

An Examination of Work/Non-Work Compensatory Need Fulfillment

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## **Dedication**

To my parents. Here's to never again needing to ask, "How's that dissertation coming?"

## **Abstract**

Research on Self Determination Theory has demonstrated the value of psychological need fulfillment across multiple domains, even on a daily level. Research on domain interactions have demonstrated that domains can and do affect one another, also on a daily level. The present research combines these perspectives to examine daily need fulfillment across both the work and nonwork domains. 185 participants completed two surveys per day – one immediately after work, and one before bed – for one week. Surveys evaluated the extent to which participants felt their needs for competence, autonomy, and relatedness were fulfilled in each domain, in addition to the extent to which participants felt satisfied with each domain. Results found a positive relationship between autonomy and relatedness fulfillment at work with their nonwork counterparts. Results also demonstrated that higher need fulfillment related to higher satisfaction within that same domain; in addition, work competence and autonomy had a significant relationship with nonwork satisfaction as well. Finally, autonomy fulfillment was found to be higher on weekends than on weekdays. Implications of these findings are discussed, along with study limitations and directions for future research.

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## **An Examination of Work/Non-Work Compensatory Need Fulfillment**

A late night at work causes a father to miss his daughter's soccer game. A negative interaction with her supervisor leads a woman to come home with a bad mood and short temper. A child's artistic yet dramatic exploration with finger paint results in a father bringing creatively embellished professional files to work. Interactions between work and non-work domains are frequent, and such examples are not rare instances of extreme behaviors; they are real and salient illustrations of the way work and non-work domains commonly intermingle. Indeed, much research has been dedicated to the interaction of domains, with constructs such as work-life balance, work-family conflict, and work-family enrichment.

While interactions between the two domains are frequently framed as competitions for time, attention, or other resources (see Greenhaus & Beutell, 1985; Allen, 2013), the present research takes a different an alternative approach to work-non-work interactions: rather than compete with one another in general terms, to what extent does one domain compensate for unfulfilling experiences in the other on a daily basis? Examples of domain compensation may not be as immediately obvious as examples of domain conflict, but they are just as resonant: after a day of little interaction with others, a woman sets up a happy hour after work or calls a family member on the way home. A man finally gets that home project done or prepares a particularly intensive meal after a day of spinning wheels and not feeling like much was accomplished at work.

To date, most work-family or work-life data collection efforts have focused predominantly on 'in general' statements and measurements; that is, most research has examined patterns and relationships on a macro level, surveying employees without any

time-bound frame for answering questionnaires (e.g. Thomas & Ganster, 1995; Bruck, Allen, & Spector, 2002; Demerouti, Bouwman, & Sanz-Vergel, 2011). Through these studies, we have gained such valuable information as the antecedents of work-family conflict, consequences of work-life imbalances, and an understanding of how each domain can potentially enrich or enhance the other. Unfortunately, few studies exist which examine the interactions of multiple domains on a daily basis. Such knowledge would not only give us a more nuanced understanding of employees' experiences, but would also enable us to provide more specific and actionable recommendations for alleviating stresses or issues that arise on any given day.

The present paper presents a study of daily interactions between work and non-work domains. It begins with an examination of our current knowledge about cross-domain interactions (work-life, in general; work-family conflict, and work-family enrichment), follows with a primer of a popular theory of psychological need fulfillment (Self Determination Theory), then applies that theory to the domain-spanning literature to suggest how happenings in one domain may influence behaviors in another. After describing the methodology used to examine if and how one domain may compensate for unmet needs in another, results are presented with a brief discussion and concluding thoughts.

### **Work-Life, In General**

Perhaps the most colloquially popular study of domain interactions is that of work-life, with 'balance' often acting as the construct of interest. Aside from presenting a false dichotomy of domains, another frustrating feature of this body of research is its lack of specificity. Intuitively, most people (especially those outside of psychology) believe

they understand what is meant by ‘work-life balance, at least at a colloquial level; unfortunately, intuition does not always translate into clear and measurable construct definitions, and the domain of work-life balance is no exception. Some researchers avoid the issue entirely and simply dive into the research and other variables of interest, without offering a definition of work-life balance (e.g. Beauregard & Henry, 2009). In a meta-analytic review of the work-nonwork literature, Casper and her research team (2018) identified 233 unique definitions of the construct across 290 papers. Similarly, they identified that many researchers use balance, conflict, and enrichment interchangeably, thus further muddying the construct waters (the team did analyze effects sizes and confirmed that all three are distinct constructs; Casper et al., 2018).

In his 2002 review of work-life balance research, Guest spends four pages circling around a definition of the construct, before arriving at the anticlimactic and intentionally-vague definition of “a perceived balance between work and the rest of life” (Guest, 2002, pp. 263). After a more recent review of the literature, Casper et al. proposed their own definition of work-nonwork balance: “Employees’ evaluation of the favorability of their combination of work and nonwork roles, arising from the degree to which their affective experiences and their perceived involvement and effectiveness in work and nonwork roles are commensurate with the value they attach to these roles” (2018, pp.197). A commonality between these definitions is their reliance on perception. Both of these definitions allow researchers to account for the subjective nature of the construct: while one individual may only feel ‘balanced’ or satisfied if they spend an equal amount of time devoted to each domain, other individuals may prefer to allocate more

time/resources to one of the domains over the other. In short, what is ‘balanced’ to one person may not be ‘balanced’ to another.

### **Consequences.**

Perceived balance between work and life has important consequences for the ways employees approach and interact with their work and organizations. A study of employees at a pharmaceutical organization confirmed that employees who express higher levels of work-life balance also have higher levels of organizational pride and job satisfaction (Mas-Machuca, Berbegal-Mirabent, & Alegre, 2016). By contrast, a lack of balance often leads to work-family conflict and negative spillover (Guest, 2002), which in turn lead to negative consequences that will be discussed in a later section. Wayne, Butts, Casper, & Allen (2017) found that an individual’s satisfaction with their balance and their perceived effectiveness with their balance of domains together predicted job performance and family performance (as rated by the individual themselves).

### **Antecedents.**

A body of research has explored the construct and variables that predict better or worse work-life balance among employees. One study found that the total weekly hours worked (negative relationship), as well as the amount of individual control over the weekly schedule/hours worked (positive relationship), were the strongest predictors of work-life balance among a sample of physicians (Keeton, Fenner, Johnson, & Hayward, 2007). Similarly, another study found that perceptions of autonomy at work were positively related with work-life balance (Mas-Machuca, Berbegal-Mirabent, & Alegre, 2016). A survey study by Karkoulian, Srour, & Sinan (2016) revealed that individuals with an external locus of control experienced more work interference with life than

individuals with an internal locus of control; in addition, the researchers found a positive relationship between perceived stress levels at work and imbalance between work and life. The influence of supportive supervision on employee work-life balance remains inconclusive in the construct's literature; some studies identify a positive relationship (e.g. Mas-Machuca, Berbegal-Mirabent, & Alegre, 2016), while others fail to identify a significant direct relationship between the two variables (e.g. Clark, 2000, as cited in Guest, 2002). However, a more consistent relationship has been established between more supportive supervision and lower levels of work-family conflict; this relationship will be discussed further at a later point.

Operational flexibility, characterized by employee control over the content or the “what” of work, was more positively related to work-life balance than temporal flexibility, characterized by employee control over the “when” of work (Clark, 2000; as cited in Guest, 2002). As many other studies capture ‘balance’ as a time-oriented construct (i.e. satisfactory amounts of time being devoted to each domain), this somewhat surprising result once again brings into question what exactly the construct of ‘work-life balance’ actually entails.

In terms of objective variables that are associated with work-life balance, Guest (2002) concluded in a review of the literature that imbalance is more likely to be reported by employees who worked longer hours, individuals in managerial positions, individuals with higher income, women, individuals with dependent children, and by individuals who work multiple jobs (Guest & Conway, 1998, 2000, as cited in Guest, 2002). However, Guest notes that there are individual differences associated with the impact of longer work hours on levels of work-life satisfaction; he contrasts the ‘workaholics,’ who work

long hours with high levels of satisfaction in both job and life, with the ‘overworked,’ who also work long hours but without the satisfaction.

### **Measurement.**

Survey methodology deployed at a single point in time (or multiple, separated points in time) is typically employed to better understand work-life balance. For example, a team of researchers in Spain used a single survey to determine that work-life balance was had a positive relationship with organizational pride and job satisfaction, as well as with job autonomy and supervisor support (Mas-Machuca, Berbegal-Mirabent, & Alegre, 2016). As another example of survey methodology in work-life balance studies, Sturges & Guest (2004) distributed surveys three times over the course of 20 months to examine attitudes and behaviors around work-life balance among individuals in the early years of their careers. By distributing questionnaires to new graduates, graduates with three years of work experience, and graduates with eight years of work experience, the researchers revealed a possible dissonance between attitudes and behaviors, as each group of graduates reported long working hours despite expressing a desire for balance between work life and home life.

The measurement of work-life balance in survey-based methodologies confirms the inconsistent definitions and unsatisfactory clarity of the construct. Several studies opt for the simple, if vague, method of assessing work-life balance with a single item (e.g. “I am satisfied with the work/life balance I have achieved,” Sturges & Guest, 2004).

Mas-Machuca, Berbegal-Mirabent, & Alegre (2016) used the following four-item scale to measure work-life balance among employees at a pharmaceutical company: 1. There is enough time for recreation activities; 2. I do not need to work overtime as I

finish work within working hours; 3. I have enough time for my family and friends; and 4. I value the social benefits that the company offers me. While the first and third items in this scale are consistent with each other and with other scales adopting a temporal approach to work-life balance, the other two items are more curious. The fourth item in particular, “I value the social benefits that the company offers me,” is a useful and important question to ask (and the present study proposes to elaborate more on the value of such items); however, it deviates from the concept of balance across domains and stands out as an outlier when compared with the other cross-domain, time-oriented items.

Keeton, Fenner, Johnson, & Hayward (2007) used a five item survey to measure work-life balance: 1. Feeling torn between demands from work and personal life; 2. Missing social obligations because of work; 3. Worrying about issues at work when home; 4. Having home activities interrupted by work-related telephone calls or pages; and 5. Experiencing household tension regarding time devoted to work-related activities. Rather than looking at time in one domain taking away from time in the other, this scale focused on the negative interactions between work and non-work domains, leading to a scale more consistent with the work-family conflict body of research.

Hayman’s (2005) scale on work-life balance is a popular choice among researchers studying the construct (e.g. Karkoulian, Srour, & Sinan, 2016). The 15-item scale assesses three dimensions of work-life balance: work interference with personal life, personal life interference with work, and work/personal life enhancement. This bi-directional approach is seen frequently in the work-family literature and helps to identify the source domain(s) of any perceived imbalance.

### **Work - Family Conflict**

While work-life research has predominantly focused on a balance of the two domains, a more developed body of research has examined the way work interacts both positively and negatively with one specific domain: family. Indeed, as displayed in the previous section, several measures which proclaim to evaluate work-life balance tend to mimic or even slip into the work-family realm. Research examining the interaction of work and family mainly focuses on the negative interactions between the two domains through the study of work-family conflict, though research on the positive influences each domain has on the other has developed more recently into the field of work-life enrichment (to be discussed later).

Work-family conflict is defined as “a form of interrole conflict in which the role pressures from the work and family domains are mutually incompatible in some respect” (Greenhaus & Beutell, 1985, p. 77). While research on the construct began by evaluating work-family conflict in general, research since the end of the twentieth century has incorporated directionality to the construct: indeed, work-to-family conflict (WFC; also called work interference with family - WIF), defined as instances where the work domain interferes with the family domain, is a similar but distinct construct from family-to-work conflict (FWC; also called family interference with work - FIW), defined as instances where the family domain disrupts the work domain (Mesmer-Magnus & Viswesvaran, 2005).

In addition to the bi-directional nature of work-family conflict, Greenhaus & Beutell (1985) proposed three different types of conflict that may occur: time-based conflict, strain-based conflict, and behavior-based conflict. Most research (and most perceptions of the construct) focus on time-based conflict, in which the time dedicated to

one domain interferes with the time required for another domain. Strain-based conflict, in which strain (e.g. tension, anxiety, fatigue, depression, apathy, irritability) in one domain affects performance in another domain, is important and salient, though it overlaps heavily (and by some definitions, identically) with spillover and is often treated as an outcome of time-based conflict. Behavior-based conflict occurs when the behaviors expected by an individual in one domain conflict with the behaviors expected in another domain; for example, a single parent may experience behavior-based conflict if she is used to setting priorities, making decisions, and managing a small 'team' at home, but at work is expected to take on a more submissive and lower-level role. While these dimensions demonstrated distinct relationships with various outcome variables, most research favors a more simplistic view of the construct, focusing more on the presence and extent of work-family conflict (and sometimes directionality of conflict) instead of the type of conflict.

### **Consequences.**

Research has consistently shown that conflict between work and family domains leads to negative outcomes. Indeed, a conflict between work life and family life has been associated with lower levels of job satisfaction, greater intentions to leave the organization, less marital satisfaction, less life satisfaction, more stress and strain, and higher levels of depression (Allen et al., 2000).

As one would expect, the directionality of the conflict influences the extent to which the conflict relates to various outcomes. When it comes to work outcomes, employees who experience their job getting in the way of their family life tend to feel more negative outcomes than employees who perceive their family as getting in the way

of their work. For example, the negative relationship between conflict and job satisfaction has been demonstrated to be stronger when employees perceive their work as negatively impacting their family life (WIF) than when employees perceive their family life as negatively impacting their work (FIW) (Anderson, Coffey, & Byerly, 2002; Kossek & Ozeki, 1998). Turnover intentions showed a positive relationship with work-to-family conflict and no relationship with family-to-work conflict; conversely, employee absenteeism was more positively related to family-to-work conflict than it was to work-to-family conflict (Anderson, Coffey, & Byerly, 2002). Work interfering with family is also negatively related to employees' commitment to their organization (Allen et al., 2000).

When it comes to non-work outcomes, differential effects based on the directionality of the conflict are not as easily distinguished. Both WIF and FIW have a negative impact on life satisfaction, with studies examining WIF identifying stronger relationships than studies that also examine FIW (Kossek & Ozeki, 1998). Both FIW and WIF positively relate to anxiety and mood disorders (Eby et al., 2005). A study of 2250 working adults revealed that WIF correlated more strongly with general stress ( $r=0.63$ ,  $p<0.01$ ) than did FIW ( $r=0.40$ ,  $p<0.01$ ), though both had significant relationships (Anderson, Coffey, & Byerly, 2002). In a longitudinal study of the health outcomes of work-family conflict among 267 adults, Frone, Russell, & Cooper (1997) found that FIW was significantly related to depression and poor physical health four years later, while WIF was significantly related to heavy alcohol use four years later. A meta-analysis examining the relationship between work-family conflict and strain (including fatigue, depression, psychological distress, or physical symptoms) confirmed that both WIF and

FIW predicted strain; however, path analyses found the relationships to be reciprocal, in that strain also predicted WIF and FIW (Nohe, Meier, Sonntag, & Michel, 2015).

### **Antecedents.**

In addition to examining the consequences of work-family conflict, research has also endeavored to identify its antecedents and the conditions which make domain conflict more or less likely. As a result of such pursuits, we understand that conflict within work roles (Carlson, 1999), the employee's level of job involvement (Byron, 2005), spousal support (Greenhaus & Beutell, 1985; Eby et al., 2005), organizational support (French, Dumani, Allen, & Shockley, 2018), within-family conflict (Greenhaus & Beutell, 1985; Byron, 2005), number of children (Carlson, 1999), and number of hours worked (Byron, 2005) all influence the extent to which employees experience work-family conflict.

Research on the antecedents of work-family conflict has also happened on the individual level, trying to identify if a certain type of person or certain individual differences lead to an increased prevalence of work-family conflict. In a sample of 225 working adults, Carlson (1999) identified a positive relationship between negative affect and an individual's experience of time-based, strain-based, and behavior-based work-to-family conflict. In addition, individuals who scored higher on a measure of Type A personality traits also had higher levels of behavior-based work-to-family conflict, though there was no significant relationship between Type A personality traits and time- or strain-based conflict. Other researchers have found connections between the Big Five and experiences of work-family conflict: two studies (Bruck & Allen, 2003; Wayne et al., 2004; both as cited in Allen, 2012) consistently identified lower levels of agreeableness

in individuals with higher levels of work-family conflict and higher levels of conscientiousness in individuals with lower levels of work-family conflict.

### **Measurement.**

Most of the predominant measures of work-family conflict focus purely on the time imbalances between the domains. Absolute measurements of time are rarely used (for the better), and instead measures tend to examine the extent to which time spent in one domain interferes with the activities of another domain. For example, Frone, Russell, & Cooper (1992) use a four-item scale to assess the bi-directional interference of work and family domains:

1. How often does your job or career interfere with your responsibilities at home, such as yard work, cooking, cleaning, repairs, shopping, paying the bills, or child care?
2. How often does your job or career keep you from spending the amount of time you would like to spend with your family?
3. How often does your home life interfere with your responsibilities at work, such as getting to work on time, accomplishing daily tasks, or working overtime?
4. How often does your home life keep you from spending the amount of time you would like to spend on job or career-related activities?

Kopelman, Greenhaus, & Connolly (1983) prefer a more comprehensive eight-item work-to-family interference scale that features time conflicts (e.g. “My work takes up time that I’d like to spend with my family”), but also assesses emotional spillover (e.g. “Because my work is demanding, at times I am irritable at home”). Perhaps the most comprehensive scale examines both directions of each of the three types of conflict

identified by Greenhaus & Beutell (1985); Carlson, Kacmar, & Williams (2000) validated an 18-item scale that distinctly measures time-based WIF, time-based FIW, strain-based WIF, strain-based FIW, behavior-based WIF, and behavior-based FIW.

### **Work-Family Enrichment**

The extent to which we understand the antecedents and consequences of work-family conflict may be considered a strength of cross-domain literature. However, interactions between work and family do not need to be negative, nor do they always lead to negative outcomes. More recent research has examined the construct of work-family enrichment, or the extent to which experiences in one domain improve the quality of life in the other domain (Greenhaus & Powell, 2006); while such literature is comparatively sparse, its contributions are far from futile. Like work-family conflict, research on work-family enrichment has adopted a bidirectional approach: work-to-family enrichment (when experiences at work improve family life), and family-to-work enrichment (when experiences at home improve work life) have been parsed out as distinct variables with differing relationships with relevant outcomes (Carlson, Kacmar, Wayne, & Grzywacz, 2006). Wave 1 of the National Survey of Midlife Development in the United States, collected in 1995-1996, featured over 2,000 employed adults (ages 25-74) who completed measures of both work-family conflict and work-family enrichment. Research on this sample suggests that enrichment (in either direction) occurs more frequently than conflict (again, in either direction). In cases of enrichment, family-to-work enrichment was reported more frequently than work-to-family enrichment, a conclusion echoed in a review of the literature by Greenhaus & Powell (2006). Conversely, work-to-family

conflict was reported more frequently than family-to-work conflict (Gareis, Barnett, Ertel, & Berkman, 2009).

Research on work-family enrichment has primarily focused on three ways in which enrichment may occur (Greenhaus & Powell, 2006): work and family may have additive effects on individual well-being; positive experiences in one role can buffer distress in the other (e.g. a supportive spouse can buffer the negative effects of a stressful job); and experiences in one domain can lead to positive experiences in the other (e.g. communication skills learned at work may be applied to communication at home). Thus, through these mechanisms, work and family need not negatively influence one another, but they can actually have positive cross-domain outcomes.

Using the MIDUS I data, Gareis and her colleagues (2009) compared three different models to determine how work-family conflict and work-family enrichment potentially interact to affect various well-being outcomes. In addition to confirming that work-family conflict and enrichment are distinct variables (that is, enrichment is not merely the opposite of conflict), the team found that model fit depended on directionality. For work-to-family interactions, an additive model best predicted well-being outcomes; enrichment and conflict independently predicted well-being outcomes. For family-to-work interactions, an interactive model was the best fit; in cases of family-to-work interactions, positive interactions (enrichment) buffer negative outcomes, and this buffering effect is seen most when conflict is high (rather than low).

### **Consequences.**

Research has found work-family enrichment to have positive relationships with a variety of important outcomes. As they validated their proposed multi-dimensional, bi-

directional measure of work-family enrichment, Carlson et al. (2006) found both work-to-family and family-to-work enrichment to positively and significantly relate to job satisfaction, family satisfaction, and psychological well-being. Wayne, Randel, & Stevens (2006) conducted a survey of 167 employees at a major insurance company to explore both the predictors and consequences of each direction work-family enrichment, finding that work-to-family enrichment predicted employees' positive affective commitment to their organization, and that family-to-work enrichment predicted employee turnover intentions.

A meta-analytic review of 25 studies conducted by McNall, Nicklin, & Masuda (2009) examined the consequences of both work-to-family as well as family-to-work enrichment. Similar to the previous studies described, and as expected, they found that work-to-family enrichment was more strongly related to work-related outcomes, and family-to-work enrichment was related more strongly to non-work outcomes. Work-to-family enrichment was consistently and significantly related to higher job satisfaction, higher affective commitment to the organization, and higher life satisfaction. Family-to-work enrichment was related to family satisfaction, and also related to job satisfaction and affective commitment to the organization, though not to the same degree as work-to-family enrichment. Both directions of enrichment were equally related to increased employee physical and mental health (McNall, Nicklin, & Masuda, 2009).

### **Antecedents.**

Carlson et al. (2006) attempted to tease apart various work and family antecedents in how they correlate with each direction of work-family enrichment. Job salience, developmental experiences at work, autonomy at work, and the individual's quality

relationship with their supervisor are all work-related antecedents that were found to relate to both directions of enrichment; however, for each of these variables, the relationship with work-to-family enrichment was stronger than family-to-work enrichment. The family antecedents of family salience, family mutuality, and the individual's quality of relationship with their family demonstrated more inconsistent relationships with enrichment: all three variables were more strongly related to developmental aspects of work-to-family enrichment (compared to the developmental aspects of family-to-work enrichment), such as gaining viewpoints, skills, and knowledge at work that helped the individual become a better family member. These variables were also all more strongly related to the affective components of family-to-work enrichment (compared to affective aspects of work-to-family enrichment), meaning they related to the individual being in a good mood outside of work that in turn helped the individual be a better worker (Carlson et al., 2006).

Wayne, Randel, & Stevens (2006) endeavored to answer similar questions, investigating how various antecedents predicted each direction of work-family enrichment. They found that work identity, or using more work-related self-descriptors, predicted more work-to-family enrichment; similarly, family identity predicted more family-to-work enrichment. Family instrumental support, defined by instances where family members took over the employee's home responsibilities, did not relate to enrichment, but family emotional support predicted higher family-to-work enrichment. Finally, more organizational time demands significantly predicted lower levels of work-to-family enrichment and marginally predicted lower levels of family-to-work enrichment.

A research team in China (Siu et al., 2010) conducted an interesting longitudinal study of over 750 respondents from hospitals and an eyeglass factory. In two surveys distributed six months apart, researchers collected data on work engagement, supervisor support, coworker support, family support, job autonomy, and the presence of family-friendly organizational policies in order to evaluate the extent to which work engagement mediated any of the relationships between work-family enrichment and its antecedents. They found that work engagement fully mediated the relationship between job autonomy and family-to-work enrichment. Engagement was a partial mediator between supervisor support and work-to-family enrichment, and between job autonomy and work-to-family enrichment. When predicting family-to-work enrichment, engagement was a partial mediator for family support (Siu et al., 2010). The researchers also found that work engagement fully mediated the relationship between family-friendly organizational policies and work-to-family enrichment. However, other researchers (Wayne et al., 2006) have found minimal, if any, support for family-friendly policies increasing work-family enrichment; indeed, even Siu et al. (2010) found no correlation between family-friendly policies and either direction of work-family enrichment, so the importance and impact of this finding may have been exaggerated by the researchers.

### **Self Determination Theory**

In addition to the idea of one domain positively influencing another, both domains have separately been considered as sources of individual need fulfillment. In one of the most parsimonious and well-studied theories of psychological needs, Ryan & Deci's Self Determination Theory (SDT) asserts that there are three basic psychological needs – autonomy, competence, and relatedness – that are not only necessary for individual well-

being, but for personal growth and development (Ryan & Deci, 2000). These three psychological needs have furthered the research of four “mini-theories” that fully constitute Self Determination Theory: cognitive evaluation theory, which focuses on the needs for competence and autonomy in the variability of intrinsic motivation; organismic integration theory, which takes a more precise approach to extrinsic motivation, acknowledging the varying degrees of internalization and regulation; causality orientations theory, which incorporates individual differences in people’s tendencies to seek out or make more likely the fulfillment of psychological needs; and basic needs theory, which explains how motivation contributes to individual health and well-being by way of need fulfillment (Ryan & Deci, 2002; Ryan & Deci, 2000). While important, the nuances of theories themselves are beyond the scope of this paper, as the psychological needs themselves have served “as a means of organizing and interpreting a wide array of empirical results, results that seemed not to be readily and satisfactorily interpretable without the concept of needs” (Ryan & Deci, 2000, p. 74). These psychological needs are truly the foundation of Self Determination Theory, and the interest of the current research lies in how these needs may be filled across domains. A discussion of each of the three needs follows, along with an examination of the consequences associated with need fulfillment in the workplace. This section ends with a look at SDT research in non-work domains.

### **Competence.**

The need for competence may be described as uncomplicatedly as needing to feel effective; according to Ryan & Deci (2002), competence is “feeling effective in one’s ongoing interactions with the... environment and experiencing opportunities to exercise

and express one's capacities" (p. 7). Competence is less about *having* or *attaining* a certain skill or capability, but instead is more a sense of inherent confidence in one's own ability to bring about desired effects and outcomes (Reis, Sheldon, Gable, Roscoe, & Ryan, 2000, p. 420). Similarly, the need for competence is not about feeling competent *at* a specific action; instead, an individual's fulfillment of their need for competence refers to a more general affective reaction to the experience of effectiveness (Van den Broeck, Vansteenkiste, De Witte, Soenens, & Lens, 2010). Simply put, the need for confidence is the need to feel confident that an individual's action will create the intended effect. It is the need for competence that drives individuals to improve their abilities and seek challenges in order to demonstrate and enhance their skills (Cerasoli, Nicklin, & Nassrelgrawi, 2016; Ryan & Deci, 2002).

Because these basic needs are inherent and generalized, the need for competence can be fulfilled through a variety of situations, even for the same individual. Elliot, McGregor, & Thrash (2002) explore how the need for competence is demonstrated and evolves throughout an individual's life. As a toddler, the need for competence may be satisfied by sorting colorful plastic figures into holes that match the corresponding shapes. Competence fulfillment that comes from playing a single note on a piano may evolve to successfully playing a chord, to playing a song, to generally "getting better at" playing the piano. "In each case, if the satisfaction being sought is the joyful pride of accomplishing a challenge, the self-regulatory behaviors involved are a manifestation of the need for competence" (Elliot, McGregor, & Thrash, 2002). While the exact activity or skill that brings about a sense of accomplishment may vary, it is that feeling of accomplishment and capability which mark the fulfillment of the need for competence.

Since the very nature of a job generally demands accomplishment, there are a wide variety of opportunities for competence fulfillment in the workplace. From secretarial work, to auto mechanics, to laboratory work, to circus performing, each job presents an avenue for competence fulfillment. However, it is not enough that a task is accomplished: the employee must feel a sense of satisfaction with their performance, a sense of confidence in the use of their capabilities. Not all tasks in all jobs necessitate the fulfillment of competence when completed. A teacher who spends all day grading assignments may not feel as though their need for competence has been satisfied, especially when it is the feeling of sharing knowledge and watching their students wrestle with and challenge ideas that brings them their sense of accomplishment. A financial analyst who spends the day collecting and compiling information from multiple sources may feel the day was wasted without having a chance to demonstrate their analytical prowess. Similarly, if an employee is overqualified and, despite the ability to easily accomplish every task, does not feel like they are fully able to demonstrate their capabilities, a job might not fulfill the need for competence at all.

**Autonomy.**

The need for autonomy reflects the need for individuals to feel in control of their own behavior. It “represents individuals’ inherent desire to feel volitional and to experience a sense of choice and psychological freedom when carrying out an activity” (Van den Broeck et al., 2010, p. 982). Fulfillment of the need for autonomy means that the individual has felt a sense of willingness, or at the very least, have made a choice, in an action or behavior. This subjective feeling of freedom in one’s own behaviors, more than the reality of choice and volition in one’s actions, is what the need for autonomy

attempts to capture (Cerasoli, Nicklin, & Nassrelrgawi, 2016). It is also important to remember that these basic needs are all generalized: there is no right or wrong way for an individual to feel fulfilled in their need for autonomy. There is no absolute level of autonomy that qualifies as ‘fulfilled’, and what brings a sense of autonomy for one individual may not for another.

No individual feels autonomous all the time, especially in the workplace, where peers, managers, and deadlines are dictating and prioritizing our actions and behaviors. In describing the fulfillment of autonomy, Ryan & Deci (2002) acknowledge this reality: “When autonomous, individuals experience their behavior as an expression of the self, such that, even when actions are influenced by outside sources, the actors concur with those influences, feeling both initiative and value with regard to them... Indeed, one can quite autonomously enact values and behaviors that others have requested or forwarded, provided that one congruently endorses them” (p. 8). Again, the subjectivity involved in perceptions of individual autonomy, especially in a work setting, cannot be forgotten or discounted.

While work certainly can and does provide a sense of autonomy, despite the presence of by deadlines, company goals, or demanding managers, individuals tend to more easily or frequently experience more autonomy in those moments outside of work.. In fact, several studies have noted that individuals’ fulfillment of autonomy is often higher on weekends than during the work week (e.g. Ryan, Bernstein, & Brown, 2010; Reis et al., 2000). However, opportunities for autonomy fulfillment do exist at work, for every job, even if an individual is not an entrepreneur or owner of their own company (who, it could be argued, also do not feel autonomous at all times). Even in the most

regulated of industries, employees can feel satisfied in their need for autonomy. For example, a health insurance claim processor may identify with the importance and purpose of her tasks, and so she may feel a sufficient sense of autonomy as she completes tasks 'by the book' (Milyavskaya, Nadolny, & Koestner, 2014). A sense of sufficient autonomy may be felt by a financial analyst when he has room to choose which task he works on next from his ever-growing pile of to-do's - even though, the tasks themselves may not be his own choice, but the ability to decide what gets worked on and when can bring a sense of need fulfillment.

### **Relatedness.**

The need for relatedness may be simply defined as the need to feel connected to others. More descriptively, "relatedness refers to feeling connected to others, to caring for and being cared for by those others, to having a sense of belongingness both with other individuals and with one's community" (Ryan & Deci, 2002, p. 7). It may also be considered as an inherent need to interact and be involved with "the social world more generally" (Deci & Ryan, 1990, p. 243). The designation of humans as social beings is by no means unique to Self Determination Theory; theorists and researchers across disciplines - including psychology, neuroscience, politics, history, philosophy, and religion - have acknowledged the tendency and even need humans have to interact with, care for, and be cared for by others.

It is with this need in particular that we must remember that Self Determination Theory "focuses on the degree to which psychological needs are satisfied, rather than the strength of the needs" (Deci & Ryan, 2014, p. 16). Because individual differences exist with regard to how much an individual enjoys or prefers certain amounts of social

interaction (i.e. extraversion), it is all too easy to conflate our knowledge of personality and individual differences with fulfillment of an individual's need for relatedness. Within Self Determination Theory, it is not the volume of relatedness that an individual needs to feel satisfied; rather, it is the extent to which an individual *feels* fulfilled in their need for relatedness that is the construct of interest. Individual differences can and certainly do exist with regard to how much interaction is necessary for an individual to feel that their need for relatedness is sufficiently met: for an individual who scores high on Extraversion, interactions with multiple people for relatively lengthy periods of time may be needed, while an individual who scores low on Extraversion may feel fulfilled after one conversation. Again, it is not 'how much relatedness' that is of interest - it is the degree to which an individual feels their need for relatedness has been satisfied.

Just as individuals can differ with the extent to which a certain amount of connectedness leads to feelings of fulfillment, jobs can differ as well with the amount and extent of opportunities that exist for individuals to feel connected. A nurse often interacts with many patients throughout a day, while an actuary tends to work with numbers more often than with people. However, every job offers opportunities for employees to feel satisfied in their need for relatedness. An elementary school teacher might feel fulfilled with lots of individual interactions with each of his students throughout the day, while a university lecturer may feel a sense of connectedness when her students ask questions or when she sees her students have 'ah-ha' moments of understanding. In jobs where interacting with clients or customers are less inherent, employees often feel fulfilled in their need for relatedness through interactions with coworkers. For example, a financial analyst may feel connected to coworkers after 'water cooler talk' about mutual interests

unrelated to work. In any scenario, it is not enough merely to have a conversation with another person - the conversation (or interaction of any sort) must lead to feelings of connectedness or belonging in order to satisfy an individual's need for relatedness.

### **Outcomes of Need Fulfillment.**

The extent to which an environment can provide opportunities for such need fulfillment is of interest to researchers of self determination theory, and the work environment especially has piqued the interest of scholars and practitioners alike. Ryan & Deci (2000) cites Baard, Deci, & Ryan (1998) – “employees’ experiences of satisfaction of the needs for autonomy, competence, and relatedness in the workplace predicted their performance and well-being at work. Such research shows that within specific domains, especially those central to the lives of individuals, need satisfaction is correlated with improved well-being” (p. 75). Indeed, research has confirmed that satisfaction of these three basic psychological needs, even across multiple levels of experience, is positively associated with both concurrent and future well-being (Milyavskaya, Philippe, & Koestner, 2013). Other research has shown autonomy on the job to be positively related to work-family enrichment (Carlson et al., 2006), while satisfaction of autonomy, competence, and relatedness each have been demonstrated to have a positive relationship with engagement at work (De Fraga & Moneta, 2016). Fulfillment of each of the three basic needs has also been associated with higher levels of life satisfaction and lower levels of exhaustion (Van den Broeck et al., 2010), in addition to lower levels of work-family conflict, role stressors, and job insecurity (Van den Broeck, Ferris, Chang, & Rosen, 2016).

In a daily study of need fulfillment, Reis et al. (2000) found that daily fulfillment of competence, autonomy, and relatedness were each associated with higher levels of positive affect and vitality on those same days. Daily fulfillment of autonomy and competence were also associated with lower levels of negative affect and physical symptoms of ailment (relatedness fulfillment was not significantly related to these particular outcomes). The same research team also confirmed previous research: overall trait-levels of autonomy fulfillment were associated to higher levels of vitality and positive affect; general competence fulfillment was significantly related to lower levels of negative affect; and general feelings of connectedness were related to higher levels of positive affect (Reis et al., 2000).

Olafsen (2016) completed a longitudinal study of 115 employees in Norway, examining the effects of need fulfillment on state mindfulness in addition to the outcomes of mindfulness in a work setting. Using four periods of data collection over a 15-month time span, Olafsen assessed participant need satisfaction at work, state mindfulness, perceived goal attainment, subjective well-being, burnout, and the extent to which participants felt supported by their manager. Path analysis revealed that need satisfaction at any time period significantly predicted state mindfulness in the subsequent time period, which in turn predicted subjective well-being, goal attainment, and burnout (negative coefficient) in the following wave of data collection.

In terms of work-related outcomes, fulfillment of the needs for autonomy, competence, and relatedness has been demonstrated to have a positive relationship with job satisfaction, energy at work, organizational commitment, and performance (Van den Broek et al., 2010). Perhaps the most persuasive and robust evidence of the positive work

outcomes associated with fulfillment of the basic needs of SDT comes from a meta-analysis conducted by Cerasoli, Nicklin, & NassreIrgawi (2016). In an analysis of 108 independent samples and over 30,000 employees, the authors discovered that fulfillment of autonomy, competence, and relatedness are each associated with higher levels of performance at work, with fulfillment of competence exhibiting the strongest relationship. Need fulfillment was even associated with better performance across various operationalizations of performance: both performance quality and performance quantity were related need fulfillment, and while performance quality was more strongly related, the difference between quality and quantity was not statistically significant. Interestingly, the presence of an incentive did not impact feelings of need satisfaction but the salience of the incentive did, such that “when incentives present are indirectly salient to performance, need satisfaction is a significantly stronger predictor [of performance] than when incentives present are directly salient to performance” (pp. 796).

### **Self Determination Theory in Other Domains.**

It is imperative to note - both for the sake of the well-being of an individual as well as for the present research - that the need fulfillment outlined in Self Determination Theory does not need to occur in the workplace. While Self Determination Theory originated in reference to a workplace context, some research has expanded psychological need fulfillment to other domains. Along with need fulfillment in the workplace relating to well-being, the fulfillment of autonomy, competence, and relatedness in other domains such as hobbies, communities of interest, sports, or family are similarly related to motivation and well-being in those domains (Milyavskaya & Koestner, 2011). Similarly, adolescents who are balanced in their need fulfillment across

multiple domains demonstrate higher well-being and better school adjustment (Milyavskaya et al., 2009). SDT has also been applied to parenting behaviors (Grolnick & Apostoleris, 2002), educational settings (Reeve, 2002), sports and exercise (Frederick-Recascino, 2002), and even pro-environmental behaviors (Pelletier, 2002).

### **Other Needs Theories**

While Self Determination Theory is one of the most parsimonious models of basic human needs as well as one that is among the most researched, other theories of human needs are worth mentioning. Maslow's hierarchy of human needs is perhaps the most well-known theory, recognized by nearly everyone who has taken an introductory psychology class (provided they opened their textbook). He posited that humans are motivated to fulfill a series of basic needs, the more basic of which needing to be met before an individual will feel motivated to pursue higher levels of needs. The most fundamental of these needs are the individual's physiological needs, such as food and water; followed by safety needs; needs for love and belonging; esteem needs, and finally piquing with the highest level of needs for self-actualization and self-transcendence (Maslow, 1954, as summarized by Koltko-Rivera, 2006). While sticky for mainstream psychology, Maslow's hierarchy remains a conceptual cornerstone for models of human needs, but it has not garnered as much empirical attention as other, more recent models of human needs.

As a simplified alternative to Maslow's hierarchy, Alderfer (1969) proposed a more parsimonious model of three human needs: existence, relatedness, and growth. While there are parallels between Alderfer's needs and Maslow's needs (e.g. Alderfer's need for existence with Maslow's physiological and safety needs), Alderfer's model

rejected the hierarchical notion and instead identified the needs as simultaneous pursuits. This quickly became commonplace for proposed models human needs. Shortly after Maslow's hierarchy of needs emerged in the motivation literature, and around the same time as Alderfer's theory, McClelland presented another theory of three distinct human needs: need for achievement, need for affiliation, and need for power (as summarized in Steers, Mowday, & Shapiro, 2004). The proposed need for achievement quickly gained the attention of the academic community as research on the role of need for achievement in goal-setting (e.g. Phillips & Gully, 1997) and in workplace performance (e.g. Ambrose & Kulik, 1999); indeed, the construct garnered so much attention that eventually, a hierarchical model of the need for achievement itself emerged (Elliot & Church, 1997). In a series of three studies, Sheldon, Elliot, Kim, & Kasser (2001) found needs for self-esteem, pleasure/stimulation, physical thriving, and meaning/self-actualization among the more salient needs for participants in the United States and South Korea, in addition to the needs of SDT. Other basic needs proposed with regard to a workplace setting include the need for engagement, the need to contribute to a larger entity, need for belonging/connection, and a need for progress and growth (Harter, Schmidt, & Keyes, (2003). Despite the multitude of proposed basic human needs, the present research will remain focused on the needs identified in Self Determination Theory. The decision to concentrate on the needs of autonomy, competence, and relatedness is supported by the breadth and depth of research that exists around the constructs, their applicability to the workplace setting, and to the simplicity and salience of the model.

### **Value of Within Person Research**

All of the research described up to this point has been reflective of employees' views 'in general'; that is, studies of work-family or work-life conflict take a broad scope, and employees that are classified as experiencing conflict are not asked about daily variations in their conflict or need fulfillment. While the vast majority of studies examining work-life balance employ broad questionnaires requesting responses on attitudes and behaviors 'in general', a few notable exceptions do examine employee perceptions and behaviors on a more granular level.

### **Daily Studies of Self Determination Theory.**

In their research on daily fulfillment of relatedness and autonomy, Ryan, Bernstein, & Brown (2010) sought to specifically investigate the effect that day of the week - weekday or weekend - had on feelings of need fulfillment and well-being. The researchers used an experience sampling methodology to ask 74 individuals to record their activities, mood state, and need satisfaction at three varying times each day over a three-week span. Through this methodology, researchers were able to obtain a more specific understanding of how need fulfillment manifests through different daily activities, and they also were able to identify fluctuations in need fulfillment throughout different days of the week. Ultimately, researchers were able to conclude that well-being (defined by higher sense of vitality, higher positive affect, and lower negative affect) was significantly higher on weekends, and this trend was mediated by the fulfillment of the individual's needs for autonomy and relatedness.

Ilies et al. (2017) used a daily, within-person experience sampling methodology to introduce a new construct into the SDT field: flow. Over the course of two weeks (10 work days), 118 participants completed a short survey when signalled three times during

their work day, then completed a survey once they had finished working for the day. Participants also completed a personality assessment evaluating their levels of openness to experience and conscientiousness before the experience sampling portion of the study began. The surveys to which participants responded three times a day included measures of flow, assessed by asking individuals to assess the challenge and level of skill associated with their present activity; autonomy felt during the activity; competence felt during the activity; and the level of positive affect felt. At the end of each work day, participants evaluated their level of job satisfaction experienced that day. This methodology enabled the researchers to determine that the fulfillment of participants' needs for autonomy and competence partially mediated the relationship between flow and well-being (as measured by the combined results of participants' positive affect and job satisfaction on a given day). By examining both personality traits and daily flow and need fulfillment, the researchers were also able to identify an interaction effect between flow and personality on need fulfillment: in this study, openness to experience had a moderating effect on an individual's experience of flow and their fulfillment of their need for autonomy on a given day, such that individuals higher in openness had a stronger relationship between their experience of flow and their fulfillment of their need for autonomy (Ilies et al., 2017).

The effects of competence and autonomy fulfillment were both evaluated at the between-person and the within-person level in a study by Sheldon, Ryan, & Reis (1996). Using a sample of 60 college students, researchers collected data on participants' trait autonomy and trait competence. Over a two-week period, the researchers also collected daily diary measures of well-being outcomes and activity measures, which included

probes of how effective they felt at the activity and their reasons for doing the activity, i.e. the competence and autonomy experienced with each activity. Consistent with previous between-person studies of SDT, analyses revealed that individuals who had higher levels of trait competence and trait autonomy tended to have higher levels of daily well-being. Within each participant, well-being tended to be higher on days where participants felt higher levels of autonomy and competence. By studying both between and within person effects, this study was able to confirm the benefits of daily need fulfillment relative to participants' own fulfillment baselines while also acknowledging the well-researched between-person trends.

Perhaps the best example of research examining daily need fulfillment comes from Reis and his research team (2000). In order to explore the hypothesis that daily fluctuations in emotional well-being are in part attributed to daily fulfillment of competence, relatedness, and autonomy, researchers received daily reports from 67 students over a span of two weeks. Before the daily study began, participants first completed trait-level measures of self-determination, self-perceived competence, and connectedness in order to control for these variables and identify the independent effects of daily fluctuations of fulfillment. For 14 consecutive days, participants completed diary forms which included measures of daily autonomy, competence, relatedness, positive mood, negative mood, vitality, and physical well-being (a variable of daily global well-being was created from a composite of these last four variables). Through this methodology, the researchers were able to corroborate the findings of Ryan, Bernstein, & Brown (2010) that autonomy and relatedness were higher on weekends than on weekdays, and that weekends also saw higher levels of the positive outcomes associated

with need fulfillment: higher positive affect and lower negative affect. More importantly, their study was able to detect daily fluctuations in need fulfillment and demonstrate that these fluctuations had real consequences on important well-being outcomes, even after controlling for more global and “in general” levels of need fulfillment.

### **Daily Studies of Cross-Domain Interactions.**

In addition to studies of daily need fulfillment, some research has also examined domain-spanning behaviors in a daily level. While examples of these studies are discussed more thoroughly below, all provide evidence that work and non-work domains interact daily, their interactions have important and meaningful effects, and the extent of their variation warrants the examination of these domain interactions on a daily level.

One of the (relatively) earlier studies to investigate the effects of cross-domain interactions was conducted by Karyl Macewen and Julian Barling in 1994. For 35 work days, 19 couples were asked to complete one survey per day on their levels of work interference with family, family interference with work, personal strain, withdrawal from work, withdrawal from family, and marital behaviors. On average, participants completed reports on 18 work days during the 35-day data collection period. In addition to confirming daily fluctuations in inter-role conflict, this methodology allowed the researchers to identify the daily effects of these fluctuations. On days where work interfered with family, participants were more likely to withdraw from the family; similarly, family interference with work on any given workday predicted work withdrawal. They also identified differences between men and women in the outcomes of their daily interference experiences: for men, family interference with work led to higher levels of personal strain (this relationship was not significant for women); women, by

contrast, experienced more strain as a result of work interference with family. The application of a daily methodology enabled researchers to more deeply capture within-person experiences of domain interference, as well as its outcomes.

Judge and Ilies (2004) examined the daily, within-person relationships between job satisfaction, mood, and spillover. They recruited a sample of 74 employees from a single university. Trait-level affectivity was measured through ratings by the significant others of the participants. Experience-sampling methodology was used to collect employee reports of their mood and job satisfaction at three points in their work day each day for two weeks. Additionally, off-work surveys of mood were completed once each evening of the work-week and twice each day of the weekend. As hypothesized, an individual's level of job satisfaction was a significant predictor of post-work positive affect that same day (though not negative affect). This relationship was found to be stronger for individuals with higher levels of trait positive affect. Similarly, and consistent with other research on spillover, an individual's positive and negative mood at work predicted positive and negative mood outside of work, respectively.

Feuerhahn, Sonnentag, & Woll (2014) collected two diary entries per day from 126 participants for five consecutive days to examine the role of exercise in post-work recovery. Through daily post-work surveys and end-of-evening surveys, participants documented their exercise activity for the day (type, intensity, and duration), psychological detachment from work, their sense of belonging felt during their leisure time, physical self-perceptions, and positive and negative affect. As researchers expected, days where participants engaged in exercise activities after work related to more positive affect later in the evening, and this relationship was explained through mediators of

psychological detachment from work and a sense of belonging (Feuerhahn, Sonnentag, & Woll, 2014). Thus, this study provides just one example to demonstrate that post-work activities (in this case, exercise) have significant effects on individual outcomes (in this case, affect), demonstrating that the work and non-work domains have interactions with meaningful effects on a daily level.

To more closely examine the outcomes of daily work stress, Calderwood and Ackerman (2016) conducted a study of 75 hospital nurses and their self-assessments of their work stress and subsequent off-job reactions for four consecutive work days. Before beginning the study, participants completed a questionnaire that included measures of trait-level positive affect, trait-level negative affect, and overall subjective job stress. Then, participants chose four consecutive work days to complete two daily questionnaires: one was completed within the first 30 minutes of arriving home after work and contained items examining daily work stressors, including negative interpersonal interactions and situational constraints experienced at work; the other questionnaire was completed within 30 minutes of bedtime and contained measures of cognitive, affective, and behavioral reactivity, all of which focused on participants' perceptions of their time outside of work that day. The authors used hierarchical linear modeling to conclude that daily job stress at work predicts post-work behavioral reactivity (e.g. being unable to concentrate on things outside of work due to things that happened at work), while trait-level negative affect provided the strongest prediction of affective reactivity after work (Calderwood & Ackerman, 2016).

While a daily diary study was used to confirm the negative post-work effects of work-day stress, another study used daily diary methodology to examine the post-work

effects of flow experienced during the work day. Demerouti, Bakker, Sonnentag, & Fullagar (2012) asked 83 participants to complete daily surveys over four consecutive work days. Similar to other daily studies of cross-domain interactions, participants completed a questionnaire at the end of their work day and again before bed. Immediately after work, participants were asked about their experience of flow at work, any recovery after breaks, exhaustion, and vigor. Participants reported their psychological detachment, exhaustion, and vigor again at bedtime. Data supported the researchers' hypotheses: experiences of flow at work were related to levels of energy (defined by high vigor and low exhaustion) after work, and this relationship was moderated by participants' recovery at work, such that when participants had lower levels of recovery at work, the relationship between flow and exhaustion was stronger than when participants had higher levels of recovery.

Finally, one study by Christian, Eisenkraft, and Kapadia (2014) used experience-sampling methodology to investigate the relationship between daily work behaviors and individual experiences of somatic pain. 102 participants (85 used for analyses) were emailed twice daily for three weeks with surveys that assessed pain level, sleep deprivation, promotive extra-role behaviors (helping behaviors and sense of voice), withdrawal behaviors, resource depletion, and work engagement. This methodology allowed the researchers to conclude that daily pain levels lead to higher levels of resource depletion and lower levels of work engagement, which in turn lead to more withdrawal behaviors at work. While this study takes a less conventional approach than traditional studies of boundary-spanning interactions, it did find that chronic pain, unassociated with the workplace, did, in fact, have significant effects on an individual's behaviors at work.

## **Compensatory Need Fulfillment**

Overall, research examining SDT in the workplace tends to suggest that need fulfillment is related to positive outcomes, and such findings have been replicated in other domains. Unfortunately, most research that uses a Self Determination Theory lens simply compares need fulfillment in various domains; if cross-domain research occurs, it is often centered around the effects of need unfulfillment in one domain on outcomes in another domain. The present research proposes an additional conjecture, one that examines need unfulfillment in one domain and need fulfillment in another: namely, that when need fulfillment in one domain is low, compensatory activities in the other domain may make up for any deficiencies.

Anecdotally, we see such compensatory activities taking place already. After a day of working alone in a cubicle with little interaction with others (i.e. low relatedness at work), an employee may set up a happy hour or may take advantage of family dinner time to fulfill their need for relatedness. If a work day is relatively unproductive or has not afforded an employee the opportunity to demonstrate his or her skills (i.e. low competence at work), an individual may make sure to accomplish something at home; he/she might cook or bake a particularly challenging or intensive dish, do laundry, finish up a project around the house – anything that will provide a sense of competence or accomplishment. Therefore, despite a lack of need fulfillment in one domain, individuals may engage in compensatory need fulfillment activities in another domain and still reap the positive outcomes associated with need fulfillment as outlined in SDT. By understanding such compensatory processes, we can help employees achieve positive outcomes and fill their needs of autonomy, competence, and relatedness, even in the face

of less-than-satisfying experiences at work. Despite the prevalence of such compensatory activities, the work-family literature has not yet examined the extent to which one domain may 'make up for' another. While the 'buffering' hypothesis of work-family enrichment comes close to the idea of compensatory activities, it does not reach the same level of intentionality or reactivity as the proposed process implies.

### **Theoretical and Practical Contributions**

Most research to date has examined cross-domain interactions in general terms, looking at chronic conflict or enrichment as well as the effect each has on other variables such as life or job satisfaction. These variables are all often treated as relatively static, measured once and in general or sweeping terms. The theory of compensatory need fulfillment instead operates on a more micro level. Most likely (and as indicated by research, Van den Broek et al. 2010), individuals whose needs are chronically unmet by their workplace experience low levels of satisfaction and self-select out of their workplace. However, it is no stretch to presume that even employees whose jobs and workplaces meet their needs have daily fluctuations in their level of need fulfillment, and those daily fluctuations can have meaningful consequences. Indeed, research has confirmed that daily fluctuations can and do tell a different story than more macro 'in general' data: daily variations in SDT need fulfillment predict corresponding variations in well-being (Gagne & Deci, 2005); and daily fluctuations in job satisfaction influence daily marital satisfaction and affect at home (Ilies, Wilson, & Wagner, 2009).

Knowledge of compensatory need fulfillment at a daily level can enable recommendations to help employees make the most out of unsatisfying work days, or unsatisfying non-work time. Of course, such solutions would by no means suffice for

chronic need unfulfillment; arguably, if an individual's job consistently fails to meet their basic needs, a more drastic change may be required, such as changing jobs to favor something more fulfilling. However, if research suggest behaviors in one domain may compensate for needs unfulfilled in another domain, we can encourage employees to identify the source of their dissatisfaction with a particular work day and suggest activities outside of work to prevent or assuage the negative influences from that day on the employee's well-being.

The proposed idea of compensatory need fulfillment represents an important first step in a practical and necessary line of research. Rather than viewing work and life as two domains which compete with one another, the time has come to examine the extent to which one domain can fill the other's unmet needs, resulting in a more holistic picture of individual need fulfillment and well-being.

### **Current Study and Research Questions**

This study adopts a within-person approach to examine daily need fulfillment at work and any compensatory need fulfillment that occurs outside of work (the inverse will be studied as well). Because little research exists that examines daily fluctuations in basic need fulfillment (and even less examines overall need fulfillment as a result of activities across multiple domains), there is simply not enough published evidence on which to base sound and reasonable hypotheses. As such, the present research examines two primary research questions in a more exploratory endeavor to expand our knowledge of daily need fulfillment in a more inductive manner (e.g., Hambrick, 2007; Locke, 2007). I have also proposed one hypothesis to confirm previous research trends.

The foundation of the present research rests on the assumption that daily fluctuations in basic need fulfillment exist. Recall that the body of daily within-person research in the workplace is relatively small; for example, one of the few within-person studies in this domain has asserted that certain needs, such as autonomy and relatedness, tend to be experienced more highly on weekends versus on weekdays (e.g. Ryan, Bernstein, & Brown, 2010). Less research has examined the extent to which daily experiences at work satisfy or do not satisfy an individual's needs, separate from their overall "on average" level of need fulfillment. However, studies examining the correlates of daily need fulfillment have found significant results; recall that Reis et al. (2000) found that daily fulfillment of SDT needs related to higher levels of vitality and positive affect on those same days, and Ilies et al. (2017) were able to connect personality to daily experiences of flow and need fulfillment. While these studies did not explicitly call out need fulfillment in one domain specifically, they do demonstrate that daily fluctuations in need fulfillment do exist, and these fluctuations have important implications on other experiences that day.

Assuming daily fluctuations in need fulfillment do exist across individuals' work days, the primary question of interest concerns what individuals may or may not do as a result of need fulfillment (or lack thereof) on any given day. This question is truly at the crux of compensatory need fulfillment, focusing on if, on days when an employee's psychological needs are not fully fulfilled in one domain, the employee engages in compensatory behaviors to fulfill those needs in the other domain.

The first direction compensatory behaviors may be seen, and anecdotally the simplest one to envision, is work to non-work; that is, within a single day, assuming the

majority of an individual's volitional non-work time comes after the workday, this research question examines at-work need fulfillment as a predictor of non-work need fulfillment. Unfortunately, a lack of research prevents us from making a reasonable hypothesis; while there is research on SDT need fulfillment, even at a daily level, along with high-level research on need fulfillment in domains other than the workplace (e.g. Milyavskaya & Koestner, 2011), there is not yet enough research examining need fulfillment across multiple domains within the same day. If the proposed concept of compensatory need fulfillment exists, we would expect to see a relationship between the satisfaction of each need achieved in each domain. For example, if an individual does not feel satisfied with their need for autonomy during their work day, we might expect them to find need satisfaction outside of work in order to feel fulfilled with their need for autonomy that day. However, the reverse is less predictable: if an employee *does* feel satisfied with their level of autonomy at work, will they report *less* fulfillment of their need for autonomy outside of work? Or, will they report the same level of autonomy experienced outside of work as they did at work? Previous research unfortunately falls short in bringing clarity to these unanswered questions. Thus, instead of a specific hypothesis, I pose the following research question:

*Research Question 1a: Does at-work need fulfillment predict non-work need fulfillment?*

It is important to note that compensatory need fulfillment may be bi-directional; that is, an employee may use work as an avenue to pursue needs which are unmet outside of work. An example of this may be an individual who does not know many people outside of work (being new to an area, far away from family, etc.), and therefore uses

work to fulfill their need for relatedness. Again assuming that the majority of an individual's non-work time comes after their day at work, it becomes difficult to measure this particular directionality on a day to day basis - the closest we can come is to examine one day's non-work need fulfillment and how it relates to need fulfillment at work on the following day. Once again, previous research in cross-domain interactions and in SDT does not quite help answer the question of the effects of one day's need fulfillment outside of work on the next day's need fulfillment at work; even in daily studies of work-non-work interactions, effects are limited to a single day, from wake-up to sleep (e.g. Judge & Ilies, 2004; Feuerhahn, Sonnentag, & Woll, 2014). Thus, I pose the following research question to investigate this gap:

*Research Question 1b:* Does non-work need fulfillment predict the next day's at-work need fulfillment?

Next, it becomes important to examine the extent to which these fluctuations in daily need fulfillment have consequences. We know that in general, need fulfillment at work relates to more positive outcomes, such as higher levels of job performance, job satisfaction, and organizational commitment (Cerasoli, Nicklin, & NassreIrgawi, 2016; Van den Broek et al., 2010). At the daily level, research has demonstrated need fulfillment to be related to higher levels of positive affect, lower levels of negative affect, and higher levels of well-being (Reis et al, 2000; Sheldon, Ryan, & Reis, 1996); however, daily SDT research has not yet examined the effect of need fulfillment on daily feelings towards work. Trends from previous research generally confirm that need fulfillment leads to (or is at least related to) positive outcomes. Thus, I propose:

*Hypothesis 1:* The level of need fulfillment in a domain on one day relates to an individual's satisfaction with the domain on that same day, where more need fulfillment is related to higher levels of satisfaction, and less need fulfillment is related to lower levels of satisfaction, for both the (a) work domain and (b) non-work domain.

One extension of this hypothesis is to examine domain satisfaction as it relates to need fulfillment achieved beyond that same domain. While we would expect to see higher need fulfillment in one domain relate to higher satisfaction with that same domain, it is also possible that the 'total' level of need fulfillment for the day (that is, fulfillment from that same domain *and* fulfillment from the other domain) relates to satisfaction with a domain. A question of interest is which is more strongly related to domain satisfaction: domain need fulfillment, non-domain need fulfillment, or overall need fulfillment? To reframe with more context: how does an individual's fulfillment of autonomy at work and their autonomy outside of work each relate to the individual's job satisfaction that day? To their satisfaction with their time outside of work? Therefore, I pose the following question:

*Research Question 2:* Are there differences between at-work need fulfillment and overall need fulfillment in terms of how each relates to / predicts an individual's feelings towards their (a) work and (b) non-work domains?

## **Method**

### **Study Design**

This study uses a within-person approach to investigate individuals' need fulfillment at work and outside of work. Participants received two surveys each day via email – one at the end of their work day, and one before they went to bed – for one full

work week. They also received one survey before bed on the Saturday and Sunday that immediately followed their work week. Data collection occurred in four waves of collection, and was thus spread out over four weeks, for two primary reasons: better participant management, and to best accommodate varying schedules across multiple time zones. To elaborate on this second point briefly: participants were recruited through Mechanical Turk (TurkPrime) and were located across the United States, meaning they were spread across up to four time zones. This poses a challenge for sending a survey to all participants ‘at the end of the work day’ in addition to another survey to be completed ‘before bed’ at a relevant and timely manner. Studies which employ multiple surveys per day (e.g. Feuerhahn, Sonnentag, & Woll, 2014; Ilies et al., 2017) typically have all of their participants in the same geographical area (e.g. students at a university, employees at a single organization), making it easier to know the times at which participants will receive and complete their surveys. As such, each wave of data collection limited participants to either the Eastern/Central time zone, or to the Mountain/Pacific time zone, thus enabling more precise timing of surveys.

Previous studies have already examined need fulfillment on weekends versus weekdays (see Ryan, Bernstein, & Brown, 2010; Reis et al., 2000 for examples). Additionally, while the intention of this study is to examine need fulfillment across domains in the same day, specifically, need fulfillment at work and how it relates to need fulfillment outside of work, it is possible that there may be delayed or accrued effects of need fulfillment (or lack thereof) throughout the work week, and that compensation may be seen during the weekend. Therefore, even though individuals tend to not be in both the work and non-work domains on Saturdays and Sundays, weekend data collection was

added to the final methodology. Some general analyses are included as supplemental analyses in the present study.

A single work week was chosen for data collection to maximize participant retention and minimize any participant scheduling conflicts. The total number of participants used in this sample (185 - moderately higher than other within-person studies) should help to assuage any concerns over the sufficiency of a five-day data collection window, and the confinement of data collection to a single work week has been successfully employed by other researchers in studies cross-domain interactions (e.g. Demerouti, Bakker, Sonnentag, & Fullagar, 2012; Calderwood & Ackerman, 2016; Feuerhahn, Sonnentag, & Woll, 2014). A key assumption is that participants work each of the five days in a given work week, and have reasonable time spent in each domain (i.e. assuming that participants are not doctors working 18-hour shifts). This assumption was identified when recruiting participants in Turk Prime. Additionally, before daily data collection began, a baseline survey asked participants to identify their typical work schedule, and the daily surveys themselves asked participants to identify when their time at work began and ended that day. This helped ensure that all participants worked each day of the survey period.

The weekend survey was sent to participants at the end of the day on the Saturday and Sunday following their work week. Participants were first asked if they worked that day; if they said yes, their survey was split to focus on their need fulfillment at work and need fulfillment outside of work separately, prompting them to think of each domain respectively as they answered the items. If they said no, their survey asked about their

need fulfillment that day in general. Only around 11% of collected weekend surveys were from people who worked on a weekend day.

The weekday surveys asked individuals to describe their need fulfillment at work, as well as need fulfillment after their work day ended. They also examined the individual's feelings towards their job and towards their activities outside of work that same day. The post-work survey was sent to participants at 3pm/4pm local time, and the end-of-day survey was sent at 7pm/8pm local, depending on if participants were in the Pacific/Mountain or Central/Eastern time zones. Surveys were left open for 18 hours – if participants did not respond to a survey in those 18 hours, the survey closed and they were not able to access it. Participants were also sent a reminder for each survey. By using a repeated measures study design, this study was able to examine more deeply the daily behavior of employees as they seek satisfaction in their needs both at work and outside of work while controlling for some variability between individuals. A more thorough discussion of the participants and of the items included in the surveys follows.

### **Participants**

Participants self-selected into this study through Amazon Mechanical Turk. Participants were compensated according to the number of surveys they completed, with a tiered bonus approach: participants were bonused more if they completed more surveys. To encourage participants to complete both the work and non-work survey in any given day, they were bonused an additional \$0.50 per day they completed both surveys. Participants could earn up to \$11.00 if they completed all available surveys. More detail on participant compensation is presented in Table 1.

All participants resided in the continental United States so that timing of survey sending could be controlled within a reasonable number of time zones. Participants were either limited to the Eastern/Central time zones or to the Mountain/Pacific time zones for each round of data collection.

The initial HIT on Mechanical Turk requested participants who were employed and would be working a full work week (Monday through Friday) during the following week. A pre-screening of participants helped ensure our final participant set worked full time and intended to be at work during the data collection period. This pre-screen occurred through the initial baseline survey that participants completed upon signing up to participate in the study. The baseline survey also included attention check items, asking participants to briefly describe what the study was about, how many days they would be expected to participate, and how many surveys they would be expected to complete. Any participants who did not meet the employment requirements or failed the attention check items were compensated for their completion of the baseline survey but were not invited to continue the study.

291 participants responded to the initial invitation to participate. Of these, 21 participants gave bogus answers (e.g. responded “Good” to a prompt to briefly describe what this study was about), failed to correctly answer basic survey attention check items (e.g. answered “200” when asked how many days they were expected to participate), declined to consent to participation after reading study expectations, or were not employed – these participants were not invited to continue in the daily data collection portion of the study. Of the 270 participants who were sent daily surveys, 54 did not complete any daily surveys. The majority of analyses required at least one day of

complete data – that is, the participant must have completed both the work and the nonwork survey on at least one day. The work and the nonwork survey data were merged, only including records for which a participant had both surveys in a single day, which left the final number of participants at 185, with a total of 749 matched daily observations.

The final sample did not significantly differ from the participants who were not in the final sample in terms of age ( $\chi^2 = 15.579$ ,  $df = 10$ ,  $p = 0.112$ ), gender ( $\chi^2 = 2.077$ ,  $df = 3$ ,  $p = 0.557$ ), industry ( $\chi^2 = 7.635$ ,  $df = 10$ ,  $p = 0.664$ ), education ( $\chi^2 = 3.308$ ,  $df = 6$ ,  $p = 0.769$ ), or compensation format ( $\chi^2 = 1.154$ ,  $df = 2$ ,  $p = 0.562$ ). The participants who were not in the final sample tended to work more hours in a day on average (8.95 vs 8.18 hours, difference = 0.77 hours;  $t = 2.913$ ,  $df = 124$ ,  $p = 0.004$ ; 95% CI [0.25, 1.30]). It is possible that more work each day contributed to the lack of participation from those excluded from the final sample. This was prevented as much as possible by being fully transparent at the start of the study with expectations for participation, by keeping each daily survey as brief as possible (the majority of participants completed their surveys in less than five minutes), and by allowing 18 hours for each survey to be completed. While a follow up survey would be useful to determine the actual cause of attrition, if the number of work hours was truly the cause and a lack of time resulted in the lack of participation, it is unlikely that they would be willing to complete another survey to more deeply share their reasons for not participating. An examination of the limitations this may cause is in the Discussion section of this paper.

The final sample of 185 participants was 46% female, 52% male, with 2% selecting 'Other' or choosing not to answer. The sample represented a variety of ages,

with the most frequently represented age groups being 25-29 (22%), 35-39 (21%), and 30-34 (19%). The most frequently represented industries were Information and Technology (19%); Trade, Transportation, and Utilities (12%); Education (10%), and 20% of participants selected Other. 48% of participants have a college degree, 17% have a post graduate degree, and 16% completed some college. The majority of participants are employed full time (91%), with some employed part time (9%).

## **Measures**

### **Baseline Survey.**

All measures are included in Appendix A, and all scale reliabilities are presented in Tables 2, 3, and 4. The needs of *competence*, *autonomy*, and *relatedness* were assessed by the Work-Related Basic Need Satisfaction Scale by Van den Broek et al (2010). The scale consists of 18 items rated on a five-point Likert scale, ranging from 1 (totally disagree) to 5 (totally agree), with five items exploring each of the three constructs. The scale was used before the study to measure need fulfillment in general, both at work and outside of work; since the items are originally written to reflect a job or work setting, the context items was adapted to also identify need fulfillment outside of work. This adjustment brings the total number of items to 36, with 18 focused on the work domain and 18 focused on non-work domains. For the baseline survey, instructions asked participants to reflect on their jobs and life outside of work in general to get an overall idea of their general need fulfillment at and outside of work.

*General job satisfaction* was assessed at the beginning of the study through a scale used by Judge, Bono, & Locke (2000, adapted from Brayfield-Rothe, 1951). The scale is five items, each rated on a five-point Likert Scale, with anchors of Strongly

Disagree (1) to Strongly Agree (5). A sample item from this scale is “I feel satisfied with my job.” Though the scale was designed for job satisfaction, it was adapted to also reference participants’ *satisfaction with their activities outside of work* by changing references to “job” to “activities outside of work.”

*Work-family conflict* was assessed at the beginning of the study using the 18-item Work-Family Conflict Scale by Carlson, Kacmar, & Williams (2000). This scale measures time-based conflict, strain-based conflict, and behavior-based conflict in both directions of work-family conflict (work interference with family, and family interference with work). The items are answered with a five-point Likert scale with the anchors of Strongly Disagree (a response of 1) and Strongly Agree (a response of 5). Sample items from this measure include: “My work keeps me from my family activities more than I would like” (time-based WIF); and “Due to stress at home, I am often preoccupied with family matters at work” (strain-based FIW).

*Work-family enrichment* was also assessed at the beginning of the study using a scale by Carlson, Kacmar, Wayne, & Grzywacz (2006). Like the Work-Family Conflict Scale, the Work-Family Enrichment scale features 18 items that evaluate both directions of work-family enrichment (work-to-family and family-to-work) across three dimensions: developmental enrichment, affective enrichment, and capital enrichment. Items are rated on a five-point Likert scale with anchors of Strongly Disagree (response of 1) and Strongly Agree (response of 5). Sample items from this measure include: “My involvement in my work helps me to understand different viewpoints and this helps me be a better family member” (work-to-family development); and “My involvement in my

family puts me in a good mood and this helps me be a better worker” (family-to-work affect).

### **Demographics.**

The baseline survey also asked participants for some basic demographic information. Participants’ age, gender, education level, work industry, work schedule, and employment status (full time or part time employment) were collected.

### **Daily Surveys.**

The Work-Related Basic Need Satisfaction Scale by Van den Broek et al. (2010) was also used during the study to capture *daily need fulfillment*, again both at and outside of work. This is the same survey asked in the baseline survey before daily data collection, but the daily survey prompted participants to only consider their time at work or away from work that day to keep the participants’ answers limited to the day’s need fulfillment. While the scale was designed to measure need fulfillment at work, items were adapted to also capture need satisfaction outside of work. Items were also modified from the original scale to be past tense in order to better encourage participants to consider only that day’s activities while responding to the items. The scale is 18 items (6 measuring each competence, autonomy, and relatedness) which are answered on a five-point Likert scale, with anchors of Strongly Disagree (1) and Strongly Agree (5). Sample items include: “I was good at the things I did in my job today” (competence at work); “The tasks I had to do outside of work were in line with what I really wanted to do” (autonomy outside of work); and “At work, I felt like part of a group” (relatedness at work). The daily surveys also asked three open-ended questions: “What tasks or activities at work (outside of work) made you feel competent today?”; “What tasks or activities at work (outside of

work) made you feel most in control and independent today?"; and "When did you feel most connected to people at work (outside of work) today?" These questions were optional for participants to answer and were added to get a better understanding of the types of work and nonwork activities that facilitated feelings of competence, autonomy, and relatedness.

*Daily satisfaction with work and activities outside of work* was assessed through a scale used by Judge, Bono, & Locke (2000, adapted from Brayfield-Rothe, 1951). The scale is five items, each rated on a five-point Likert Scale, with anchors of Strongly Disagree (1) to Strongly Agree (5). Though the scale was designed for job satisfaction, it was adapted to also reference participants' satisfaction with their activities outside of work. Items were also adapted to be past tense to better help participants only consider the events of that day while responding. Sample items include "I felt fairly satisfied with my job" (job satisfaction) and "I found real enjoyment in my activities outside of work" (satisfaction with activities outside of work)

*Flexibility outside of work* was assessed with a single item for each non-work survey during the week, at the request of the committee. The item "To what extent did you have flexibility in your activities outside of work today?" was assessed with a five-point Likert Scale, with one being "No flexibility" and five being "Entirely flexible."

## **Procedure**

Before the daily study began, participants were asked to complete a survey that assesses their overall need satisfaction at their job, their overall need satisfaction in their non-work life, their feelings of work-family conflict and enrichment, and their overall job satisfaction. Basic demographic information, including age, gender, education level,

industry, work schedule, and employment status was also collected as additional control variables.

Beginning on a Monday afternoon, all participants were sent a link to complete their first post-work daily survey. The link was sent around 3pm/4pm each day (depending on if participants were in the Pacific/Central time zone [3pm local time] or the Mountain/Eastern time zone [4pm local time]). The daily survey asked participants to describe the extent to which their needs for competence, autonomy, and relatedness were met that day at work. The survey also briefly asked participants to rate their level of job satisfaction for that day. Around 7pm/8pm, participants were sent another link to complete a survey on their time outside of work, with the request that it be completed before they went to bed that night. Email reminders were sent to those who had not yet completed the post-work survey around 6pm/7pm. Around or after 9pm/10pm, participants who had not yet completed the end-of-day survey were also sent email reminders. Surveys remained open for 18 hours to allow participants sufficient time to complete their surveys, but closed before the next work or non-work surveys were sent.

This continued each weekday through Friday. On Saturday and Sunday, participants were sent a single survey at 7pm/8pm, with the instructions to complete the survey before they went to bed. The first item asked participants if they worked that day. If participants said yes, indicating they did work that day, they were given both the post-work and end-of-day surveys, with items prompting them to reflect on their need fulfillment during their time working and their time outside of work. If participants said no, they did not work that day, they were given a survey that asked for their need

fulfillment by reflecting on their day's activities. The majority of participants (89%) did not work on their weekends.

Before data collection began, a pilot study of 5 participants helped to test methodology, participant screening, and survey completion. This pilot study served several purposes. First, it helped test methodology - by doing a smaller study before broader data collection, methodology and tool logistics could be tested and refined as necessary. Second, the pilot study helped identify the sorts of questionable response patterns that may occur (e.g. participants incorrectly answering attention checks, answering items the same way each day). By identifying these patterns, the researcher could clarify expectations for study participation and will have a better idea of how closely the data would need to be monitored daily during the broader data collection. As a result of the pilot study, some clarifying questions were added in the baseline survey to ensure participants were fully aware of what was expected of them by agreeing to participate in the study. Clarifying text was also added around why we requested participants to enter their Mturk ID (used for linking all of a participant's surveys together), and email text was also revised to emphasize compensation bonuses. Because the methodology (especially items) did not change significantly, the data from the pilot study was included in the final analyses.

## **Analysis**

Because the data collected was nested within individuals, multilevel analyses were used to analyze this data. Hierarchical linear modeling has been the preferred analysis approach for most daily studies of SDT as well as daily studies of cross-domain interactions. Reis et al. (2000) used HLM to predict daily well-being from person-level

variables (self-determination, effectance, and connectedness) and day-level variables (daily need fulfillment of each of the basic needs of SDT). Sheldon, Ryan, & Reis (1996) also employed HLM to examine their hypotheses that daily autonomy and daily competence are positively related to daily well-being, while also keeping trait-level autonomy and competence in mind. HLM was used by Ilies et al. (2017) in their daily experience sampling study of flow and need fulfillment, and it was also used by Calderwood & Ackerman (2016) to examine the role of daily job stress on off-job reactivity after work. Given the methodological similarities, HLM appeared to be the best choice for the present study as well.

## **Results**

### **Data Cleaning and Descriptive Statistics**

Because there were four separate surveys (baseline, post-work, end-of-day, and weekend), data was exported in four separate Excel workbooks. First, surveys that were rejected via Mechanical Turk during the data collection process (due to incorrect answering of attention checks or incomplete surveys) were removed from each spreadsheet. Items were reverse-scored as necessary, and scale composites were constructed. Daily variables were centered using group means, so that the centered variables represented individual deviations from their own average. This helped to more easily compare participants in terms of their own individual fluctuations instead of absolute levels of fulfillment. These centered variables were also used in analyses to directly capture within-person variance.

Descriptive statistics for the baseline surveys, the daily surveys, and the weekend surveys are shown in Tables 2, 3, and 4, respectively. Of particular interest is that daily

competence was higher at work than outside of work, on average (average difference = 0.08,  $t = 2.406$ ,  $p = 0.016$ ), and autonomy was higher outside of work than at work (average difference = -0.405,  $t = -11.53$ ,  $p = 0.00$ ). Relatedness was also higher outside of work than at work, though this difference was not significant (average difference = -0.069,  $t = -1.673$ ,  $p = -0.095$ ). Tables 5 and 6 show the correlations among the daily survey variables (and among the daily survey variables after they had been centered around their group means), and among baseline variables with daily variables, respectively.

Before examining the research questions pertaining to daily need satisfaction, it was important to first assess the extent to which the study variables varied between- and within-persons. That is, given that many of the research questions concern the correlates of within-person fluctuations in daily need satisfaction, it is important to examine the extent to which these variables do indeed fluctuate within-person. A common means of addressing such questions is the intraclass correlation, or ICC(1), which can be interpreted as “the proportion of the total variance that can be explained by group membership” (Bliese, 2000); in this case, the ‘group’ is each individual participant, so we may think of this as the proportion of between-person variance in each daily variable. Therefore, the proportion of within-person variance is simply  $1 - [ICC]$ . ICC(1)s ranged from .41 to .68 for each of the daily survey variables (see Table 7); this indicates that 41% to 68% of the variance in the daily study variables was associated with between-person differences, while 32% to 59% of the variance was attributable to day-to-day, within-person fluctuations. In total, the ICCs establish considerable within-person

variation (and between-person variation), thus indicating that hierarchical modeling was an appropriate analysis choice for these research questions.

Because the research question is primarily interested in the within-person variance in daily nonwork need fulfillment explained by daily at-work need fulfillment, the group-centered daily work variables were each used as an independent variable to predict the non-centered nonwork corresponding need (i.e. centered at-work competence was used to predict non-centered nonwork competence). Without within-person centering the predictors, the results would reflect an indeterminable mix of between- and within-person relationships of the predictors and outcomes. Because corresponding between- and within-person relationships can (and often do) differ from one another in magnitude and potentially even direction, it is important to disentangle the between- and within-person components of these relationships. We included nonwork flexibility as a control variable in the analyses of the research questions, also centered by the group mean to only account for within-person variability.

Although the primary research questions concerned the within-person relationships, the between-person components were also examined in supplementary analyses to provide a more complete view of the multilevel nature of these relationships. Between-person analyses were primarily conducted through OLS regression. Person-averages were calculated by averaging each individual's raw daily ratings of domain fulfillment and satisfaction; this gave each person a single numeric average representing their average fulfillment of work competence (for example) during the days of the study. This helped eliminate any within-person variation and enabled comparison across

individuals. This also allowed analyses to include baseline variables as controls, as that data also only reflects between-person differences.

## Research Questions

### **Research question 1a: Does at-work need fulfillment predict non-work need fulfillment?**

HLM results predicting nonwork need fulfillment with their at-work counterparts are displayed in Table 8. The control variable - flexibility outside of work - was a significant predictor of nonwork need fulfillment for all three basic needs, with more flexibility outside of work relating to more competence ( $\gamma = 0.17, p = 0.00$ ), autonomy ( $\gamma = 0.26, p = 0.00$ ), and relatedness ( $\gamma = 0.09, p = 0.006$ ) need fulfillment outside of work. Fulfillment of the need for competence at work was not found to predict competence need fulfillment outside of work ( $\gamma = 0.06, p = 0.17$ ). However, both autonomy ( $\gamma = 0.13, p = 0.00$ ) and relatedness ( $\gamma = 0.17, p = 0.00$ ) fulfillment at work positively predicted fulfillment of autonomy and relatedness outside of work.

When testing nonwork flexibility as a moderator, the [need] x nonwork flexibility interaction term was not statistically significant for competence and autonomy (competence:  $\gamma = -0.16, t = -1.871, p = 0.062$ ; autonomy:  $\gamma = -0.015, t = -0.030, p = 0.764$ ). The interaction for relatedness was significant at  $p = 0.05$ , but not at  $p = 0.01$  ( $\gamma = 0.157, t = 2.095, p = 0.037$ ). When plotting this interaction (illustrated in Figure 1), the magnitude, or lack thereof, of the interaction becomes clear: in fact, whether nonwork flexibility is high or low appears to, from a visual standpoint, have little influence on the relationship between work relatedness and nonwork relatedness. While statistically significant, the effect seems to have little noticeable influence on the relationship.

Though the within-person trends were of primary interest for this research question, the between-person lens should also be applied for a more thorough examination of the relationship between work and nonwork fulfillment. By using regression to analyze the between-person relationship, we can also control for baseline levels of need fulfillment. For the between-person analyses, the average of each individual's daily fulfillment of each need at work was used to predict average daily nonwork fulfillment of that same need. Baseline levels of fulfillment for the same need at work were used as controls, as well as average levels of daily flexibility outside of work.

Regression results of this between-person analysis are displayed in Table 9. Baseline levels of competence and relatedness were significant at the  $p < 0.05$  level in predicting daily nonwork competence and relatedness, respectively; baseline levels of autonomy were not significant in predicting daily nonwork autonomy fulfillment. Average flexibility outside of work was also a significant predictor of nonwork need fulfillment; this relationship was significant at  $p < 0.01$  for competence and autonomy, and  $p < 0.05$  for relatedness. Even after controlling for baseline levels of need fulfillment and average nonwork flexibility, daily need fulfillment at work remained a significant predictor of daily nonwork need fulfillment for each of the basic needs; for competence and autonomy, this relationship was significant at the  $p < 0.01$  level, and for relatedness, this relationship was significant at the  $p < 0.05$  level.

Overall, Research Question 1a found a positive relationship between work autonomy and relatedness and nonwork autonomy and relatedness at the within person level; that is, when a person had higher levels of fulfillment in autonomy and relatedness at work, they also tended to have higher levels of fulfillment in those same needs outside

of work that same day. At the between-person level, people who had more need fulfillment at work tended to have more fulfillment outside of work as well, for each of the three basic needs.

**Research question 1b: Does non-work need fulfillment predict the next day's at-work need fulfillment?**

Similar to Research Question 1a, the primary interest of Research Question 1b is within-person variability, this time of the amount of variance in daily work need fulfillment explained by the previous evening's nonwork fulfillment. For this reason, group-centered variables for nonwork need fulfillment were used as independent variables to predict the next day's need fulfillment at work (not centered). Additionally, centered nonwork flexibility remained in each model as a control variable.

In order to answer this question, the next day's fulfillment at work for each need had to be created as a lagging variable. This could only be done in cases where a participant responded to a day's nonwork survey *and* the next day's work survey – surveys needed to be from consecutive days in order to be included in this analysis. This led to a lower number of usable observations; while Research Question 1a (and any subsequent analyses examining same-day relationships) utilized 745 observations from 185 participants, Research Question 1b utilized 581 observations from 175 participants.

HLM results for Research Question 1b are displayed in Table 10. Nonwork need fulfillment did not predict the next day's fulfillment at work for any of the three basic needs. Flexibility outside of work also did not have any impact on need fulfillment at work the next day. This suggests that need fulfillment is most meaningful within the

bounds of a single waking period – it appears that fulfillment on one day has little impact on fulfillment in the day immediately following.

**Hypothesis 1: The level of need fulfillment in a domain on one day relates to an individual’s satisfaction with that domain on the same day, where more need fulfillment is related to higher levels of satisfaction, and less need fulfillment is related to lower levels of satisfaction, for both the (a) work domain, and (b) nonwork domain.**

This hypothesis is designed to replicate and extend the findings of previous research within SDT. We know that, in general, fulfillment of the three basic needs relates to higher levels of job satisfaction, job performance, and organizational commitment (Cerasoli, Nicklin, & Nassrelgrawi, 2016; Van den Broek et al., 2010). We also know that, on a daily level, need fulfillment relates to higher levels of positive affect, lower levels of negative affect, and higher levels of daily well-being (Reis et al, 2000; Sheldon, Ryan, & Reis, 1996). However, previous research has not yet made the connection between daily need fulfillment at work and daily job satisfaction. The present study fills this gap, and it also extends the question to multiple domains.

Because this hypothesis continues to be focused on within-person fluctuations instead of general between-person trends, group-centered variables were once again used as the independent variables for these analyses. As such, group-centered variables were used as predictors in all models used to address this hypothesis. The first part of this hypothesis focuses on the work domain; daily work satisfaction was used as the dependent variable, while group-centered daily competence, relatedness, and autonomy were simultaneously used as independent variables. Results are displayed in Table 11.

Fulfillment of each of the three basic needs at work was significantly related to that day's job satisfaction ( $p < 0.01$  for each), supporting Hypothesis 1a.

The same analysis was conducted for the nonwork domain. This time, nonwork flexibility was included in the model along with the day's fulfillment of the three basic needs outside of work (see Table 12). The control variable, flexibility outside of work, was positively related to nonwork satisfaction ( $\gamma = 0.049, p = 0.029$ ). Once again, fulfillment of each of three of the basic needs was positively related to satisfaction with nonwork activities in the same day ( $p < 0.01$  for each), supporting Hypothesis 1b.

In total, Hypothesis 1 was supported: fulfillment of the needs for competence, autonomy, and relatedness on any given day at work were each significantly related to higher levels of job satisfaction for that same day. Similarly, fulfillment of the same needs outside of work on any given day was significantly related to higher levels of satisfaction with nonwork time on that same day. Flexibility outside of work also predicted nonwork satisfaction, though not to as great of an extent as basic need fulfillment.

Though the within-person lens is sufficient in addressing this hypothesis, an examination of the between-person relationship can help provide a different perspective of the same relationship. Results for the regression predicting work satisfaction from average daily work competence, autonomy, and relatedness are shown in Table 13; baseline measures of overall work competence, autonomy, relatedness, and satisfaction were also included in the model. Among the control variables, baseline levels of overall work satisfaction was the strongest predictor of daily work satisfaction. After controlling for baseline levels of need fulfillment at work as well as baseline work satisfaction, daily

competence and autonomy remained significant predictors of daily work satisfaction; interestingly, daily fulfillment of relatedness at work was not significant in this between-person model.

A parallel between-person model was created for the nonwork domain, with the same nonwork counterparts of the aforementioned work variables used to predict daily nonwork satisfaction. These results are presented in Table 14. Similar to the within-person model for nonwork satisfaction, all three of the daily basic needs were significantly related to daily nonwork satisfaction, even after controlling for baseline levels of nonwork competence, autonomy, and relatedness fulfillment. Unlike the work domain, baseline levels of overall nonwork satisfaction were not significant for the nonwork domain.

**Research Question 2: Are there differences between at-work need fulfillment and nonwork need fulfillment in terms of how each relates to / predicts an individual's feelings towards their (a) work and (b) nonwork domains?**

While Hypothesis 1 confirmed previous research and found that higher levels of need fulfillment in a given domain related to higher levels of domain satisfaction, it is still feasible that fulfillment found *outside* of a given domain could still impact domain satisfaction. My second research question examines this possibility for both the work and the nonwork domains.

As within-person fluctuations were still of primary interest, daily work and nonwork fulfillment variables were centered by their group mean and then used to predict work satisfaction and nonwork satisfaction. To first answer this question on a high level, composite variables were created for daily work need fulfillment (taking the average of

each day's fulfillment of competence, autonomy, and relatedness at work) and daily nonwork need fulfillment (taking the average of each day's fulfillment of competence, autonomy, and relatedness outside of work). These composites were then used to predict daily work satisfaction and daily nonwork satisfaction to get an overall idea of how fulfillment in each domain related to satisfaction in each domain.

Results for this first set of analyses using work and nonwork fulfillment composites are found in Table 15. Average daily satisfaction at work was significantly predicted by daily fulfillment at work ( $\gamma = 1.26, p = 0.00$ ), but not by daily fulfillment outside of work ( $\gamma = -0.027, p = 0.56$ ). A similar trend occurred in the nonwork domain: average daily satisfaction with nonwork activities was predicted by daily fulfillment found in nonwork activities ( $\gamma = 1.12, p = 0.00$ ), but not by fulfillment achieved at work that same day ( $\gamma = -0.06, p = 0.18$ ).

While examining the average fulfillment in the work and nonwork domains each day does answer the research question, a more interesting examination is that of how fulfillment of each individual need (competence, autonomy, and relatedness) in each domain (work and nonwork) affects domain satisfaction. Results for these analyses are found in Table 16. Consistent with the more general findings previously noted, when predicting daily satisfaction at work, only work-related variables were significant: each of daily work competence, autonomy, and relatedness significantly predicted satisfaction at work, where higher levels of work need satisfaction were related to higher levels of work satisfaction. All nonwork-related variables (daily nonwork competence, autonomy, and relatedness) were not significant in predicting daily work satisfaction. Given the study methodology, this is what we would expect to see – since work satisfaction was assessed

before participants had even spent time in the nonwork domain, we would expect to see little or no relationship between work satisfaction and nonwork need fulfillment. If there was a relationship, it might suggest the influence of an unassessed, underlying person-level variable (e.g. propensity to be fulfilled or satisfied in general). The lack of a relationship in this case helps affirm that variables are acting as they should!

Predicting daily nonwork satisfaction was not as consistent with the average domain fulfillment results. Consistent with the average domain fulfillment results, and in line with individual need fulfillment prediction of work satisfaction, each of the nonwork daily needs significantly predicted daily nonwork satisfaction, where higher levels of nonwork need fulfillment were related to higher levels of nonwork satisfaction. However, two of the daily work-related variables, competence and autonomy, were also significant in predicting nonwork satisfaction. Daily work autonomy had a positive relationship with daily nonwork satisfaction, while daily work competence had a negative relationship with daily nonwork satisfaction.

Between-person analysis found similar results as the within-person analyses. Regression results are displayed in Table 17; after controlling for baseline need fulfillment and satisfaction in both domains, daily work competence and autonomy were each significantly related to daily work satisfaction. Daily work relatedness, along with all of the daily nonwork variables were not significant. Among the control variables, baseline work satisfaction still had the strongest relationship with daily work satisfaction, consistent with the findings from Hypothesis 1. Additionally, only the baseline levels of work-based need fulfillment had a significant (competence) or approaching-significant (autonomy) relationship with daily work satisfaction; the baseline fulfillment of nonwork

needs remained insignificant. When predicting daily nonwork satisfaction, only fulfillment of the daily nonwork needs were significant predictors, after controlling for all baseline levels of need fulfillment; no daily work fulfillment variables had a significant relationship with daily nonwork satisfaction. Among the control variables, only baseline levels of work relatedness and work satisfaction had significant relationships with daily nonwork satisfaction.

### **Supplemental Analyses**

Though not a primary focus of this study, there remains the possibility that any daily deficiencies in need fulfillment may not be rectified on a daily level; instead, people may use weekends to make up for any accumulated need deficiencies experienced over multiple days. Therefore, weekday versus weekend need fulfillment was also examined, with the possibility of weekends compensating for any deficiencies in need fulfillment during the work week. To examine daily differences in need fulfillment, an analysis of variance (ANOVA) was conducted for each basic need. In order to best compare weekend fulfillment, which was measured by a single survey (in most cases), and weekday fulfillment, which was measured by a work and a nonwork survey, work and nonwork need fulfillment for each of the three basic needs were averaged in order to get a daily fulfillment average for each need. For the analyses, absolute fulfillment totals were used instead of centered variables, which followed similar analyses conducted by Reis, et al. (2000). Table 18 shows the average fulfillment for each basic need (competence, autonomy, and relatedness) for each of the seven days of the study. Figures 1, 2, and 3 display the distributions of fulfillment each day for competence, autonomy, and relatedness, respectively.

Results of each ANOVA are presented in Table 19. Surprisingly, there was no difference in fulfillment across each day of the week for competence or relatedness; there was, however, a significant difference in autonomy fulfillment by day of the week. Tukey's HSD test was conducted to find which days had significant differences in average autonomy fulfillment – results for this analysis are presented in Table 20. Fulfillment of autonomy on each of the weekend days (Saturday and Sunday) was significantly higher than autonomy fulfillment on each of the days of the work week.

### **Discussion**

Overall, this study presented a deeper examination of fulfillment of basic needs across multiple domains in a single day. The first research question examined how need fulfillment in one domain impacted need fulfillment in another. Competence at work did not have a significant relationship with competence outside of work on that same day. However, both autonomy and relatedness achieved at work for a given individual had a significant relationship with autonomy and relatedness achieved outside of work on the same day, such that higher levels of need fulfillment at work were associated with higher levels of fulfillment outside of work. This does not support the notion of compensatory need fulfillment, which would posit lower levels of fulfillment at work would lead to higher levels of fulfillment outside of work, which would be reflected in a negative relationship between work and nonwork need fulfillment. However, less was known about what would happen when needs were sufficiently met in the workplace – it does not seem likely that individuals would actively avoid fulfilling their needs outside of work; at best, individuals would be indifferent to their need fulfillment once their needs have been met. Self Determination Theory suggests that individuals are constantly driven

to meet their needs, whether consciously or subconsciously, though there is little in the literature to suggest what happens after an individual's needs are 'met'. In fact, there is little to suggest that needs are 'met' at all in such a black and white manner – there does not seem to be a threshold, so to speak, of the point at which needs go from not fulfilled to fulfilled. Research instead tends to focus on the degree to which needs are met, not a check box of met or not met.

It is important to keep this lack of a dichotomy in mind when we recall the average daily fulfillment of each need in each domain. Although the HLM results suggest that higher levels of autonomy and relatedness at work lead to higher levels of autonomy and relatedness outside of work later that day, it is of interest to recall that individuals experienced higher levels of autonomy and relatedness outside of work than at work, on average. Additionally, individuals tended to have higher levels of competence at work than outside of work on a given day (remember, there was not a significant relationship between competence achieved at work and competence achieved outside of work). This may lend support to the idea of compensatory need fulfillment – despite a positive relationship between autonomy and relatedness at work with their nonwork counterparts, the 'absolute' level of fulfillment was still higher outside of work than it was at work.

Though support for the idea of compensatory need fulfillment is slightly tenuous, the results of Research Question 1 are more consistent with positive spillover, with more fulfillment at work leading to more fulfillment outside of work that same day. It may be that need fulfillment across multiple domains in a single day acts as a virtuous cycle, with fulfillment at work begetting fulfillment outside of work.

The between-person analysis of the same question further supports the idea of individuals being in constant pursuit of need fulfillment; people who had higher levels of fulfillment at work tended to also have higher levels of fulfillment outside of work, for each of the three basic needs. Future research may benefit from a more qualitative study to further investigate the nuances of daily need fulfillment across domains.

This study operated under the assumption that most individuals had their nonwork time after their work day; indeed, this was confirmed by individuals entering their work and nonwork hours in each daily survey. This makes the reverse direction – fulfillment outside of work leading to fulfillment at work – a little more of a challenge to visualize. While it is conceivable that an individual whose needs are not met outside of work on a given day may seek greater fulfillment at work the following day, the data did not support such a relationship for any of the three basic needs. Cross-domain need fulfillment seems to be most salient within the confines of a single waking period; indeed, previous daily research on need fulfillment has focused on fulfillment within a single day instead of the immediate effects of how one day bleeds into the next. (The exception here is more habitual patterns of need fulfillment – for example, how need fulfillment during the work week might differ from fulfillment on weekends. This will be discussed a little later on!)

The remainder of the planned research examined more deeply an outcome of need fulfillment – namely, domain satisfaction. Hypothesis 1 aligns with previous research, in that higher levels of domain need fulfillment predicted higher levels of satisfaction with that same domain. The present study confirmed this within-person relationship on a daily level (while previous research had only done so on a more general level, see Cerasoli, Nicklin, & Nassrelrgawi, 2016; Van den Broek et al., 2010), and demonstrated the

relationship across multiple domains. This affirms the importance of the fulfillment of basic needs, both at work and outside of work, even at a daily level.

This trend was generally supported in the between-person analyses as well, with a few interesting notes. With regard to the work domain, after controlling for baseline levels of work need fulfillment and work satisfaction, fulfillment of the need for relatedness at the daily level at work was no longer a significant predictor of daily work satisfaction. While this does not mean that relatedness at work is not important, it may signal a greater reliance on fulfillment of competence and autonomy at a daily level, provided the job satisfies an individual's need for relatedness more generally. More puzzling, however, is that an individual's baseline levels of autonomy at work had a *negative* relationship with daily work satisfaction (daily work autonomy had the expected positive relationship). Because there are multiple other terms in this model, I hesitate to infer too much from this one relationship; indeed, an individual's general (baseline) work autonomy has a strong, positive correlation with both baseline and daily levels of work satisfaction. Thus, it may be that the relationship between daily autonomy at work and daily work satisfaction is simply stronger when an individual has a slightly lower baseline level of autonomy at work; that is, higher levels of autonomy at work on a given day have a more noticeable effect on daily work satisfaction when an individual tends to experience a lower level of autonomy at work on average.

A similar phenomenon was observed in the nonwork domain, as well. Unlike the work domain, all basic needs outside of work remained significant for predicting nonwork satisfaction at the daily level, even after controlling for their baseline counterparts. However, we did see another negative relationship in the baseline variables,

this time with relatedness. Once again, overall levels of nonwork relatedness have a positive correlation with overall and daily levels of nonwork satisfaction (admittedly, a stronger relationship with overall than with daily nonwork satisfaction), so we must not rush to the conclusion that lower levels of relatedness outside of work in general leads to higher levels of daily satisfaction outside of work. However, a deeper examination of how overall levels of fulfillment interact with daily experiences to result in positive outcomes of fulfillment could be an interesting endeavor for future research to explore more fully.

When including daily nonwork fulfillment variables in the model to predict daily work satisfaction, the daily work fulfillment variables remained significant while the nonwork variables did not. While this makes sense, it also could be a slight artifact of the study design: daily work need fulfillment and daily work satisfaction were both assessed at the same time in the post-work survey, while daily nonwork need fulfillment was not assessed until later in the evening in a separate survey. Therefore, at least part of these findings could be due to common method bias (though the same can be said for the findings of Hypothesis 1). Additionally, if any of the nonwork fulfillment variables did have a significant relationship with work satisfaction at the within-person level, interpretation would be difficult, since nonwork fulfillment would have happened after satisfaction with work had already been assessed on a given day. That is, given the study design, it would be unlikely for daily nonwork fulfillment to affect daily work satisfaction when, as of the time of measuring work satisfaction, individuals had not yet had nonwork time. Again, while the results themselves make sense (that is, for domain

fulfillment to relate more strongly to domain satisfaction than nondomain fulfillment), we must keep in mind the methodological constraints that make such results more likely.

A more colorful picture emerges when adding daily work fulfillment to the model used to predict daily nonwork satisfaction. Similar to the previous discussion, the daily nonwork fulfillment variables all remain significant predictors of daily nonwork satisfaction, a result that continues to intuitively make sense. However, several of the daily work fulfillment variables are significant as well, suggesting a little bit of domain spillover. Daily autonomy at work was a significant predictor of daily nonwork satisfaction, such that more autonomy at work on a given day was related to higher satisfaction with time spent outside of work that day. Interestingly, daily work competence was also significantly related to daily nonwork satisfaction, such that when an individual feels a greater sense of competence at work on a given day, they tend to feel a *lower* level of satisfaction with the nonwork domain (conversely, less competence at work was associated with greater satisfaction with the nonwork domain). This relationship is limited to the within-person level; it disappears when analyzed at the between-person level. One possible explanation is a lower level of competence at work could lead an individual to strive for a greater sense of competence outside of work, thereby increasing nonwork satisfaction; however, based on our findings in Research Question 1, we know this is not likely the case – there was no significant relationship between daily work competence and daily nonwork competence to support this idea. This is another instance where a qualitative follow up would be of interest!

Though not addressed in any of the research questions, an examination of need fulfillment by day of the week was of interest to identify any distal effects of daily need

fulfillment (specifically, lack thereof). Previous research has found higher levels of need fulfillment on weekends in comparison to weekdays for autonomy and relatedness, but no significant difference for competence (Reis et al., 2000; Ryan, Bernstein, & Brown, 2010). The present study confirmed no significant difference in daily competence across different days of the week. Daily autonomy was found to be significantly higher on Saturdays and Sundays than on other days of the week, also consistent with previous research. However, Saturday or Sunday fulfillment of relatedness was not significantly different from relatedness fulfillment throughout the other days of the week; this was inconsistent with previous research. Perhaps if this study was repeated with the same participants over multiple weeks, we may see a shift in results – both of the aforementioned studies that found a significant difference in weekend relatedness took place over two or three weeks, meaning more than one weekend was included in the sample.

### **Limitations and Future Research**

Recall that the only difference between those included in the final sample and those excluded was self-reported number of hours worked per day; on average, the people who were excluded from the final sample (primarily due to lack of participation) reported working 45 minutes per day more than the participants included in the final sample, on average. It would be interesting to examine the need fulfillment patterns of those with higher working hours - it is feasible to surmise that more time at work means less time in the nonwork domain and possibly less opportunity for nonwork need fulfillment. However, with more time spent at work, it may be that these individuals experience higher levels of fulfillment at work than those who have more balanced time across

multiple domains. Though it would be challenging to secure the participation of such individuals, future research investigating the role of working hours in work (and nonwork) need fulfillment could offer valuable insights. As it is, the average difference in working hours between the final sample and those not in the final sample does slightly impact the inferences we can make – currently, our conclusions cannot extend to those working longer hours (nine or more hours per day).

Similarly, given the study design, our participants (intentionally) tended to have their nonworking time immediately follow their time at work within a given day. The present research cannot extend to individuals with less traditional working schedules (e.g. shift work). However, given the findings that cross-domain effects of daily domain need fulfillment tend to be limited to that same day, future research examining less ‘traditional’ scheduling would be worthwhile. For example, if an individual works second shift and has the majority of their nonwork time before their work time in a single day, we might expect to see similar fulfillment trends from the earlier domain influencing fulfillment in the later domain. In a similar vein, future research could benefit from examination of the smaller amounts of time devoted to each domain – for example, any fulfillment achieved in the hour or two at home in the morning before an employee goes to work.

As domain need fulfillment and satisfaction within a single day were the primary interest of the present study, the decision to collect data within the span of a single week is justified. However, it does limit the breadth and depth of situations we were able to capture. For instance, a deeper look into a single day (or two) for each participant could help identify more of the individual nuances that occur, including the smaller amounts of

time mentioned earlier between/before/after time devoted to a specific domain. Conversely, a longer data collection period could be beneficial to look at more of the cumulative or additive effects of need fulfillment (or lack thereof) that may occur across multiple weeks. Changing the temporal scope of data collection would change the questions investigated, but these changes would also provide valuable information about need fulfillment across multiple domains.

As previously mentioned, the methodology slightly constrained some of the conclusions that we could make from our analyses. For example, because daily work fulfillment and daily work satisfaction were assessed using the same survey at the same point in time, the relationship between those variables may be slightly inflated. While more costly and time intensive, an experience sampling methodology, which is sometimes used by other researchers in the study of daily need fulfillment, may be more useful in reducing this methodology impact. Additionally, because domain need fulfillment and domain satisfaction were assessed in the same surveys, our ability to make causal inferences is also limited.

With regard to future research, quantitative trends are certainly interesting and useful to identify behavioral themes and patterns. However, as mentioned previously, there were a few points where pointed insights through qualitative data would be useful to understand individual nuances and rationale for behaviors. Future research may benefit from an interview-based study to expand on the confirmed quantitative trends in this field. The present study did collect qualitative data on the types of activities that individuals found fulfilling in each domain, but this does not explain as deeply or as pointedly the underlying processes or cognitions at play. On that note, however, a more

thorough analysis of the types of activities that individuals find fulfilling could also be useful. The difficult part of such an endeavor is the subjectivity of fulfillment – even for the same individual, an activity at work or outside of work that may bring a sense of fulfillment on one day may fail to feel fulfilling on another day.

Additionally, the primary outcome of interest in this study was satisfaction with each domain. Other research examining need fulfillment, especially daily need fulfillment, also tends to focus on self-reported outcome measures (e.g. job commitment, positive or negative affect). However, a study examining others' reactions to an individual and how those fluctuate with an individual's need fulfillment in that domain would be enlightening – how would a spouse rate marital satisfaction on days where an individual reports a high level (or a low level) of personal need fulfillment? How would a supervisor evaluate job performance or team work as an individual's fulfillment at work fluctuates? Present research has not yet delved into the observable, behavioral effects of psychological need fulfillment, but such constructs could certainly be of interest for future research.

### **Concluding Thoughts**

Overall, this research provided a useful first step into the exploration of need fulfillment across multiple domains in the same day. Research examining fulfillment in a single domain is interesting and certainly useful, but individuals do not live or operate in a single domain. By examining multiple domains, we are able to more fully capture a more authentic reality, helping us understand the beginnings of how fulfillment in one domain might affect fulfillment in another.

Through the present study, we saw higher levels of fulfillment in autonomy and relatedness at work relate to higher levels of autonomy and relatedness outside of work. While not quite abiding by the ideals of compensatory need fulfillment, this does support a positive spillover effect from one domain into another. We also saw higher levels of fulfillment relate to higher levels of domain satisfaction, true for each of the basic needs (competence, autonomy, and relatedness) in both the work and the nonwork domains. We also saw individuals experience higher levels of autonomy fulfillment on weekends than during the week, though levels of fulfillment in competence and relatedness remained fairly consistent throughout the work week and weekend.

In sum, these findings help us start to understand the totality of daily need fulfillment, in multiple settings, across multiple days. By first understanding more deeply the individual experience at work and outside of work, we may start to see the value and the implications of need fulfillment in each domain. Ideally, this information will help us structure environments in a way that promotes need fulfillment, providing opportunities for individuals to feel satisfied and fulfilled in their needs for competence, autonomy, and relatedness. As we have seen, fulfillment in the work domain (where our expertise sits as organizational psychologists) can have positive effects on the nonwork domain – we have the ability to help create fulfilled employees, and therefore fulfilled people, leading to a more enriched and satisfying human experience.

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Table 1

*Participant compensation schedule*

Number of Surveys	Total Payment	Number of Surveys	Total Payment
Baseline Survey	\$1.80	1 non-work survey	\$0.30
1 work survey	\$0.30	2 non-work surveys	\$0.70
2 work surveys	\$0.70	3 non-work surveys	\$1.20
3 work surveys	\$1.20	4 non-work surveys	\$1.80
4 work surveys	\$1.80	5 non-work surveys	\$2.50
5 work surveys	\$2.50	6 non-work surveys	\$3.30
		7 non-work surveys	\$4.20
Bonus for completing both Work and Non-Work Surveys in a day: \$0.50			

Table 2

*Descriptive statistics for baseline survey measures*

Variable	Number of items	$\alpha$	Mean	SD
Overall Work Competence	6	.86	4.332	0.681
Overall Work Autonomy	6	.81	3.471	0.898
Overall Work Relatedness	6	.87	3.656	1.016
Overall Work Satisfaction	5	.87	3.782	0.988
Overall Nonwork Competence	6	.84	4.205	0.738
Overall Nonwork Autonomy	6	.81	4.080	0.719
Overall Nonwork Relatedness	6	.88	3.970	0.960
Overall Nonwork Satisfaction	5	.81	4.344	0.687
Overall WIF	9	.92	2.471	0.988
Overall FIW	9	.91	2.159	0.850
Overall WFE	9	.94	3.484	1.008
Overall FWE	9	.92	3.718	0.901

Table 3

*Descriptive statistics for daily survey measures*

Variable	Number of items	$\alpha$	Mean	SD
Daily Work Competence	6	.89	4.117	0.790
Daily Work Autonomy	6	.86	3.787	0.906
Daily Work Relatedness	6	.88	3.635	0.977
Daily Work Satisfaction	5	.91	3.816	1.057
Daily Nonwork Competence	6	.87	4.036	0.806
Daily Nonwork Autonomy	6	.84	4.192	0.762
Daily Nonwork Relatedness	6	.88	3.704	1.032
Daily Nonwork Satisfaction	5	.86	4.135	0.868

Table 4

*Descriptive statistics for weekend survey measures*

Variable	Number of items	$\alpha$	Mean	SD
Weekend Competence*	6	.92	4.095	0.821
Weekend Autonomy*	6	.85	4.319	0.717
Weekend Relatedness*	6	.92	3.801	1.108
Weekend Satisfaction*	5	.89	4.195	0.864
Weekend Work Competence	6	.79	3.682	0.759
Weekend Work Autonomy	6	.82	3.578	0.833
Weekend Work Relatedness	6	.78	3.131	0.831
Weekend Work Satisfaction	5	.73	3.513	0.779
Weekend Nonwork Competence	6	.91	4.167	0.974
Weekend Nonwork Autonomy	6	.82	4.375	0.834
Weekend Nonwork Relatedness	6	.80	3.510	0.892
Weekend Nonwork Satisfaction	5	.85	3.719	0.956

*Note:* \*These variables were from participants who did *not* work on the weekend ( $N = 262$ ). The Weekend Work and Weekend Nonwork variables were collected from individuals who *did* work on the weekend ( $N = 32$ ).

Table 5

*Correlation matrix of daily survey variables*

	1	2	3	4	5	6	7	8	9
1. Daily Work Competence	1.00	.56*	.50*	.65*	.35*	.34*	.27*	.29*	.15*
2. Daily Work Autonomy	.51*	1.00	.56*	.75*	.27*	.35*	.27*	.30*	.15*
3. Daily Work Relatedness	.32*	.34*	1.00	.61*	.31*	.32*	.37*	.29*	.17*
4. Daily Work Satisfaction	.67*	.68*	.40*	1.00	.31*	.30*	.33*	.29*	.14*
5. Daily Nonwork Competence	.05	.12*	.09*	.10*	1.00	.63*	.42*	.67*	.37*
6. Daily Nonwork Autonomy	.09*	.14*	.13*	.10*	.48*	1.00	.43*	.79*	.49*
7. Daily Nonwork Relatedness	.15*	.18*	.15*	.13*	.23*	.26	1.00	.52*	.17*
8. Daily Nonwork Satisfaction	.02	.17*	.09*	.10*	.52*	.72	.41*	1.00	.45*
9. Daily Nonwork Flexibility	-.05	.02	.02	-.01	.23*	.41	.12*	.36*	1.00

*Note:* N=749. Correlations for the raw daily variables fall above the diagonal, and correlations among the centered daily variables fall below the diagonal.

Table 6

*Correlation matrix of baseline (overall) variables with daily variables*

	1	2	3	4	5	6	7	8
1. Overall Work Competence	1.00	0.46	0.43	0.43	0.61	0.44	0.36	0.50
2. Overall Work Autonomy	0.46	1.00	0.65	0.77	0.42	0.37	0.34	0.33
3. Overall Work Relatedness	0.43	0.65	1.00	0.74	0.48	0.37	0.54	0.37
4. Overall Work Satisfaction	0.43	0.77	0.74	1.00	0.42	0.31	0.43	0.33
5. Overall Nonwork Competence	0.61	0.42	0.48	0.42	1.00	0.60	0.49	0.59
6. Overall Nonwork Autonomy	0.44	0.37	0.37	0.31	0.60	1.00	0.58	0.69
7. Overall Nonwork Relatedness	0.36	0.34	0.54	0.43	0.49	0.58	1.00	0.62
8. Overall Nonwork Satisfaction	0.50	0.33	0.37	0.33	0.59	0.69	0.62	1.00
9. Daily Work Competence Avg	0.72	0.46	0.50	0.53	0.57	0.45	0.45	0.44
10. Daily Work Autonomy Avg	0.48	0.73	0.58	0.66	0.44	0.40	0.40	0.33
11. Daily Work Relatedness Avg	0.42	0.54	0.81	0.65	0.49	0.42	0.54	0.38
12. Daily Work Satisfaction Avg	0.44	0.68	0.67	0.83	0.44	0.38	0.49	0.39
13. Daily Nonwork Competence Avg	0.49	0.29	0.33	0.32	0.55	0.38	0.29	0.41
14. Daily Nonwork Autonomy Avg	0.50	0.32	0.34	0.28	0.55	0.58	0.38	0.54
15. Daily Nonwork Relatedness Avg	0.37	0.28	0.46	0.37	0.43	0.34	0.52	0.44
16. Daily Nonwork Satisfaction Avg	0.50	0.29	0.33	0.33	0.56	0.51	0.36	0.54

*Note:* All correlations are significant at  $p < 0.01$ .

Table 6, continued

*Correlation matrix of baseline (overall) variables with daily variables)*

	9	10	11	12	13	14	15	16
1. Overall Work Competence	0.72	0.48	0.42	0.44	0.49	0.50	0.37	0.50
2. Overall Work Autonomy	0.46	0.73	0.54	0.68	0.29	0.32	0.28	0.29
3. Overall Work Relatedness	0.50	0.58	0.81	0.67	0.33	0.34	0.46	0.33
4. Overall Work Satisfaction	0.53	0.66	0.65	0.83	0.32	0.28	0.37	0.33
5. Overall Nonwork Competence	0.57	0.44	0.49	0.44	0.55	0.55	0.43	0.56
6. Overall Nonwork Autonomy	0.45	0.40	0.42	0.38	0.38	0.58	0.34	0.51
7. Overall Nonwork Relatedness	0.45	0.40	0.54	0.49	0.29	0.38	0.52	0.36
8. Overall Nonwork Satisfaction	0.44	0.33	0.38	0.39	0.41	0.54	0.44	0.54
9. Daily Work Competence Avg	1.00	0.58	0.58	0.62	0.52	0.47	0.36	0.47
10. Daily Work Autonomy Avg	0.58	1.00	0.61	0.79	0.34	0.43	0.29	0.36
11. Daily Work Relatedness Avg	0.58	0.61	1.00	0.67	0.40	0.41	0.48	0.42
12. Daily Work Satisfaction Avg	0.62	0.79	0.67	1.00	0.41	0.42	0.40	0.41
13. Daily Nonwork Competence Avg	0.52	0.34	0.40	0.41	1.00	0.70	0.50	0.73
14. Daily Nonwork Autonomy Avg	0.47	0.43	0.41	0.42	0.70	1.00	0.51	0.84
15. Daily Nonwork Relatedness Avg	0.36	0.29	0.48	0.40	0.50	0.51	1.00	0.59
16. Daily Nonwork Satisfaction Avg	0.47	0.36	0.42	0.41	0.73	0.84	0.59	1.00

*Note:* All correlations are significant at  $p < 0.01$ .

Table 7

*Intraclass correlations (ICCs) of daily survey variables*

Variable	ICC(1) (Proportion of between- person variance)	Proportion of within-person variance
Daily Work Competence	0.425	0.575
Daily Work Autonomy	0.626	0.374
Daily Work Relatedness	0.684	0.316
Daily Work Satisfaction	0.534	0.466
Nonwork Flexibility	0.414	0.586
Daily Nonwork Competence	0.436	0.564
Daily Nonwork Autonomy	0.503	0.497
Daily Nonwork Relatedness	0.599	0.401
Daily Nonwork Satisfaction	0.416	0.584

Table 8

*HLM results for daily work need fulfillment predicting daily nonwork need fulfillment*

	Daily Nonwork Competence			Daily Nonwork Autonomy			Daily Nonwork Relatedness		
	$\gamma$	SE	t	$\gamma$	SE	t	$\gamma$	SE	t
(Intercept)	4.037	0.046	88.273*	4.166	0.046	89.618*	3.685	0.064	57.336*
Nonwork flexibility	0.168	0.029	5.759*	0.257	0.024	10.613*	0.088	0.032	2.761*
Daily work competence	0.057	0.041	1.374						
Daily work autonomy				0.130	0.037	3.494*			
Daily work relatedness							0.171	0.049	3.460*

\* $p < 0.01$ .

*Note:* All terms in each model had 558 degrees of freedom. All predictors in these models were centered by group-mean.

Table 9

*Regression results for between-person daily work need fulfillment predicting daily nonwork need fulfillment*

	Daily Nonwork Competence			Daily Nonwork Autonomy			Daily Nonwork Relatedness		
	B	SE	t	B	SE	t	B	SE	t
(Intercept)	1.385	0.271	5.116*	1.952	0.236	8.273*	1.460	0.304	4.789*
Daily nonwork flexibility avg	0.184	0.045	4.080*	0.304	0.047	6.483*	0.148	0.068	2.175 <sup>+</sup>
Overall work competence	0.204	0.079	2.588 <sup>+</sup>						
Daily work competence avg	0.264	0.082	3.212*						
Overall work autonomy				0.002	0.064	0.033			
Daily work autonomy avg				0.287	0.076	3.751*			
Overall work relatedness							0.202	0.096	2.105 <sup>+</sup>
Daily work relatedness avg							0.257	0.114	2.242 <sup>+</sup>

<sup>+</sup> $p < 0.05$ ; \* $p < 0.01$ . Each model had 180 degrees of freedom.

Table 10

*HLM results for daily nonwork need fulfillment predicting the next day's work need fulfillment*

	Next Day Work Competence			Next Day Work Autonomy			Next Day Work Relatedness		
	$\gamma$	SE	t	$\gamma$	SE	t	$\gamma$	SE	t
(Intercept)	4.067	0.047	86.841*	3.769	0.061	62.247*	3.653	0.067	54.253*
Nonwork flexibility	0.007	0.038	0.189	0.018	0.037	0.471	0.018	0.033	0.526
Daily nonwork competence	0.028	0.052	0.538						
Daily nonwork autonomy				0.042	0.058	0.716			
Daily nonwork relatedness							0.026	0.043	0.617

\* $p < 0.01$ .

*Note:* All terms in each model had 404 degrees of freedom. All predictors in these models were centered by group-mean.

Table 11

*HLM results for daily work satisfaction predicted by daily work need fulfillment*

	Daily Work Satisfaction		
	$\gamma$	SE	t
(Intercept)	3.807	0.063	60.592*
Daily work competence	0.504	0.037	13.564*
Daily work autonomy	0.551	0.040	13.658*
Daily work relatedness	0.165	0.037	4.442*

\* $p < 0.01$

*Note:* All terms had 560 degrees of freedom. All predictors were centered by group-mean.

Table 12

*HLM results for daily nonwork satisfaction predicted by daily nonwork need fulfillment*

	Daily Nonwork Satisfaction		
	$\gamma$	SE	t
(Intercept)	4.110	0.050	82.990*
Daily nonwork flexibility	0.049	0.023	2.184 <sup>+</sup>
Daily nonwork competence	0.223	0.033	6.673*
Daily nonwork autonomy	0.672	0.040	16.723*
Daily nonwork relatedness	0.220	0.028	7.816*

<sup>+</sup>  $p < 0.05$ . \* $p < 0.01$ .

*Note:* All terms had 556 degrees of freedom. All predictors were centered by group-mean.

Table 13

*Regression results for between-person work fulfillment predicting work satisfaction*

	Daily Work Satisfaction		
	B	SE	t
(Intercept)	0.068	0.194	0.352
Overall work competence	-0.107	0.060	-1.785
Overall work autonomy	-0.118	0.056	-2.100 <sup>+</sup>
Overall work relatedness	-0.006	0.055	-0.101
Overall work satisfaction	0.489	0.052	9.473*
Daily work competence avg	0.195	0.070	2.784*
Daily work autonomy avg	0.460	0.060	7.692*
Daily work relatedness avg	0.070	0.059	1.174

<sup>+</sup> $p < 0.05$ ; \* $p < 0.01$ .  $df=176$

Table 14

*Regression results for between-person nonwork fulfillment predicting nonwork satisfaction*

	Daily Nonwork Satisfaction		
	B	SE	t
(Intercept)	-0.141	0.194	-0.727
Overall nonwork competence	0.050	0.049	1.017
Overall nonwork autonomy	0.010	0.055	0.186
Overall nonwork relatedness	-0.075	0.037	-2.014 <sup>+</sup>
Overall nonwork satisfaction	0.101	0.056	1.799
Daily nonwork competence avg	0.226	0.060	3.798*
Daily nonwork autonomy avg	0.574	0.062	9.314*
Daily nonwork relatedness avg	0.151	0.037	4.032*

<sup>+</sup>  $p < 0.05$ . \* $p < 0.01$ . df=176

Table 15

*HLM results for work versus nonwork need satisfaction predicting domain satisfaction*

	Daily work satisfaction			Daily nonwork satisfaction		
	$\gamma$	SE	t	$\gamma$	SE	t
(Intercept)	3.807	0.063	60.589*	4.111	0.049	83.082*
Daily work need fulfillment	1.263	0.046	27.361*	-0.060	0.044	-1.344
Daily nonwork need fulfillment	-0.027	0.046	-0.589	1.117	0.044	25.410*

\* $p < 0.01$ . All terms had 561 degrees of freedom. *Note:* Daily work (nonwork) need fulfillment is the average of daily fulfillment of competence, autonomy, and relatedness at work (nonwork).

Table 16

*HLM results for daily need fulfillment predicting domain satisfaction*

	Daily work satisfaction			Daily nonwork satisfaction		
	$\gamma$	SE	t	$\gamma$	SE	t
(Intercept)	3.807	0.063	60.592*	4.110	0.050	82.881*
Daily work competence	0.508	0.037	13.642*	-0.117	0.034	-3.402*
Daily work autonomy	0.555	0.041	13.630*	0.108	0.038	2.870*
Daily work relatedness	0.168	0.037	4.518*	-0.038	0.034	-1.115
Daily nonwork competence	0.045	0.036	1.254	0.218	0.033	6.612*
Daily nonwork autonomy	-0.035	0.041	-0.857	0.704	0.038	18.759*
Daily nonwork relatedness	-0.038	0.031	-1.233	0.226	0.028	8.014*

\* $p < 0.01$ . All terms had 557 degrees of freedom. *Note:* All predictors have been centered by their group-mean.

Table 17

*Regression results for need fulfillment predicting domain satisfaction*

	Daily work satisfaction			Daily nonwork satisfaction		
	B	SE	t	B	SE	t
(Intercept)	-0.267	0.225	-1.188	-0.154	0.204	-0.759
Overall work competence	-0.149	0.065	-2.300 <sup>+</sup>	0.042	0.059	0.713
Overall work autonomy	-0.106	0.056	-1.888	-0.060	0.051	-1.175
Overall work relatedness	-0.015	0.055	-0.265	-0.104	0.050	-2.101 <sup>+</sup>
Overall work satisfaction	0.492	0.052	9.437*	0.115	0.047	2.434 <sup>+</sup>
Overall nonwork competence	-0.056	0.058	-0.961	0.051	0.053	0.959
Overall nonwork autonomy	-0.049	0.061	-0.796	0.022	0.055	0.395
Overall nonwork relatedness	0.045	0.044	1.008	-0.072	0.040	-1.790
Overall nonwork satisfaction	0.069	0.063	1.085	0.086	0.057	1.508
Daily work competence avg	0.170	0.071	2.369 <sup>+</sup>	-0.030	0.064	-0.464
Daily work autonomy avg	0.447	0.061	7.371*	-0.041	0.055	-0.756
Daily work relatedness avg	0.039	0.060	0.658	0.079	0.054	1.461
Daily nonwork competence avg	0.074	0.068	1.096	0.206	0.061	3.367*
Daily nonwork autonomy avg	0.093	0.070	1.324	0.596	0.063	9.399*
Daily nonwork relatedness avg	0.011	0.043	0.251	0.143	0.038	3.712*

<sup>+</sup>  $p < 0.05$ . \* $p < 0.01$ . Note: all terms were entered into the model simultaneously.

Table 18

*Average need fulfillment by day*

	Average Need Fulfillment		
	Competence	Autonomy	Relatedness
Day 1 (Monday)	4.17	4.00	3.67
Day 2 (Tuesday)	4.10	4.02	3.72
Day 3 (Wednesday)	4.04	3.96	3.64
Day 4 (Thursday)	4.00	3.97	3.62
Day 5 (Friday)	4.06	4.00	3.69
Day 6 (Saturday)	4.16	4.37	3.83
Day 7 (Sunday)	4.04	4.27	3.77

*Note:* All averages are based on a 1-5 rating scale, where a value of '5' is the highest possible fulfillment. All workday averages are the average fulfillment of each need across the work and the nonwork domains.

Table 19

*ANOVA results for need fulfillment by day of study*

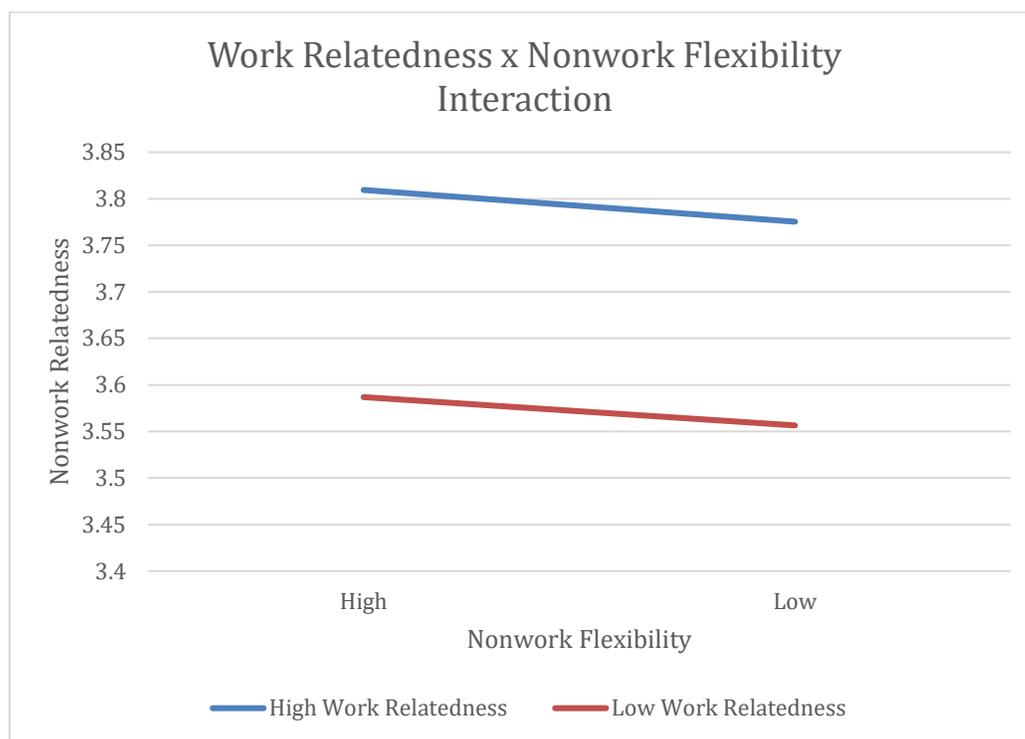
		df	Sum Sq	Mean Sq	F	<i>P</i>
Daily Competence	Day	6	3.6	0.600	1.222	0.292
	Residuals	1003	492.8	0.491		
Daily Autonomy	Day	6	22.1	3.686	7.632	0.000
	Residuals	1003	484.5	0.483		
Daily Relatedness	Day	6	4.5	0.752	0.903	0.492
	Residuals	1003	835.7	0.833		

Table 20

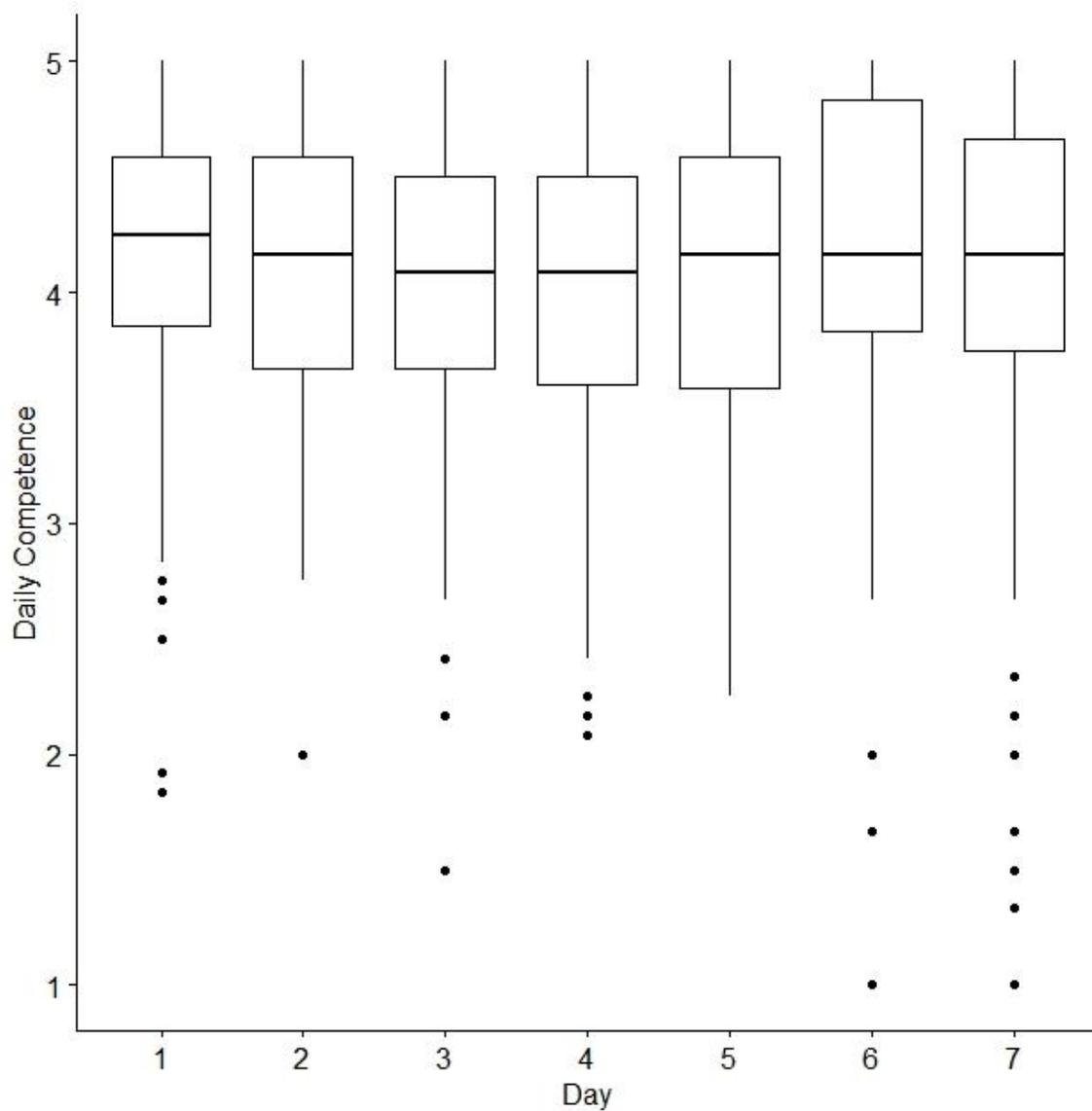
*Results of Tukey HSD analysis of daily differences in autonomy*

Days	Difference	Lower CI (95%)	Upper CI (95%)	Adjusted <i>p</i> -value
2-1	0.021	-0.211	0.253	1.000
3-1	-0.045	-0.277	0.188	0.998
4-1	-0.034	-0.270	0.202	1.000
5-1	-0.001	-0.238	0.235	1.000
6-1	0.372	0.126	0.617	0.000
7-1	0.270	0.033	0.507	0.014
3-2	-0.066	-0.301	0.170	0.983
4-2	-0.055	-0.294	0.185	0.994
5-2	-0.022	-0.262	0.218	1.000
6-2	0.351	0.102	0.600	0.001
7-2	0.249	0.008	0.490	0.037
4-3	0.011	-0.229	0.251	1.000
5-3	0.044	-0.197	0.284	0.998
6-3	0.416	0.167	0.666	0.000
7-3	0.315	0.073	0.556	0.002
5-4	0.033	-0.211	0.277	1.000
6-4	0.405	0.153	0.658	0.000
7-4	0.304	0.059	0.549	0.005
6-5	0.373	0.119	0.626	0.000
7-5	0.271	0.026	0.516	0.020
7-6	-0.102	-0.356	0.153	0.901

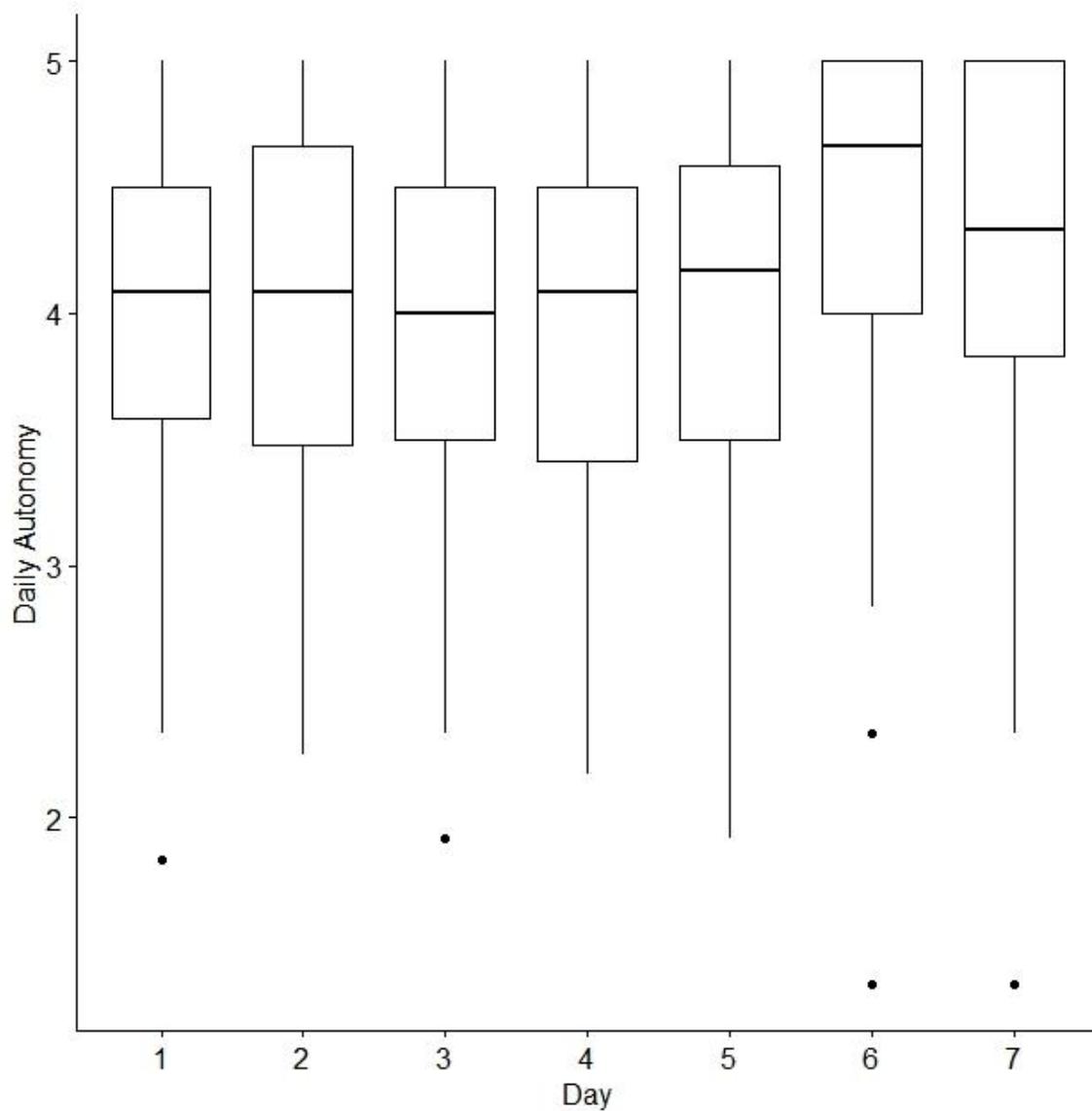
*Note:* Day 1=Monday, Day 2=Tuesday, Day 3=Wednesday, Day 4=Thursday, Day 5=Friday, Day 6=Saturday, Day 7=Sunday



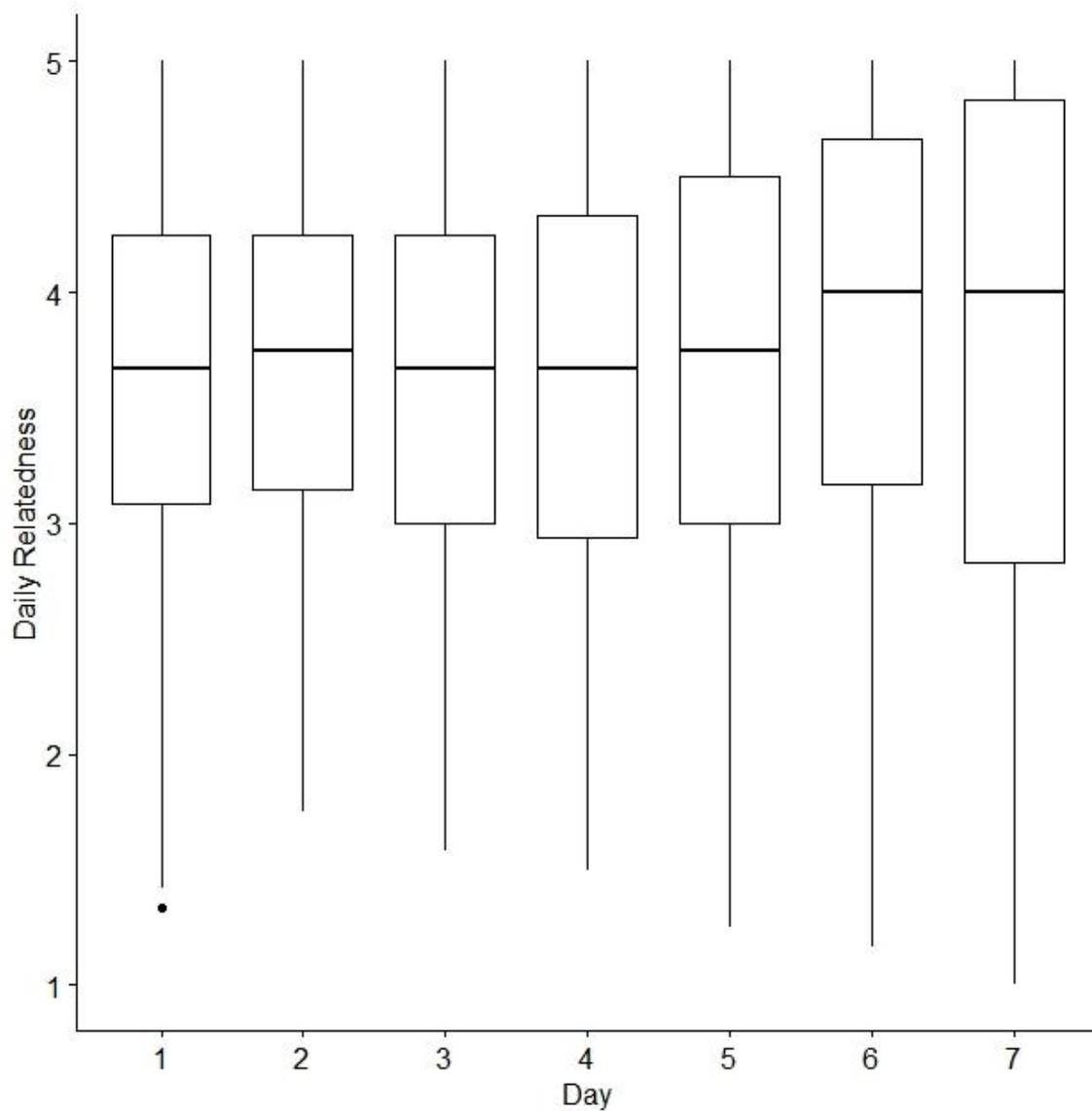
*Figure 1.* Work relatedness x nonwork flexibility interaction. Note: work relatedness and nonwork flexibility have been centered by their group means.



*Figure 1.* Average competence fulfillment by day of study. Note: Day 1=Monday, Day 2=Tuesday, Day 3=Wednesday, Day 4=Thursday, Day 5=Friday, Day 6=Saturday, Day 7=Sunday



*Figure 2.* Average autonomy fulfillment by day of study. Note: Day 1=Monday, Day 2=Tuesday, Day 3=Wednesday, Day 4=Thursday, Day 5=Friday, Day 6=Saturday, Day 7=Sunday



*Figure 3.* Average relatedness fulfillment by day of study. Note: Day 1=Monday, Day 2=Tuesday, Day 3=Wednesday, Day 4=Thursday, Day 5=Friday, Day 6=Saturday, Day 7=Sunday

## Appendix A

### Baseline Survey

Measure of work-family conflict: Work-Family Conflict Scale by Carlson, Kacmar, & Williams (2000)

Time based WIF

1. My work keeps me from my family activities more than I would like.
2. The time I must devote to my job keeps me from participating equally in household responsibilities and activities
3. I have to miss family activities due to the amount of time I must spend on work responsibilities

Time based FIW

4. The time I spend on family responsibilities often interferes with my work responsibilities
5. The time I spend with my family often causes me not to spend time in activities at work that could be helpful to my career
6. I have to miss work activities due to the amount of time I must spend on family responsibilities

Strain based WIF

7. When I get home from work I am often too frazzled to participate in family activities/responsibilities
8. I am often so emotionally drained when I get home from work that it prevents me from contributing to my family
9. Due to all the pressures at work, sometimes when I come home I am too stressed to do all the things I enjoy

Strain based FIW

10. Due to stress at home, I am often preoccupied with family matters at work
11. Because I am often stressed from family responsibilities, I have a hard time concentrating on my work.
12. Tension and anxiety from my family life often weakens my ability to do my job.

Behavior based WIF

13. The problem-solving behaviors I use in my job are not effective in resolving problems at home.
14. Behavior that is effective and necessary for me at work would be counterproductive at home.
15. The behaviors I perform that make me effective at work do not help me to be a better parent and spouse

Behavior based FIW

16. The behaviors that work for me at home do not seem to be effective at work.
17. Behavior that is effective and necessary for me at home would be counterproductive at work.
18. The problem-solving behavior that works for me at home does not seem to be as useful at work.

Work-Family Enrichment Scale by Carlson, Kacmar, Wayne, & Grzywacz  
(2006):

My involvement in my work \_\_\_\_\_

Work to family development

1. Helps me to understand different viewpoints and this helps me be a better family member

2. Helps me to gain knowledge and this helps me be a better family member

3. Helps me acquire skills and this helps me be a better family member

Work to family affect

4. Puts me in a good mood and this helps me be a better family member

5. Makes me feel happy and this helps me be a better family member

6. Makes me cheerful and this helps me be a better family member

Work to family capital

7. Helps me feel personally fulfilled and this helps me be a better family member

8. Provides me with a sense of accomplishment and this helps me be a better family member

9. Provides me with a sense of success and this helps me be a better family member

My involvement in my family \_\_\_\_\_

Family to work development

10. Helps me to gain knowledge and this helps me be a better worker

11. Helps me acquire skills and this helps me be a better worker

12. Helps me expand my knowledge of new things and this helps me be a better worker

Family to work affect

13. Puts me in a good mood and this helps me be a better worker

14. Makes me feel happy and this helps me be a better worker

15. Makes me cheerful and this helps me be a better worker

Family to work efficiency

16. Requires me to avoid wasting time at work and this helps me be a better worker

17. Encourages me to use my work time in a focused manner and this helps me be a better worker

18. Causes me to be more focused at work and this helps me be a better worker

### Daily Survey Items

What time frame represents your working hours today?

[Drop downs with start/end time worked]

What time frame represents your time outside of work today?

[Drop downs with start/end time outside of work]

Work-related Basic Need Satisfaction Scale by Van den Broek et al. (2010)  
Items have been slightly modified to be past tense

Competence

- I didn't really feel competent in my job
- I really mastered my tasks at my job
- I felt competent at my job
- I doubted whether I was able to execute my job properly
- I was good at the things I did in my job
- I had the feeling that I could even accomplish the most difficult tasks at work

Autonomy

- I felt like I could be myself at my job
- At work, I often felt like I had to follow other people's commands
- If I could choose, I would have done things at work differently
- The tasks I had to do at work were in line with what I really wanted to do
- I felt free to do my job the way I thought it could best be done
- In my job, I felt forced to do things I did not want to do

Relatedness

- I didn't really feel connected with other people at my job
- At work, I felt like part of a group
- I didn't really mix with other people at my job
- At work, I could talk with people about things that really matter to me
- I often felt alone when I was with my colleagues
- Some people I worked with are close friends of mine

Job Satisfaction by Judge, Bono, & Locke (2000)

- I felt fairly satisfied with my job
- Today I was enthusiastic about my work
- Work today seemed like it would never end
- I found real enjoyment in my work
- I considered my job to be rather unpleasant today

Non-Work-related Basic Need Satisfaction Scale

Adapted from Work-related Basic Need Satisfaction Scale by Van den Broek et al. (2010). Original scale items have been modified to be past tense and in reference to the individual's time outside of work

Competence

- I didn't really feel competent in my activities outside of work
- I really mastered my activities outside of work
- I felt competent at the things I did outside of work
- I doubted whether I was able to execute my activities outside of work properly
- I was good at the things I did outside of work
- I had the feeling that I could even accomplish the most difficult tasks outside of work

Autonomy

Autonomy

- I felt like I could be myself outside of work
- Outside of work, I often felt like I had to follow other people's commands
- If I could choose, I would have done things outside of work differently
- The tasks I had to do outside work were in line with what I really wanted to do
- I felt free to do things outside of work the way I thought they could best be done
- In my activities outside of work, I felt forced to do things I did not want to do

#### Relatedness

- I didn't really feel connected with other people outside of work
- Outside of work, I felt like part of a group
- I didn't really mix with other people in my activities outside of work
- Outside of work, I could talk with people about things that really matter to me
- I often felt alone when I was with people outside of work
- Some people I saw outside of work are close friends of mine

#### Non-Work Satisfaction

Adapted from the Job Satisfaction scale by Judge, Bono, & Locke (2000)

- I felt fairly satisfied with my activities outside of work
- Today I was enthusiastic about my activities outside of work
- My activities outside of work today seemed like they would never end
- I found real enjoyment in my activities outside of work
- I considered my activities outside of work to be rather unpleasant today

#### Demographics

What is your current age?

- 18-24
- 25-29
- 30-34
- 35-39
- 40-44
- 45-49
- 50-54
- 55-59
- 60-64
- 65-69
- 70+

With what gender do you identify?

- Male
- Female
- Other

Which best describes the industry of your occupation?

- Construction
- Education and health services
- Financial activities
- Information

- Leisure and hospitality
- Manufacturing
- Natural resources and mining
- Other services (except public administration)
- Professional and business services
- Trade, transportation, and utilities

Level of Education Completed:

- Some high school
- High school graduate
- Some college
- Trade/technical/vocational training
- College graduate
- Some post graduate work
- Post graduate degree

What best describes the time commitment of your current occupation?

- Part-time
- Full-time
- Other: \_\_\_\_\_

What best describes the compensation format of your current occupation?

- Hourly
- Salary
- Other: \_\_\_\_\_

Which best describes the consistency of your work schedule?

- Same schedule every week
- Times remain the same but the days vary
- Times vary but the days remain the same
- Entirely different schedule every week