contributor
Intern

Age
What is your age?
Fill-in: _____ years

Gender
What is your gender? (Circle one):
Man
Non-binary/Third gender
Prefer not to disclose
Woman
A gender other than those listed

Marital Status
What is your marital status?
Response Options (Circle one): (a) Single, never married, (b) Dating someone, (c) Married, (d) Living with a partner, (e) Divorced, or (f) Widowed.

Ethnicity
What is your ethnicity?
Response Options (Circle all that apply):
Asian
Black or African American
Hispanic or Latinx
More than one race or ethnicity
Native American, Alaska Native, Native Pacific Islander
Prefer not to disclose
White
A race or ethnicity other than those listed

Education Level
What is the highest level of education you have completed?
Response Options (Circle one): (a) High school/GED, (b) Some college, (c) 2-year college degree (Associate's), (d) 4-year college degree (Bachelor's), (e) Advanced degree (Master's or other), or (f) Other (please specify: _____)

Number of Dependents in Household
How many children under 18 do you have that are living with you at least half time?
Fill-in: _____

Household Size
How many individuals, including yourself, reside in your household?
Fill-in: _____

Appendix B: Post-Hoc Group Comparisons

Variable	Men (*M*)	Men (*SD*)	Men (*N*)	Women (*M*)	Women (*SD*)	Women (*N*)	*t*	df	*p*-value	Cohen's *D*	Hedge's *g*	CI Lower	CI Upper
Need Satisfaction (W)	3.57	0.71	56	3.9	0.75	58	-2.42	112	<.05	-0.46	-0.45	-0.64	-0.26
Need Satisfaction Relatedness (W)	3.59	0.91	56	4.28	0.66	58	-4.61	99.86	<.001	-0.88	-0.87	-1.11	-0.7
Absorption	2.93	0.99	35	3.68	1.17	38	-2.91	71	<.01	-0.69	-0.68	-1.01	-0.31
Engagement	2.89	0.9	35	3.39	1.02	38	-2.22	71	<.05	-0.53	-0.52	-0.82	-0.2
Positive Work Reflection	2.78	1.24	48	3.45	0.9	55	-3.07	84.48	<.01	-0.63	-0.62	-0.97	-0.38
Need Satisfaction Relatedness (NW)	3.84	0.98	50	4.34	0.76	56	-2.95	104	<.01	-0.58	-0.57	-0.84	-0.37
Need Frustration (NW)	2.16	0.91	50	1.83	0.65	56	2.14	104	<.05	0.42	0.42	0.16	0.59
Need Frustration Relatedness (NW)	1.68	0.9	50	1.32	0.58	56	2.41	81.49	<.05	0.48	0.48	0.23	0.63
Need Frustration Autonomy (W)	3.12	1.07	56	2.59	1.08	58	-4.63	112	<.001	0.5	0.49	0.22	0.77
Negative Work Reflection	2.8	1.22	48	2.06	1.11	54	3.19	100	<.01	0.64	0.63	0.29	0.93

Note. Zero participants reported a non-binary/third gender, a gender other than those listed, or preferred not to report gender. W = work-related; NW = nonwork-related. Cohen's *D* and Hedge's *g* rules of thumb for effect sizes are: .20 = small, .50 = medium, .80 = large (Cohen, 1992).

Variable	White (*M*)	White (*SD*)	White (*N*)	DND (*M*)	DND (*SD*)	DND (*N*)	*F*	(df_w, df_b)	*p*-value	η^2	*M* diff	*SE*	CI Lower	CI Upper	Cohen's *D*	Hedge's *g*	CI Lower	CI Upper
NS-A (W)	3.4	1.04	104	1.75	1.17	6	5.77	3, 110	<.01	0.14	1.65	0.44	0.48	2.83	1.6	1.58	1.38	2.52
NF-A (W)	2.78	1.65	104	4.17	0.98	6	3.27	3, 110	<.05	0.08	-1.39	0.45	-2.59	-0.18	-0.86	-0.85	-1.17	-0.07
NS-C (W)	4.05	0.72	104	2.42	1.16	6	9.5	3, 110	<.001	0.21	1.63	0.31	0.79	2.47	2.2	2.18	2.04	3.11
NS (W)	3.81	0.68	104	2.53	0.83	6	7.46	3, 110	<.001	0.17	1.29	0.29	0.51	2.06	1.88	1.86	1.73	2.53
NF-C (W)	1.97	0.88	104	3.67	0.82	6	7.91	3, 110	<.001	0.18	-1.7	0.37	-2.69	-0.71	-1.94	-1.93	-2.1	-1.27
NF-R (W)	1.46	0.77	104	2.92	0.8	6	7.34	3, 110	<.001	0.17	-1.46	0.32	-2.32	-0.59	-1.89	-1.87	-2.02	-1.23
NF (W)	2.07	0.66	104	3.58	0.64	6	10.44	3, 110	<.001	0.22	-1.51	0.28	-2.25	-0.77	-2.32	-2.3	-2.43	-1.79
NWR	2.29	1.14	94	5	0	3	7.02	3, 98	<.001	0.18	-2.71	0.66	-4.48	-0.94	-2.43	-2.4	-2.63	-2.4
NF-C (NW)	1.87	0.97	98	3.5	1	3	3.35	3, 102	<.05	0.09	-1.63	0.56	-3.15	-0.11	-1.7	-1.68	-1.87	-0.55
PWR	3.21	1.09	95	1.33	0.58	3	3.8	3, 99	<.05	0.1	1.87	0.63	0.18	3.57	1.76	1.74	1.52	2.4

Note. DND = did not disclose race/ethnicity; NS = need satisfaction; NF = need frustration; A = autonomy; C = competence; R = relatedness; W = work-related; NW = nonwork-related; NWR = negative work reflection; PWR = positive work reflection. Eta-squared (η^2) rule of thumb for effect size is: .01 = small, .09 = medium, .25 = large. Cohen's *D* and Hedge's *g* rules of thumb for effect sizes are: .20 = small, .50 = medium, .80 = large (Cohen, 1992).

Variable	Asian (*M*)	Asian (*SD*)	Asian (*N*)	DND (*M*)	DND (*SD*)	DND (*N*)	*F*	(df_w, df_b)	*p*-value	η^2	*M* diff	*SE*	CI Lower	CI Upper	Cohen's *D*	Hedge's *g*	CI Lower	CI Upper
NS- C (W)	4.25	0.35	2	2.42	1.16	6	9.5	3, 110	<.001	0.21	1.83	0.61	0.2	3.47	1.98	1.72	1.23	2.64
NS (W)	4.17	0	2	2.53	0.83	6	7.46	3, 110	<.001	0.17	1.64	0.56	0.13	3.15	2.49	2.16	2.16	2.82
NF-C (W)	1.5	0.71	2	3.67	0.82	6	7.91	3, 110	<.001	0.18	-2.17	0.72	-4.09	-0.25	-3.13	-2.71	-3.69	-2.06
NF-R (W)	1	0	2	2.92	0.8	6	7.34	3, 110	<.001	0.17	-1.92	0.63	-3.6	-0.23	-3.03	-2.62	-2.62	-1.98
NF (W)	1.67	0.47	2	3.58	0.64	6	10.44	3, 110	<.001	0.22	-1.92	0.54	-3.36	-0.48	-3.6	-3.12	-3.77	-2.61
NWR	2	0	2	5	0	3	7.02	3, 98	<.001	0.18	-3	1.02	-5.75	-0.25	NA	NA	NA	NA

Note. DND = did not disclose race/ethnicity; NS = need satisfaction; NF = need frustration; C = competence; R = relatedness; W = work-related; NWR = negative work reflection. Eta-squared (η^2) rule of thumb for effect size is: .01 = small, .09 = medium, .25 = large. Cohen's *D* and Hedge's *g* rules of thumb for effect sizes are: .20 = small, .50 = medium, .80 = large (Cohen, 1992).

Variable	MR (*M*)	MR (*SD*)	MR (*N*)	DND (*M*)	DND (*SD*)	DND (*N*)	*F*	(df_w, df_b)	*p*-value	η^2	*M* diff	*SE*	CI Lower	CI Upper	Cohen's *D*	Hedge's *g*	CI Lower	CI Upper
NS-C (W)	4.5	0.71	2	2.42	1.16	6	9.5	3, 110	<.001	0.21	2.08	0.61	0.45	3.72	2.19	1.9	0.92	2.83
NF-C (W)	1.25	0.35	2	3.67	0.82	6	7.91	3, 110	<.001	0.18	-2.42	0.72	-4.34	-0.5	-3.68	-3.18	-3.67	-2.53
NF (W)	2	0.71	2	3.58	0.64	6	10.44	3, 110	<.001	0.22	-1.58	0.54	-3.02	-0.14	-2.81	-2.43	-3.41	-1.92

Note. MR = multiracial; DND = did not disclose race/ethnicity; NS = need satisfaction; NF = need frustration; C = competence; W = work-related. Eta-squared (η^2) rule of thumb for effect size is: .01 = small, .09 = medium, .25 = large. Cohen's *D* and Hedge's *g* rules of thumb for effect sizes are: .20 = small, .50 = medium, .80 = large (Cohen, 1992).

Variable	SC (*M*)	SC (*SD*)	SC (*N*)	Bach (*M*)	Bach (*SD*)	Bach (*N*)	*F*	(df_w, df_b)	*p*-value	η^2	*M* diff	*SE*	CI Lower	CI Upper	Cohen's *D*	Hedge's *g*	CI Lower	CI Upper
NS-R (W)	2.5	0.71	2	4.16	0.69	54	5.96	2, 111	<.01	0.1	-1.66	0.59	-3.1	-0.21	-2.45	-2.4	-3.39	-2.22

Note. SC = some college; Bach = bachelor's degree; NS = need satisfaction; R = relatedness; W = work-related. Eta-squared (η2) rule of thumb for effect size is: .01 = small, .09 = medium, .25 = large. Cohen's D and Hedge's g rules of thumb for effect sizes are: .20 = small, .50 = medium, .80 = large (Cohen, 1992).

Variable	Adv (*M*)	Adv (*SD*)	Adv (*N*)	Bach (*M*)	Bach (*SD*)	Bach (*N*)	*F*	(df_w, df_b)	*p*-value	η^2	*M* diff	*SE*	CI Lower	CI Upper	Cohen's *D*	Hedge's *g*	CI Lower	CI Upper
NF-R (W)	1.75	0.91	58	1.3	0.68	54	4.78	2, 111	<.05	0.08	0.45	0.15	0.08	0.82	0.57	0.56	0.33	0.74
NF-C (NW)	2.2	1.07	51	1.67	0.86	52	3.86	2, 103	<.05	0.07	0.52	0.19	0.06	0.99	0.54	0.54	0.24	0.77
NF-R (NW)	1.71	0.91	51	1.28	0.52	52	4.26	2, 103	<.05	0.08	0.43	0.15	0.07	0.78	0.58	0.58	0.33	0.72

Note. Adv = advanced degree; Bach = bachelor's degree; NF = need frustration; C = competence; R = relatedness; W = work-related; NW = nonwork-related. Eta-squared (η2) rule of thumb for effect size is: .01 = small, .09 = medium, .25 = large. Cohen's D and Hedge's g rules of thumb for effect sizes are: .20 = small, .50 = medium, .80 = large (Cohen, 1992).

Variable	Mgr (*M*)	Mgr (*SD*)	Mgr (*N*)	IC (*M*)	IC (*SD*)	IC (*N*)	*F*	(df_w, df_b)	*p*-value	η^2	*M* diff	*SE*	CI Lower	CI Upper	Cohen's *D*	Hedge's *g*	CI Lower	CI Upper
NF-C (NW)	3	1.41	9	1.84	0.91	78	6.39	2, 103	<.01	0.11	1.16	0.33	0.35	1.97	1.21	1.2	0.27	1.4
NF-R (NW)	2.33	1.32	9	1.42	0.67	78	6.61	2, 103	<.01	0.11	0.92	0.26	0.29	1.54	1.22	1.21	0.35	1.36
NF (NW)	2.65	1.11	9	1.91	0.69	78	3.59	2, 103	<.05	0.07	0.73	0.27	0.07	1.4	1	0.99	0.26	1.14
NWR	3.38	1.05	8	2.24	1.13	76	4.04	2, 99	<.05	0.08	1.14	0.44	0.07	2.21	1.03	1.02	0.29	1.27
NS-C (NW)	3.44	1.47	9	4.25	0.78	78	3.44	2, 103	<.05	0.06	-0.81	0.31	-1.57	-0.04	-0.93	-0.92	-1.88	-0.75

Note. Mgr = manager; IC = individual contributor; NS = need satisfaction; NF = need frustration; C = competence; R = relatedness; NW = nonwork-related; NWR = negative work reflection. Eta-squared (η^2) rule of thumb for effect size is: .01 = small, .09 = medium, .25 = large. Cohen's *D* and Hedge's *g* rules of thumb for effect sizes are: .20 = small, .50 = medium, .80 = large (Cohen, 1992).

Variable	Mgr (*M*)	Mgr (*SD*)	Mgr (*N*)	Dir (*M*)	Dir (*SD*)	Dir (*N*)	*F*	(df_w, df_b)	*p*-value	η^2	*M* diff	*SE*	CI Lower	CI Upper	Cohen's *D*	Hedge's *g*	CI Lower	CI Upper
NF-C (NW)	3	1.41	9	1.76	0.84	19	6.39	2, 103	<.01	0.11	0.94	0.29	0.3	2.17	1.22	1.18	0.25	1.55
NF-R (NW)	2.33	1.32	9	1.39	0.57	19	6.61	2, 103	<.01	0.11	1.24	0.38	0.22	1.65	1.12	1.08	0.21	1.33
NF (W)	2.74	0.85	9	1.95	0.57	19	3.88	2, 110	<.05	0.07	0.79	0.29	0.09	1.49	1.23	1.19	0.64	1.45
EXH	3.89	1.13	6	2.17	1.18	10	3.82	2, 70	<.05	0.1	1.72	0.64	0.15	3.3	1.59	1.48	0.58	2.21

Note. Mgr = manager; Dir = director or above; NF = need frustration; C = competence; R = relatedness; W = work-related; NW = nonwork-related; EXH = exhaustion. Eta-squared (η^2) rule of thumb for effect size is: .01 = small, .09 = medium, .25 = large. Cohen's *D* and Hedge's *g* rules of thumb for effect sizes are: .20 = small, .50 = medium, .80 = large (Cohen, 1992).

Variable	Legal (*M*)	Legal (*SD*)	Legal (*N*)	People (*M*)	People (*SD*)	People (*N*)	*F*	(df_w, df_b)	*p*-value	η^2	*M* diff	*SE*	CI Lower	CI Upper	Cohen's *D*	Hedge's *g*	CI Lower	CI Upper
NS-R (W)	2.9	0.22	5	4.5	0.58	7	6.89	5, 108	<.001	0.24	-1.6	0.45	-2.95	-0.25	-3.74	-3.41	-3.61	-2.98

Note. NS = need satisfaction; R = relatedness; W = work-related. Eta-squared (η^2) rule of thumb for effect size is: .01 = small, .09 = medium, .25 = large. Cohen's *D* and Hedge's *g* rules of thumb for effect sizes are: .20 = small, .50 = medium, .80 = large (Cohen, 1992).

Variable	Legal (*M*)	Legal (*SD*)	Legal (*N*)	Grow (*M*)	Grow (*SD*)	Grow (*N*)	*F*	(df_w, df_b)	*p*-value	η^2	*M* diff	*SE*	CI Lower	CI Upper	Cohen's *D*	Hedge's *g*	CI Lower	CI Upper
NS-R (W)	2.9	0.22	5	4.18	0.63	60	6.89	5, 108	<.001	0.24	-1.28	0.36	-2.35	-0.2	-2.12	-2.08	-2.28	-1.92
NS (NW)	3	0.3	4	4.1	0.66	58	2.81	5, 100	<.05	0.12	-1.1	0.35	-2.16	-0.04	-1.73	-1.7	-2	-1.53

Note. Grow = Growth team; NS = need satisfaction; R = relatedness; W = work-related; NW = nonwork-related. Eta-squared (η^2) rule of thumb for effect size is: .01 = small, .09 = medium, .25 = large. Cohen's *D* and Hedge's *g* rules of thumb for effect sizes are: .20 = small, .50 = medium, .80 = large (Cohen, 1992).

Variable	Legal (*M*)	Legal (*SD*)	Legal (*N*)	Market (*M*)	Market (*SD*)	Market (*N*)	*F*	(df_w, df_b)	*p*-value	η^2	*M* diff	*SE*	CI Lower	CI Upper	Cohen's *D*	Hedge's *g*	CI Lower	CI Upper
NS-R (W)	2.9	0.22	5	4.63	0.48	4	6.89	5, 108	<.001	0.24	-1.73	0.51	-3.27	-0.18	-5.49	-4.84	-5.04	-4.38

Note. Market = marketing team; NS = need satisfaction; R = relatedness; W = work-related. Eta-squared (η^2) rule of thumb for effect size is: .01 = small, .09 = medium, .25 = large. Cohen's *D* and Hedge's *g* rules of thumb for effect sizes are: .20 = small, .50 = medium, .80 = large (Cohen, 1992).

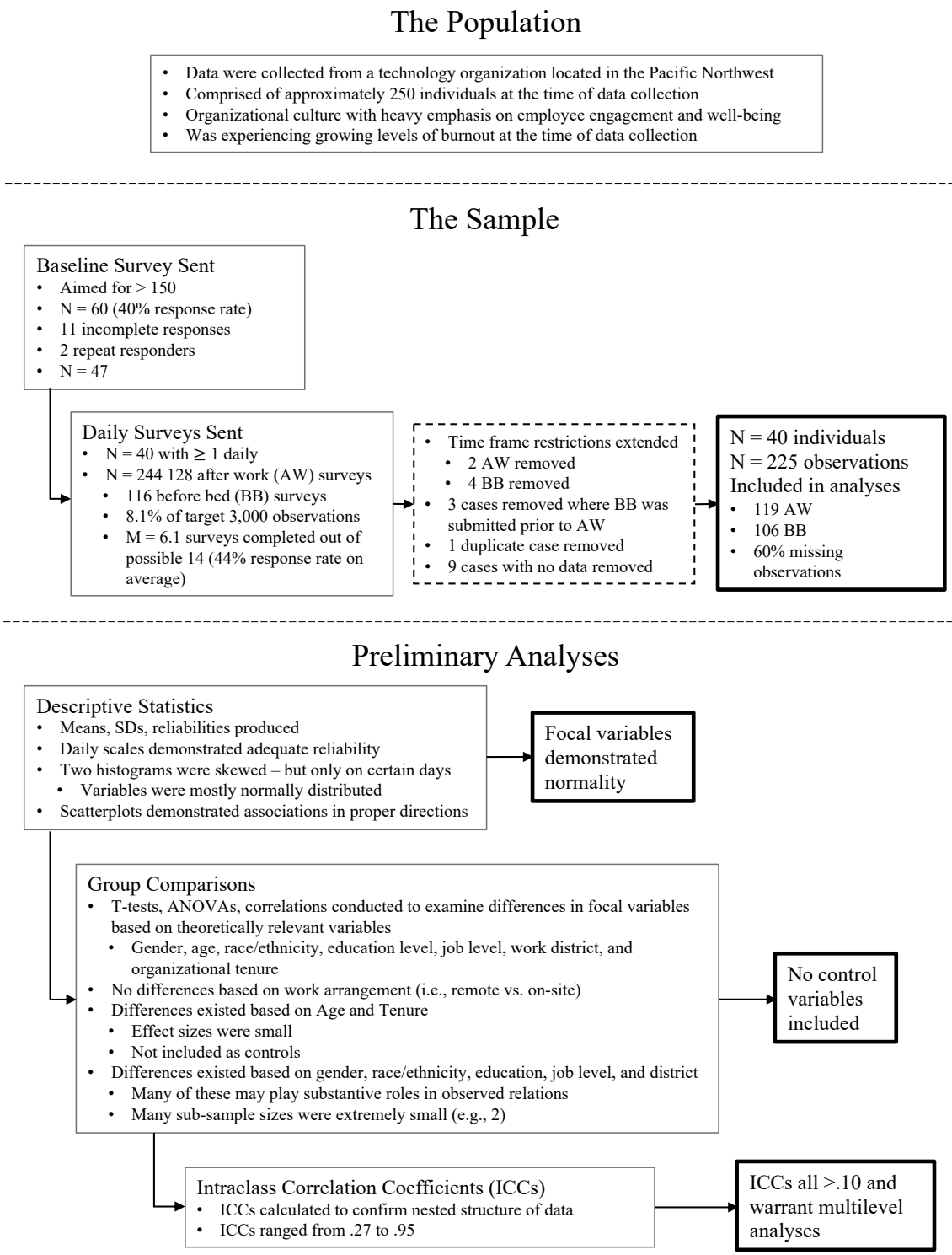
Variable	R&D (*M*)	R&D (*SD*)	R&D (*N*)	People (*M*)	People (*SD*)	People (*N*)	*F*	(df_w, df_b)	*p*-value	η^2	*M* diff	*SE*	CI Lower	CI Upper	Cohen's *D*	Hedge's *g*	CI Lower	CI Upper
PWR	2.26	1.07	31	3.86	0.5	7	8.79	5, 97	<.001	0.31	-1.6	0.4	-2.8	-0.4	-1.65	-1.6	-1.98	-1.23

Note. R&D = research and development team; PWR = positive work reflection. Eta-squared (η^2) rule of thumb for effect size is: .01 = small, .09 = medium, .25 = large. Cohen's *D* and Hedge's *g* rules of thumb for effect sizes are: .20 = small, .50 = medium, .80 = large (Cohen, 1992).

Variable	R&D (*M*)	R&D (*SD*)	R&D (*N*)	Grow (*M*)	Grow (*SD*)	Grow (*N*)	*F*	(df_w, df_b)	*p*-value	η^2	*M* diff	*SE*	CI Lower	CI Upper	Cohen's *D*	Hedge's *g*	CI Lower	CI Upper
NS-R (W)	3.57	1.02	35	4.18	0.063	60	6.89	5, 108	<.001	0.24	-0.6	0.16	-1.09	-0.11	-0.77	-0.76	-1.1	-0.6
PWR	2.26	1.07	31	3.52	0.93	56	8.79	5, 97	<.001	0.31	-1.27	0.21	-1.91	-0.63	-1.31	-1.29	-1.67	-1.05

Note. R&D = research and development team; Grow = growth team; NS = need satisfaction; R = relatedness; W = work-related; PWR = positive work reflection. Eta-squared (η^2) rule of thumb for effect size is: .01 = small, .09 = medium, .25 = large. Cohen's *D* and Hedge's *g* rules of thumb for effect sizes are: .20 = small, .50 = medium, .80 = large (Cohen, 1992).

Appendix C: Analysis Approach Flowchart



Missing Data

Representativeness
- Baseline items were matched to the organization's engagement survey items to see if the sample was representative of the "population"
- The present sample differed from the organization on 7/17 items
- Composite scores were created to represent engagement
    - T-test demonstrated that the present sample had significantly lower engagement

→ Present sample not necessarily representative

Missingness: Those who did and did not complete a daily survey
- Dummy code: 0 = completed at least 1 daily survey and 1 = did not complete any daily surveys
- Binary logistic regressions conducted to determine if gender, age, household size, job level, department, work arrangement, org resources, burnout, or engagement were predicted by missingness

→ No systematic explanation for missing data

Missingness: Those who did and did not complete at least 10 surveys
- Dummy code: 0 = completed fewer than 10 daily surveys and 1 = completed at least 10 daily surveys
- Binary logistic regressions conducted as described above

→ No systematic explanation for missing data

Factor Structure

All MCFAs were conducted twice – once using an ML estimator and once allowing M*plus* to default
- In each case, M*plus* defaulted to MLR
- MLR produces ML parameter estimates with SEs and a chi-square value that are robust to non-normality

Positive Model (H1, 3, 5, 6, & 8)
- Need satisfaction at work, positive work reflection, detachment, engagement, and exhaustion modeled on unique factors
- Needs (autonomy, competence, relatedness) modeled on separate factors
- Needs and engagement modeled using three factors each

Negative Model (H2, 4, 7, & 9)
- Need frustration at work, negative work reflection, engagement, and exhaustion modeled on unique factors
- Needs modeled on separate factors
- Needs and engagement modeled using three factors each

→ These six models did not converge with ML nor MLR

Single-level (i.e., single-day) CFAs were conducted using the full positive model

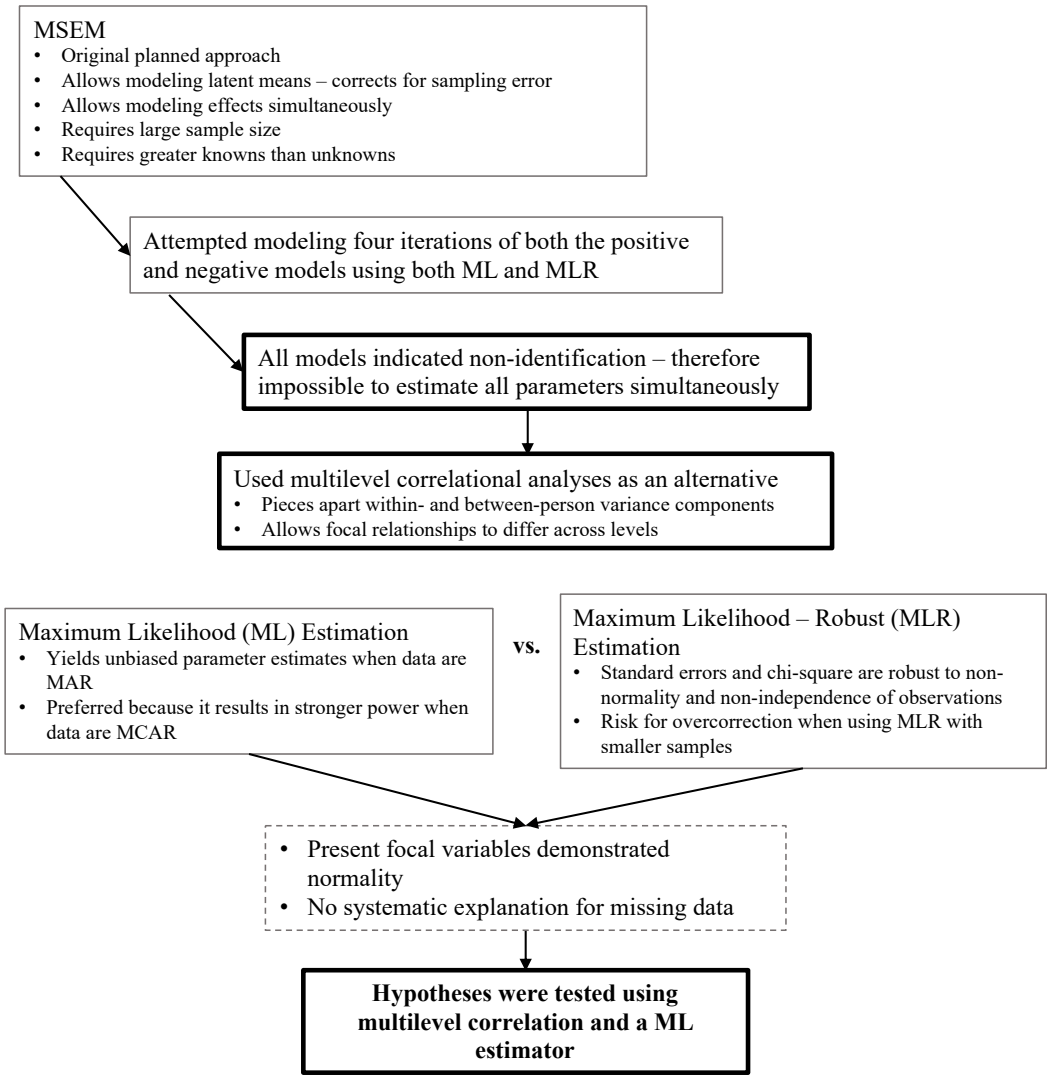
→ Did not converge indicating nonidentification issue (i.e., more unknowns than knowns)

MCFAs were conducted for unique constructs (i.e., need satisfaction alone)

→ Need satisfaction, need frustration, engagement should be treated as three-factors each

→ Based on debate in the literature, needs were treated as both a one- and three-factor construct

Analysis Approach and Hypothesis Testing



Appendix D: Future Research Propositions

Mediational Model

The present study argues that need satisfaction facilitates resource-rich states within employees, which facilitates the investment of resources in nonwork resource replenishment processes (i.e., psychological detachment and positive work reflection in the evening). Consistent with COR theory, resource-rich states provide individuals with greater control over their actions and environment. This enables individuals to invest resources in nonwork cognitive processes that generate resources (Hobfoll et al., 2018). These states facilitate positive work-related thoughts and enable individuals to experience psychological detachment from work in the evening.

Because positive work reflection during nonwork time generates resources, it provides individuals with increased resources and energy to expend the next day at work, thereby facilitating a positive motivational path and higher work engagement (Bakker & Demerouti, 2007). Further, resources generated by daily positive work reflection are linked to lower next day exhaustion. On days in which individuals experience high psychological detachment from work in the evening, they are less likely to expend resources on work-related tasks or thoughts during nonwork time (Sonnentag & Fritz, 2007; Sonnentag et al., 2017). Specifically, psychological detachment from work inhibits stressor-strain processes and therefore facilitates resource replenishment and individuals' engagement in nonwork resource generating activities. Because detachment is linked to resource replenishment and generation, it facilitates next day work engagement and inhibits next day exhaustion.

Conversely, on days in which resources are frustrated, individuals do not have adequate resources for replenishment and further resource gain. Specifically, when individuals experience work related need frustration a state is generated in which individuals are susceptible to further resource loss and, in addition, are unable to invest resources in experiences that would facilitate resource replenishment (Hobfoll et al., 2018). Further, on days in which individuals experience this resource-depleted state, they experience subsequent stress reactions which may further prolong the activation of need frustration during nonwork time (Brosschot et al., 2006; Hobfoll et al., 2018). This prolonged activation facilitates negative work reflection that evening during nonwork time.

Reflecting negatively on work necessitates the investment of resources into negative thoughts, which, concurrent with the perseverative model of stress (Brosschot et al., 2005), prolongs stressors and strain reactions. This is linked to the depletion of resources and additionally inhibits individuals from replenishing resources through resource generating processes. Because daily need frustration and subsequent negative work reflection in the evening inhibits individuals from replenishing daily resources, individuals will be more likely to experience higher next day exhaustion and lower next day work engagement.

Positive Work-Nonwork Spillover

Organizational research rooted in SDT acknowledges that need satisfaction exists with respect to specific life domains, that is, need satisfaction at work is distinct from need satisfaction at home (Milyavskaya et al., 2009; Milyavskaya & Koestner, 2011).

Although research exists that addresses the balance of need satisfaction across life domains (Milyavskaya et al., 2009; Milyavskaya & Koestner, 2011), few have examined direct associations and interactions between life domains (Hewett et al., 2017). Work-nonwork spillover refers to the transfer of experiences from one life domain to another, which may subsequently influence outcomes in the second life domain (Edwards & Rothbard, 2000).

Research on positive work-nonwork spillover has demonstrated that positive states within the work domain can "spill over" and facilitate positive states and processes in nonwork domains (Allen & Martin, 2017; Casper et al., 2018). This is consistent with research on work-family enrichment, which argues that experiences or resources in one role or life domain can strengthen the quality of one's life in another role or life domain (i.e., performance, affective states, etc.; Wayne, Grzywacz, Carlson, & Kacmar, 2007; Casper et al., 2018; Greenhaus & Powell, 2006).

Work-nonwork spillover effects of need satisfaction and frustration have not been adequately examined, despite the importance of work-nonwork dynamics (Allen et al., 2014; Edwards & Rothbard, 2000). In line with COR theory, it is possible that on days in which individuals experience high work-related need satisfaction, they will also experience high nonwork-related need satisfaction. Specifically, COR theory states that individuals with high levels of resources have stronger potential for further resource gain and that resource gain leads to additional resource gain (Halbesleben et al., 2014). Therefore, individuals who experience high daily work-related need satisfaction will be in resource rich states that subsequently facilitate high nonwork-related need satisfaction.

According to COR theory, individuals who experience resource-rich states are better enabled to invest resources in additional resource replenishing or generating activities (Hobfoll et al., 2018). Daily work-related need satisfaction facilitates positive, resource-rich states in employees that may subsequently be associated with higher need satisfaction in nonwork domains. This resource-rich state facilitates nonwork-related need satisfaction because individuals will be better able to craft nonwork time to satisfy their needs. Further, higher levels of daily need satisfaction in both life domains facilitate adequate resources to invest in resource generating processes during nonwork time. Specifically, resource-rich states after work, and subsequently in the evening and nonwork domain, will facilitate the resources necessary for reflecting positively on work. In addition, resource-rich states in both life domains facilitate psychological detachment from work in the evening by enabling individuals to remain cognitively present. Higher levels of psychological detachment from work and positive work reflection in the evening facilitate resource replenishment and will thus be associated with higher engagement and lower exhaustion the next day at work.

Negative Work-Nonwork Spillover

Need frustration may spill over from the work to nonwork domain and facilitate negative cognitive processes, and subsequently lower engagement and higher exhaustion the next workday. Specifically, daily work-related need frustration may facilitate resource-depleted states that inhibit individuals from investing or seeking resources in nonwork domains and will therefore facilitate daily nonwork-related need frustration. In line with COR theory, daily work-related need frustration facilitates resource-depleted

states that inhibit individuals from investing and replenishing resources during nonwork time to offset depletion. Further, daily work-related need frustration as a form of resource loss may beget additional loss in nonwork domains (Halbesleben et al., 2014; Hobfoll et al., 2018). Similarly, work-related need frustration can be conceptualized as a work-related stressor. The prolonged activation of work-related need frustration in nonwork domains may facilitate a negative bias in which individuals experience nonwork-related need frustration (Brosschot et al., 2005).

Daily work-related need frustration as a resource-depleted state may spill over into nonwork domains in which individuals subsequently experience nonwork-related need frustration. Because need frustration in both life domains generates a state in which resources are depleted and threatened, individuals lack adequate resources to invest resources in nonwork activities that facilitate resource replenishment. The inability to offset further resource loss, in combination with the prolonged activation of need frustration in work and nonwork domains facilitates negative work reflection as a maladaptive nonwork cognitive process. Because negative work reflection in the evening propagates resource loss and inhibits resource replenishment, it will be linked to lower levels of work engagement and higher levels of exhaustion the next day at work.

Work-Nonwork Compensation

As an alternative to spillover models of need satisfaction, it is possible that need satisfaction and need frustration in each life domain are unique from and unrelated to each other. Work-nonwork compensation, in contrast to work-nonwork spillover, represents efforts made in one life domain to offset dissatisfaction in another life domain

(Edwards & Rothbard, 2000; Petrou & Bakker, 2016). This effort to compensate can occur through decreased involvement (i.e., perceived importance, time spent, or attention devoted to a life domain) in the dissatisfying life domain and increased involvement in the other life domain. An individual may also respond to dissatisfaction in one life domain by pursuing rewards in another life domain. This form of work-nonwork compensation can be either supplemental (i.e., prompted by lack of positive experiences) or reactive (i.e., driven by excess negative experiences), however both types require shifting one's involvement in each life domain.

Research on how need satisfaction and frustration interact between life domains is warranted (Hewett et al., 2017). Literature has provided evidence for the work-nonwork spillover hypothesis, however the process of work-nonwork spillover posits individuals as passive recipients of work experiences (Staines, 1980; Petrou & Bakker, 2016), rather than considering individuals' active roles in shaping their experiences. Some research has demonstrated that needs in specific life domains are unique (Milyavskaya et al., 2009), and that need satisfaction in one life domain may compensate for lack of need satisfaction (or need frustration) in another. For example, research has found that managers who experienced greater levels of disappointment at work compensated through seeking fulfillment in their family lives (Evans & Bartolomé, 1986). Similarly, women who experienced higher levels of negative affect at work tended to be more engaged at home (Rothbard, 2001).

Regarding needs, the work-nonwork compensation hypothesis has not been fully tested, despite the potential for need satisfaction in one life domain to compensate for

frustration in other life domains (Edwards & Rothbard, 2000; Vallerand, 2000). To my knowledge, the only study explicitly testing the work-nonwork compensation hypothesis with need satisfaction found that participants benefitted from feeling competent in nonwork domains when the need for competence had not been met throughout that workday (Hewett et al., 2017). Specifically, Hewett and colleagues (2017) examined need satisfaction in work and nonwork domains, finding that when individuals had low daily satisfaction of competence needs at work, they benefitted from experiencing satisfaction of competence needs at home in the evening. When individuals experienced higher competence need satisfaction at home in the evening, they subsequently experienced higher levels of positive affect before bed. This supports the potential for individuals to seek fulfilling experiences outside of work when they are not satisfied at work (i.e., work-nonwork compensation). The researchers did not find support for autonomy or relatedness. This may indicate that compensation does not work uniformly across needs; however, this study demonstrates the potential for individuals to seek fulfilling experiences outside of work, shape their nonwork life, and facilitate their own need satisfaction (Hewett et al., 2017; Petrou & Bakker, 2016). Therefore, daily need satisfaction in nonwork domains may moderate the indirect effect of daily need frustration at work on work engagement and exhaustion, such that daily need satisfaction in nonwork domains potentially mitigates the effect of daily need frustration at work on negative work reflection and psychological detachment from work (and subsequently on work engagement and exhaustion). Further, daily need frustration in nonwork domains may moderate the indirect effect of daily need satisfaction at work on next day work

engagement and exhaustion, such that it potentially mitigates the positive effect of daily need satisfaction at work on positive work reflection and psychological detachment from work (and subsequently on work engagement and exhaustion).

Compounding Effects

Beyond the work-nonwork compensation propositions, it may be possible that experiencing high levels of daily need satisfaction or frustration in both life domains has a compounding effect, thereby amplifying subsequent effects on nonwork processes in the evening and work-related outcomes the next day. Daily work-related need satisfaction facilitates a resource positive state associated with higher levels of positive work reflection and psychological detachment in the evening, and subsequently higher work engagement and lower exhaustion the next day at work. High daily need satisfaction in nonwork domains indicates that individuals feel that their decisions outside of work are volitional, that they feel capable in their activities outside of work, and that they have a sense of community in nonwork domains. Therefore, daily nonwork-related need satisfaction indicates a resource-rich context, which may subsequently facilitate employee resource investment and replenishment in the evening and subsequent work-related well-being the next day. As such, daily need satisfaction at work and in nonwork domains may interact, such that individuals who experience high levels of daily need satisfaction in both life domains experience even higher positive work reflection and psychological detachment from work in the evening, and subsequently higher work engagement and lower exhaustion the next workday.

Need frustration at work represents a resource-depleted state that is associated with higher negative work reflection in the evening. Negative work reflection in the evening is subsequently linked to lower work engagement and higher exhaustion the next day at work. Daily need frustration in nonwork domains indicates that individuals do not feel as though they get to choose what they do during nonwork time, do not feel confident in successfully partaking in nonwork activities, and lack a sense of community outside of work. As such, daily need frustration in nonwork domains represents a resource-depleted context that may exacerbate the negative indirect effects of work-related need frustration on next day work engagement and exhaustion. Daily need frustration at work and in nonwork domains may interact, such that individuals who experience high levels of daily need frustration in both life domains experience even higher levels of negative work reflection, and subsequently lower work engagement and higher exhaustion the next workday.