8-2020

Break Interrupted: The Role of Interruptions to Work Breaks in Momentary Recovery Outcomes

Alyssa Michels

Break Interrupted: The Role of Interruptions to Work Breaks in Momentary Recovery Outcomes

by

Alyssa Michels

A thesis submitted to the College of Psychology and Liberal Arts of
Florida Institute of Technology
in partial fulfillment of the requirements
for the degree of

Master of Science
in
Industrial and Organizational Psychology

Melbourne, Florida
August, 2020

We the undersigned committee hereby approve the attached thesis,
"Break Interrupted: The Role of Interruptions to Work Breaks in Momentary Recovery Outcomes"

by

Alyssa Michels

_____

Gary Burns, Ph.D.
Professor and Program Chair
Industrial and Organizational Psychology
Major Advisor

_____

Keiron Hylton, J.D.
Assistant Professor
College of Business

_____

Patrick Converse, Ph.D.
Professor
Industrial and Organizational Psychology

_____

Lisa Steelman, Ph.D.
Dean and Professor
College of Psychology and Liberal Arts

Abstract

Title: Break Interrupted: The Role of Interruptions to Work Breaks in Momentary Recovery Outcomes

Author: Alyssa Michels

Advisor: Gary Burns, Ph.D.

Taking breaks at work can provide beneficial well-being and workplace outcomes through on-the-job recovery experiences, yet research suggests there may be specific break characteristics or individual differences influencing break effectiveness. In order to further elucidate the mechanisms contributing to the effectiveness of breaks during work hours, the present study examined the role interruptions to work breaks play in the relationship between work breaks and both recovery experiences and outcomes. Using an experience-sampling methodology, participants recorded three break experiences while at work. Results show work breaks predict a reduction in negative affect and that interruptions to these work breaks weaken this relationship. Moreover, results revealed the role of other break characteristics (i.e., preferred, effortful, and work-related break activities) in the recovery process (i.e., recovery experiences of psychological detachment, control, and relaxation) and subsequent outcomes (i.e., negative affect).

Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction

Employers often classify breaks at work as inappropriate and counterproductive uses of work time (Sackett & DeVore, 2001), yet with or without realizing it, employees often partake in various short activities throughout the work day to recover from daily job demands and stressors. Literature concerning recovery experiences during work hours has begun to elucidate the positive outcomes associated with work breaks; however, inconclusive results suggest this relationship is dynamic and complex, thus likely influenced by boundary conditions such as characteristics of the break or work setting and individual differences (Bosch et al., 2018; von Dreden & Binnewies, 2017; Hunter & Wu, 2016; Kim et al., 2016; Kuhnel et al., 2017; Rhee & Kim, 2016; Trougakos et al., 2014; Zacher et al., 2014; Trougakos et al., 2008). Uncovering the factors associated with optimal recovery following a work break will help researchers and organizations alike to better understand the dynamic nature of on-the-job recovery processes among employees. The present study begins to ascertain these factors by examining the influence interruptions to work breaks have on the relationship between work breaks and both recovery experiences and recovery outcomes.

The effort-recovery model sets forth that job demands are a result of effort expended without recovery, which in turn, produces physical and psychological strains (Demerouti, Bakker, Geurts, & Taris, 2009; Meijman & Mulder, 1998). When employees' expend effort on the job, stress systems are activated as an

adaptive mechanism accounting for acute load reactions to resource expenditure (Demerouti et al., 2009; van Hooff, Flaxman, Söderberg, Stride, & Geurts, 2018). Acute load reactions (e.g., elevated blood pressure, fatigue) require sufficient recovery to allow stress systems to return to pre-stress levels and avoid risks to health and well-being. Returning to or continuing to work without recovering from acute load reactions can increase demands on the stress system and result in chronic load reactions which are associated with chronic physical and mental health issues (Sonnentag & Geurts, 2009; van Hooff et al., 2018).

Recovery

Recovery has been examined using multiple perspectives, namely recovery as a process and recovery outcomes. The present study utilizes both these perspectives by examining recovery experiences *and* recovery outcomes. Examining recovery experiences allows for a deeper understanding of the process leading to a state of recovery, while examining recovery outcome variables (e.g., affect, fatigue) reveals the results of a successful state of recovery. Assessing recovery as a process focuses on the specific recovery experiences (e.g., relaxation) elicited during recovery activities (e.g., work breaks), which is important because it is often argued that it is the psychological experiences associated with said activities that are key for recovery (Sonnentag & Fritz, 2007; Sonnentag & Geurts, 2009). Four dimensions of recovery experiences: psychological detachment from work (i.e., mentally disengaging from job demands), control (i.e., the degree to

which employee can choose how to spend their recovery time), relaxation (i.e., decreased activation both mentally and physically), and mastery (i.e., learning something new or challenging) are conducive for recovery to occur (Sonnentag & Fritz, 2007). Mastery experiences may play more of a role in off-the-job recovery, as Sonnentag and colleagues (2017) point out short breaks while on-the-job may not be long enough for activities conducive to mastery experiences (e.g., practicing a new language).

Recovery as an outcome focuses on the results of a successful recovery state. Negative affect is an essential outcome variable in recovery literature for two reasons: 1) research shows negative affect significantly predicts the need for recovery, suggesting significant changes in affect occur between the start and end of recovery experiences and 2) both employee attitudes, such as satisfaction, emotional exhaustion, and turnover intentions (Thoresen, Kaplan, Barsky, Warren, & de Chermont, 2003), and employee work outcomes, such as productivity (Ferreira, da Costa, Cooper, & Oliveira, 2018) are associated with negative affect. Work breaks have the potential to weaken the relationship between work demands and strain reactions, such as negative affect (Kim, Park, & Niu, 2017), yet as I will show conflicting research on work breaks suggest more work is needed to determine factors that maximize these benefits. This study examines breaks in a natural work setting and assesses a potential situation-specific moderator (i.e., interruptions to breaks) to the recovery process, thus laying the groundwork for

determining the key boundary conditions that influence both recovery experiences and outcomes to inform a more nuanced understanding of on-the-job recovery.

To date, research on work recovery has largely focused on recovery experiences occurring *outside* of work, as opposed to during work, by examining recovery upon returning home from work each day, during vacations, or sabbaticals (Fritz, Ellis, Demsky, Lin, & Guros, 2013). This work has well established the fundamental need for recovery from work to maximize employee well-being, positive attitudes, and vigilance both on and off the job (Haluza, Schmidt, & Blasche, 2018; Binnewies, Sonnentag, Mojza, 2009a; Sonnentag, Mojza, Demerouti, Bakker, 2012; De Bloom, Kinnunen, & Korpela, 2015; for a review on recovery research, see Sonnentag, Venz, Casper, 2017). For example, in a diary study over one work week the state of being recovered in the morning, before work, was found to predict work engagement throughout the day (Sonnentag et al., 2012) and daily task performance, personal initiative, and organizational citizenship behaviors (Binnewies, Sonnentag, Mojza, 2009a).

Resource recovery, as it occurs through work breaks and other respites from work, are associated with outcomes such as emotional exhaustion (a key factor in burnout), job satisfaction, and organizational citizenship behavior (Hunter & Wu, 2016). To date, literature pertaining to momentary recovery experiences while at work have examined relationships between formal rest breaks at work (e.g., lunch breaks, voluntary work breaks, forced work breaks) and individual strain outcomes (e.g., fatigue, well-being, vigor), as well as individual work-related outcomes (e.g.,

job performance, engagement) (Sianoja, Kinnunen, de Bloom, Korpela, and Geurts, 2016; Rhee and Kim, 2016; Wendsche, Lohmann-Haislah, and Wegge, 2016; Bosch, Sonnentag, Pinck, 2018). The appropriate next step in work break literature should be to uncover the boundary conditions of beneficial work breaks.

Work Breaks

Taking a moment at work to chat with a coworker, shop online, check social media, grab a snack or drink, or simply daydream, are all events typically referred to as microbreaks or work breaks (Rhee & Kim, 2016; Kim, Park, & Niu, 2017). Work breaks such as these are often not encouraged by employers, thereby hindering the potential positive work-related outcomes of momentary recovery experiences, such as reducing emotional exhaustion and negative affect and increasing vigor and performance (Bosch, Sonnentag, Pinck, 2018, Rhee & Kim, 2016; Kim, Park, & Niu, 2017; Hennfng, Sauter, Salvendy, & Krieg, 1989). Work breaks offer employees the opportunity to actively engage in activities known to facilitate recovery, such as relaxing activities (e.g., gazing out the window, taking a short nap) and social activities (e.g., chatting with a co-worker, grabbing coffee with a friend) (Zhu et al., 2019; Tyler & Burns, 2008). Further examination of on-the-job recovery will help define when and how breaks at work are most effective (i.e., in terms of supporting recovery experiences and subsequent outcomes), thereby providing organizations with evidence on how to encourage optimal work breaks among employees, rather than discourage them altogether.

Breaks at work have been conceptualized in various ways, many of which often overlap. No clear consensus on how to define work breaks has been reached, and so in an effort to avoid confusion, I introduce the main conceptualizations below. Microbreaks are a type of rest-break occurring during work hours and include activities like chatting in the break room, writing a short to-do list, walking around the office, day dreaming, or stretching (Kim, Park, and Niu, 2017). Microbreaks are often categorized into four types of work breaks: relaxation (e.g., short nap, stretching), cognitive (e.g., reading a magazine, making personal plans), social (chats with coworkers about nonwork-related topics, checking personal social media accounts), and nutrition-intake (e.g., eating a snack, drinking coffee) (Kim, Park, and Niu, 2017). Social and relaxation microbreaks, but not nutrition or cognitive microbreaks, have been found to promote momentary recovery by counteracting the strains associated with increased job demands (Kim, Park & Niu, 2017). Yet, in an event-based model utilizing both pre- and post-break assessments to examine reduction in strain, all four types of microbreaks (i.e., social, relaxation, nutrition, and cognitive) significantly predicted decreases in fatigue and negative affect and increases in positive affect (Zhu, et al., 2019). The effect, if any, of break type when characterized as either social, relaxation, nutrition, or cognitive on strain is unclear.

Another conceptualization simply assesses whether breaks are work-related, preferred, and/or less-effortful (Hunter & Wu, 2016; Trougakos et al., 2008).

Hunter and Wu (2016) found only preferred breaks significantly predicted increases in resources and, thus decreases somatic symptoms (e.g., headaches or eyestrain). These results are not entirely supportive of the effort-recovery model as we would assume effortful breaks would require more resources and prevent deactivation of the stress system, thereby preventing recovery. It is possible other break characteristics or individual differences play a confounding role on effort here.

Other notable studies examining momentary recovery at work have conceptualized breaks as either work breaks or work-related strategies (Schulz, Bloom, & Kinnunen, 2017; Fritz, Lam, & Spreitzer, 2011; Zacher, Brailsford, & Parker, 2014). In this conceptualization, work breaks are defined as any social, relaxing, or nutrition-intake type activity that is not related to work or work tasks (e.g., gazing out the window) and work-related strategies are defined as those energy management activities that are related to work or work tasks (e.g., writing a to do list). Here, work breaks are often referred to as microbreaks although the conceptualization is slightly different from Kim and colleagues' (2017) definition of a microbreak, as cognitive activities are not included. A diary study that assessed break behaviors every hour across one work day found work breaks (i.e., microbreaks), as opposed to work-related strategies, negatively predicted fatigue and positively predicted vitality (Zacher, et al., 2014). Work-related strategies were more influential in long-term occupational well-being outcomes, such that those who generally partake in more work-related strategies typically report higher levels

of vitality. Thus, microbreaks seem more influential in short-term occupational well-being outcomes, while work-related strategies may offer more long-term outcomes (Zacher, et al., 2014). In contrast, Fritz and colleagues (2011) only found work-related strategies to predict vitality, and neither microbreaks nor work-related strategies to predict fatigue. These somewhat inconsistent results suggest other characteristics (i.e., of the person or the break) may be more important in influencing the effectiveness of work breaks in producing positive well-being outcomes.

Regardless of the conceptualization, moments where employees either consciously or unconsciously attempt to self-regulate their occupational well-being, occur often throughout an individual's work day. Nevertheless, little is known about the factors of work breaks that are instrumental in maximizing the potential recovery experiences and positive work-related outcomes that occur from such momentary recovery activities. The conceptualization to be used in examining breaks in the present study will be discussed further in the methods section, but for the purpose of providing a conclusive and coherent review, the term work breaks will be used to describe any of the above conceptualizations of momentary recovery activities carried out during work hours.

Work break outcomes. The momentary recovery outcomes associated with work breaks indicate successful detachment from work and job demands in an effort to replenish resources and recoup from strain. These momentary recovery

experiences have the potential to influence work-related outcomes such as burnout, job satisfaction (Thoresen, Kaplan, Barsky, Warren, & de Chermont, 2003), and productivity (Ferreira, da Costa, Cooper, & Oliveira, 2018). Inconclusive results among the existing research suggests there may be certain key components in determining how effective a work break will be in producing recovery experiences and outcomes.

An experimental study found momentary recovery after a break was only achieved if the break was long enough for "full" recovery to be obtained (Hennfng, Sauter, Salvendy, & Krieg, 1989). When discretionary, 10-minute breaks were encouraged during a work day, individuals who chose to end their break before recovery could be obtained exhibited a decrease in performance. It seems multiple breaks throughout the day may have the potential to increase performance and decrease errors, but only when breaks are long enough for full recovery to be reached (Hennfng et al., 1989). Yet, in an experimental study where participants were instructed to work in a setting with a view of a green roof with tall green grass and yellow flowers and take a 90 second break to look at the view before returning back to the task, results showed these breaks, as opposed to breaks looking at a plain roof, were associated with less effort expenditure and tension, and increased post-break performance (Lee et al., 2018) suggesting recovery can be achieved in short periods of time.

Not only does the length of the break seem to influence break effectiveness, but the time of the break also seems to matter. Work breaks in the afternoon, but not in the morning, were associated with increased engagement (Kühnel, Zacher, de Bloom, & Bledow, 2017). On the other hand, break activities that were preferred and taken earlier in the work shift were related to more resource recovery (Hunter & Wu, 2016). These inconsistencies concerning the timing and lengths of breaks and associated recovery outcomes underscore the need for further event-based designs to elucidate the within-person and between-person fluctuations in the recovery process and subsequent outcomes.

Individual differences and situation-specific characteristics seem to play a key role in day-level recovery processes suggesting breaks may be more effective under specific circumstances or for certain individuals. For example, in a sample of administrative employees break activities that were preferred predicted a decrease in somatic symptoms (e.g., headache, eyestrain, and lower back pain) through the mediating mechanism of post-break resources (Hunter & Wu, 2016). Contrary to the effort-recovery model, the degree to which employees found a break effortful on the other hand, had no significant influence on recovery outcomes. In order to completely rule out the possibility that effortful breaks have an influence on on-the-job recovery, we need to determine if these break characteristics predict recovery experiences, not outcomes alone.

Relaxation and control recovery experiences positively predict a state of recovery immediately after lunch breaks (Bosch, et al., 2018). It seems likely that characteristics of work breaks contribute to the degree to which they elicit perceived recovery experiences. Moreover, the effectiveness of cognitive microbreaks have shown inconsistent results (Kim, Park & Niu, 2017; Zhu et al., 2019), suggesting the degree to which break activities are related to work, as opposed to cognitively taxing, may play a more defining role. It could be that any break that allows for disengagement of job demands, even if cognitive resources are still being expended (e.g., completing a crossword puzzle), supports the recovery process and provides beneficial outcomes.

In terms of individual differences, literature on recovery off-the-job has determined compulsiveness at work, perfectionism, and perseverative cognition (e.g., worry and rumination) all tend to influence how post-respite recovery occurs but, these results are inconclusive (de Bloom, Radsta and Geurts, 2014; Flaxman, Menard, Bond, & Kinman, 2012). For example, vacations from work decrease ruminative cognitions and influence time spent on work upon return for both obsessive and non-obsessive workers. However, in terms of affective well-being obsessive workers showed a significantly steeper increase during vacation, yet a sharper decrease upon resumption of work, compared to non-obsessive workers (de Bloom, Radsta and Geurts, 2014). Thus, vacations for those who obsess over their work seem to have a stronger impact on affective well-being, while ruminative

thoughts and hours worked upon return are equally affected for both those obsessive and non-obsessive workers. Further, those higher in perfectionism saw a greater deterioration in well-being following return to work after respite, and this deterioration was mediated by preservative cognitions such as rumination about work during the respite (Flaxman, Menard, Bond, & Kinman, 2012). Workaholism has also shown significant, yet weak, effects on the relationship between negative emotions after work and recovery in the evening. These results suggest personality traits in conjunction with characteristics of the break may play an influential role in maximizing recovery experiences and positive post-break outcomes.

Researchers have begun to examine characteristics of breaks which may explain inconsistencies in post-break outcomes. In terms of lunch breaks, having experiences of control over the break and using the time to relax or relate to others through social activities were indirectly related to improved afternoon well-being, as determined through decreased exhaustion and increased work engagement in the afternoon, via replenished personal resources (Bosch, Sonnentag, & Pinck, 2018). Having control over break activities and engaging in relaxing experiences seem to be key factors in the likelihood that a break, be it lunch or otherwise, will result in recovery. Moreover, breaks that are not dissonant with an individual's initial and subsequent tasks can improve performance, for example physical exercise breaks result in an increase in motor performance because these experiences overlap (Santos, Ferreira, & da Costa Ferreira, 2019). Studies examining work breaks

should pay close attention to break activities and recovery experiences evoked, not simply the recovery outcomes, in order to understand the dynamic recovery process.

As discussed above, distinctions among break type, be it microbreak and work-related strategy, or even specific types of microbreaks, tend to influence the break and recovery relationship differently. For example, microbreaks, as opposed to work-related strategies, predicted fatigue and vitality in an hourly interval-based design lasting one day (Zacher et al., 2014). Physical microbreaks (e.g., stretching, some sort of physical activity) and work-related strategies (e.g., write a to-do list for work, set a work-related goal) show a positive relationship with general health and negative relationship with emotional exhaustion. While private microbreaks (e.g., interacting with someone about nonwork-related topics, listening to music) show no effect on neither general health nor emotional exhaustion (Schulz, Bloom, & Kinnunen, 2017). The inconsistencies in break type and associated recovery outcomes suggest the influence of individual differences or situation-specific break characteristics on the on-the-job recovery process. For example, an interruption to a break could change the recovery process and influences break effectiveness. Previous literature examining work breaks has yet to examine whether or not an individual's work break was interrupted, potentially muddying the results of these studies.

Within-day work break study designs. Existing research pertaining to work breaks typically utilizes some variation of experience sampling methodology including either an interval-based design, where participants are asked about their break activities retrospectively for a set interval, such as the past day or morning (i.e., Bosch et al., 2018; Kim et al., 2016; Kim et al., 2018; Kuhnel et al., 2017; Trougakos et al., 2014; Zacher et al., 2014), or an event-based design where participants are assessed on recovery outcomes immediately after the occurrence of a break (i.e., von Dreden & Binnewies, 2017; Hunter & Wu, 2016; Trougakos et al., 2008), or rarely, where participants are assessed immediately before and after the occurrence of a break (i.e., Zhu, Kuykendall, Zhang, 2019).

Extant literature in this area has been criticized for a lack of alignment between the study design and the underlying theoretical framework describing the processes of work breaks and subsequent recovery (see Zhu et al., 2019). The effort-recovery model sets forth that job demands result in an excess of effort and reduced resources without sufficient recovery which in turn, produces physical and psychological strains contributing to undesirable outcomes such as fatigue and negative affect (Demerouti, Bakker, Geurts, & Taris, 2009; Meijman & Mulder, 1998). Work breaks allow employees to detach from work and their job demands, allowing for resources to replenish and fatigue to diminish as a result of the break from job stressors. In order to accurately assess the relationship between work breaks and recovery outcomes through the theoretical framework of the effort-

recovery model, both pre- and post- break assessments of recovery outcomes are required to observe a reduction in strain reactions resulting from work breaks (Zhu et al., 2019).

Interruptions

Existing organizational research on interruptions focuses on interruptions to work, as opposed to interruptions to a breaks. In fact, work breaks are often considered interruptions to work (Jett & George, 2003). Interruptions are often conceptualized using the four-factor model (Jett & George, 2003) which classifies interruptions based on two key factors: the degree of multitasking that results from the interruption (i.e., sequential or concurrent) and the source of the interruption (i.e., external or internal).

The four types of interruptions as determined by the four-factor model (George & Jett, 2003) are intrusions, distractions, ruminations, and breaks. Intrusions are external interruptions that result in the withdrawal of one task prior to engagement with another (i.e., sequential multitasking), such as a request from a coworker. Intrusions to work explain strain over and above that of displaced time associated with said intrusion and have shown to explain variance in exhaustion, physical complaints, and anxiety over and above the influence of workload (Lin, Kain, & Fritz, 2013). Furthermore, interruptions from online messages (i.e., intrusions) predict negative affect via time pressure (Sonnentag et al., 2017). On the other hand, distractions are considered external interruptions associated with

simultaneous engagement of tasks, such as a nearby coworker's phone ringing. These events cause cognitive reactions where attention is divided concurrently between the primary task and the distraction (Jett & George, 2003). These types of interruptions are associated with decreased engagement toward the primary task as a result of the increased cognitive resources expended on reactions to outside stimuli. Consequently, distractions contribute to increased anxiety, somatic symptoms, and negative affect (i.e., psychological stress outcomes), and decreased positive affect (i.e., well-being) (Fletcher et al., 2018).

Ruminations are internal interruptions that induce concurrent multitasking, such as worrying about an upcoming deadline or meeting. Discrepancies are considered types of ruminations and like intrusions, partially shift cognitive resources and thus attention away from the primary task. Discrepancies occur when expectations about the task or environment are not met and thus, positively predict an increase in psychological stress outcomes and decrease in well-being (Fletcher et al., 2018; Thomsen, 2006). According to the four-factor model of interruptions, breaks are considered internal interruptions leading to sequential multitasking. Literature pertaining to on-the-job recovery examines breaks as positive influences to worker well-being and performance, as opposed to the four-factor interruption framework. Under the four-factor framework, work breaks are thought to be positively associated with psychological stress outcomes. It seems likely that both characteristics of the situation and individual differences determine the degree to

which a work break is helpful, rather than impeding. Moreover, considering interruptions at work are clear causes of strain, I believe interruptions to breaks will hinder the beneficial effects on recovery provided through work breaks.

Polychronicity, or a preference for multitasking, is a likely individual difference playing an important role in the degree to which a break is helpful as opposed to harmful to psychological stress outcomes, as well as whether or not an interruption to a break hampers the subsequent recovery experiences and outcomes (van Wijhe, Peeters, Schaufeli, & Ouweneel, 2013). Those with a predisposition and preference to multi-task may have a protective buffer to the potential negative influence of interruptions, be that to work or to work breaks. Moreover, personality traits such as agreeableness, extraversion, and emotional stability may too influence the work break recovery process. Exploratory analyses will be conducted to examine the role polychronicity and these other personality traits play in the recovery process and subsequent outcomes, as well as their influence on the impact of interruptions to work breaks on recovery (experiences and outcomes).

Chapter 2: Hypotheses

The present study posits break characteristics including preferred, effortful, and work-related breaks, as well as the presence of interruptions, to be associated with recovery experiences. I also set forth that interruptions to breaks influence the relationship between work breaks and reduced negative affect. Interruptions to work breaks should weaken this relationship, as break interruptions prevent full disengagement from demands and subsequent resource replenishment, thereby deterring the recovery process. I propose the following hypotheses:

Hypothesis 1a: Effortful breaks will be negatively related to recovery experiences (i.e., psychological detachment, control, and relaxation).

Hypothesis 1b: Preferred breaks will be positively related to recovery experiences.

Hypothesis 1c: Breaks that include work-related activities will be negatively related to recovery experiences.

Hypothesis 1d: Interruptions during work breaks will be negatively related to recovery experiences.

Hypothesis 2a: Work breaks will be associated with reduced negative affect.

Hypothesis 2b: Work breaks that are not interrupted will be more effective in reducing negative affect than work breaks that are interrupted.

Chapter 3: Methods

Participants

A total of 248 participants completed an initial HIT posted on Amazon's Mechanical Turk (MTurk). A HIT on Amazon's MTurk is essentially a survey link. In order to take part in the study, participants must indicate they work a full-time job and reside in North America. Following completion of the initial survey, participants were invited to three subsequent HITs where they were asked to record a break while at work. As incentive to participate, .25 cents was provided for each HIT the participants complete, with a .05 cents bonus for completing all four HITs. Completing the maximum amount of HITs for this study would equal to 105 cents.

In the final sample of break observations, 55 participants provided data for a total of 112 breaks observations and 224 observations of negative affect (i.e., pre- and post-break). Of the breaks examined, 30 were reported as being interrupted while the remaining 82 were not. The sample consisted of 38.2% males and 56.4% females, with the majority being between the ages of 35 and 44. On average, break surveys were completed in the morning (from 7:00 am - 11:59 am) and lasted 11 minutes.

Procedure

This study included one initial survey and three subsequent event-based observation surveys. The initial survey assessed demographics and control

variables, and established the procedure for reporting subsequent breaks in the following HITs. Participants were instructed to complete the initial survey and wait for subsequent HIT links, to be sent to their MTurk Worker ID, inviting them to the record three of their work breaks over the next few work days. Information on what constitutes a work break and the recording procedure was provided in both the initial survey and at the start of each break observation survey. For each recorded break observation, participants were instructed to open the HIT immediately before the start of the break and complete the pre-break section of the survey. This HIT window remained open as they took their break. Upon returning to work from a break, the participant completed the post-break section of the survey. This results in one completed event-based pre-post break observations.

Measures

Work break characteristics. Work breaks were assessed using a total of five items. Break length was asked in terms of minutes. The Qualtrics survey also had an embedded page timer, unbeknownst to the participant, which automatically tracked how long an individual was on the "break" page of the survey. This allowed us to compare self-reported break length with actual break length in order to analyze only accurate responses. Following Hunter and Wu (2016), participants were then asked to rate the following items as they pertain to their break on a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree): "I extended mental or physical effort on this activity (reverse coded)", "I prefer to engage in this activity",

"I thought about or talked about work during this activity" (reverse coded), each assessing effortful, preferred, and work-related break characteristics, respectively. A final item, "Did you interact with anyone during this break?" was asked in a dichotomous, "yes" or "no" format.

To assess interruptions to work breaks, a 6-item measure was developed and adapted using Fletcher and colleagues' (2018) short interruption to work scale (based on Jett & George, 2003 framework). The most relevant items were selected and adapted to refer to interruptions to breaks as opposed to interruptions to work, and were framed to reflect the previous work break as opposed to a general time frame. Three dimensions of work break interruptions: intrusions, distractions, and discrepancies were assessed with two items each. See Appendix A for a list of items.

Recovery experiences. Following Bosch and colleagues (2018), recovery experiences were assessed using a truncated and adapted version of the Recovery Experience Questionnaire (REQ, Sonnentag & Fritz, 2007). One item from each of the three dimensions of recovery experiences were used: psychological detachment, "I forgot about work during this break", relaxation, "I used the time during my break to relax", and control, "I took care of things the way that I wanted to during my break" on a 5-point scale (1 = strongly disagree; 5 = strongly agree).

Affect. Following Zhu and colleagues (2019), negative affect was measured using two items (i.e., upset and irritable) from PANAS (Watson, Clark, & Tellegen,

1988) and one item (i.e., anxious) from Job-Related Affective Well-Being Scale (Van Katwyk, Fox, Spector, & Kelloway, 2000). All items were measured on a 5-point scale (1 = strongly disagree; 5 = strongly agree).

Personality. Agreeableness, Extraversion, and Emotional Stability was measured using the IPIP-NEO scale (Goldberg et al., 2006; Johnson, 2014). See Appendix B for list of items. Polychronicity was be measured using the 14-Item Multitasking Preference Inventory developed by Poposki and Oswald (2010). See Appendix C for list of items.

Chapter 4: Analysis and Results

Break observation surveys were included for analysis if they met the following criteria: 1) the survey break timer indicated a break of at least 45 seconds and 2) the survey break timer and the self-reported break duration were different by no more than 5 minutes. Each break observation survey had a built-in, automatic timer within Qualtrics that started when participants were on the "break" page of the survey. The participants were not aware of this automatic break page timer. Break observations were removed from analysis if participants were on this page for less than 45 seconds, indicating a break of less than 45 seconds and therefore careless or insufficient effort responding. In the post-break portion of the survey, participants were asked to self-report the length of their break. Break observations where participants' self-reported break time was different than the Qualtrics page timer by greater than 5 minutes were removed from analysis. Of the original 259 break observations, 147 were removed based on this criteria.

In the final sample, 55 participants provided data for a total of 112 breaks observations and 224 observations of negative affect (i.e., pre- and post-break). Of the 112 breaks examined, 30 were reported as being interrupted while the remaining 82 were not. The sample consisted of 38.2% males and 56.4% females, with the majority being between the ages of 35 and 44. On average, break surveys were completed in the morning (from 7:00 am - 11:59 am) and lasted 11 minutes. Of the total 55 participants, 19 completed only one break observation, 18

completed 2 break observations, and 18 completed 3 beak observations. Of the 36 participants who took multiple breaks, 27 of these breaks were taken within the same day (w an average time of 4 hours between each within-day work break) and 57 breaks were taken on different days. Descriptive statistics for all study variables can be found in Table 1.

Table 1.
Descriptive Statistics for Pre-break Negative Affect, Post-break Negative Affect, Break Interruptions, Recovery Experiences, Effortful Breaks, Preferred Breaks, and Work-related breaks

Variable	*M*	*SD*
Pre-break NA	1.70	.76
Post-break NA	1.40	.58
Break Interruptions	1.28	.68
Recovery Experiences	3.97	.96
Relaxation	3.78	1.16
Psychological Detachment	4.07	.97
Control	4.11	1.05
Effortful Breaks	2.15	1.25
Preferred Breaks	3.38	1.21
Work-related Breaks	2.01	1.22
Break Duration (in seconds)	658.31	385.05

Note. $n = 55$. NA = Negative Affect.

In this study, break observations were nested within individuals. A multilevel approach for data analysis was used due to this nested data structure, and as such, all Level 1 variables were grand mean centered. Centering predictors allows for a more intuitive interpretation of regression coefficients, specifically regarding interactions. Further, when main effects and interactions are combined multicollinearity, or a high correlation between two predictors, becomes an issue and affects the standard errors. By grand-mean centering, interpreting the

regression coefficients becomes easier and more accurate, as multicollinearity can be alleviated. Although there has been contention regarding whether grand-mean or group-mean centering should be used, the literature shows both methods are effective in alleviating issues of multicollinearity (Kreft, de Leeuw, & Aiken, 1995) and grand-mean centering has often been the recommended default (Finch, Bolin, & Kelley, 2019; Hox, 2002). In using grand-mean centering, I was better able to compare the individuals to one another across the entire sample. Group-mean centering would have resulted in an interpretation that is slightly different, conceptually, as this compares individuals to one another within the same group, not the entire sample (Finch, Bolin, & Kelley, 2019).

The between-individual variances (ICC) for recovery experiences and negative affect were 22.6 % and 27.4% respectively. This suggests while both recovery experiences and negative affect have stable aspects, there is also a considerable amount of variable aspects as well suggesting a multilevel approach is appropriate for data analysis.

Effects of Break Characteristics on Recovery Experiences

Hypotheses 1a – 1d were tested by regressing recovery experiences on effort expended during the break, preference for break activity, work-related break activities, and interrupted break activities, individually. I first compared null models without predictors to determine if the intercepts should be allowed to vary. Results indicated that allowing intercepts to vary across participants only

marginally improved model fit, $\chi 2$ (1) = 2.98, p = .08. Although not significant at the .05 level, intercepts were allowed to vary as I tested each hypothesis in separate analyses.

Recovery experiences were significantly related to effortful breaks, such that as effort expended during the break increased, recovery experiences decreased (b = -.29, SE = .07, p < .001). Recovery experiences were significantly related to preferred breaks, such that recovery experiences increased when break activities were preferred by the employee (b = .27, SE = .07, p < .001). Recovery experiences were significantly related to work-related break activities, such that recovery experiences decreased when work breaks were more work -related (b = -.16, SE = .07, p = .037). Recovery experiences were significantly related to interruptions to breaks, such that recovery experiences decreased when interruptions to breaks increased (b = -.84, SE = .10, p < .001). These results support hypothesis 1a, 1b, 1c, and 1d.

Effects of Taking a Break on Negative Affect

To test if there was a reduction in negative affect before and after breaks, I used the mean difference for fixed occasions model from Lischetzke and colleagues (2015).

Level 1 (within-person level):

$$Y = \pi_0 + \pi_1^*(\text{POST})$$

Level 2 (person level):

$$\pi_0 = b_{00} + R_0$$

$$\pi_{\mathbf{1}} = b_{10} + R_1$$

In this model the varying intercept term, π_0, refers to individuals pre-break negative affect scores. The varying slope term, π_1, represents the difference between individuals pre-break and post-break negative affect (i.e., post-break minus pre-break). Specifically, β_{00} represents mean levels of pre-break negative affect across individuals and R_0 represents the deviation of individual scores to the mean. To model the difference between the average pre-break and post-break negative affect scores, dummy variables representing post-break scores were created, coded 0 for pre-break and 1 for post-break. The average pre-/post-break difference for negative affect are significantly different from each other when β_{10} is significant, with R_1 representing the deviation of individual scores from the mean difference between pre-/post-break negative affect.

Similar to the analyses with recovery experiences, I first tested to see if intercepts should be allowed vary. Results indicated that allowing intercepts to vary significantly improved model fit, $\chi 2$ (1) = 21.16, $p < .001$. Adding in the dummy coded variable described above, the average difference between pre-break negative affect scores was significantly different from post-break negative affect scores (b_{10}= -.29, *SE* = .08, $p < .001$), supporting hypothesis 2a, which predicted that taking a break results in a reduction in negative affect.

To examine differential effectiveness of work breaks I introduced interruptions, a variable describing breaks, as a potential moderator of break effectiveness. Two dummy variables were created to represent three different groups of scores: pre-test scores, post-test scores from breaks that were interrupted, and post-test scores from breaks that were not interrupted. Dummy variable 1 was coded 0 for pre-test scores and breaks that were interrupted and 1 for breaks that were not interrupted. This dummy variable represents the mean difference between pre-/post-break scores for breaks that were not interrupted. Dummy variable 2 was coded 0 for pre-break scores and scores from breaks that were not interrupted and 1 for breaks that were interrupted. This dummy variable represents the mean difference between pre-/post-break scores for breaks that were interrupted. When interruptions to breaks are included in the model, the average difference between pre-break negative affect scores was significantly different from post-break negative affect scores when breaks were not interrupted (b_{10}= -.36, *SE* = .08, $p <$

.001), but this difference was not significant when breaks were interrupted (b_{20}= -.12, *SE* = .12, *p* = .341). A one-tailed t-test (Cohen et al., 2013) found the regression coefficient for interrupted breaks was significantly smaller than the regression coefficient for non-interrupted breaks, *t*(110) = 1.71, *p* = .04. Thus, hypothesis 2b was supported. Interrupted breaks were not effective at lowering negative affect.

Exploratory Analyses with Personality Variables

In order to facilitate an exploratory analysis of the effects of personality characteristics on break effectiveness, I shifted from a focus on the mean difference between pre-/post-break occasions model back to a simple regression framework focusing only on post-break negative affect as the dependent variable while controlling for pre-break negative affect. Results indicated that allowing intercepts to vary across participants significantly improved model fit, $\chi 2$ (1) = 5.05, *p* = .025. Allowing these intercepts to vary, I individually tested if agreeableness, extraversion, emotional stability, and polychronicity were related to post-break negative affect after controlling for pre-break negative affect. In these analyses only extraversion was related to post-break negative affect (β = -.55, *SE* = .19, *p* = .005).

Next, I examined if any of these personality variables moderated the impact of interruptions on NA. The level of interruptions was positively related to post-break negative affect, after controlling for pre-break negative affect (β = .18, *SE* = .06, *p* = .004). Although allowing the slope of interruptions to vary did not

significantly improve model fit, $\chi 2$ (1) = 2.20, p = .33, I proceeded with the exploratory analyses. None of the interactions were significant, suggesting that the impact of interruptions on post-break negative affect was constant across these individual differences after controlling for pre-break negative affect.

Switching to reported recovery experiences, these analyses were replicated. As reported above, interruptions were negatively related to recovery experiences (β = -.84, SE = .10, $p < .001$); additionally, allowing this slope to vary significantly improved model fit, $\chi 2$ (1) = 32.37, $p < .001$. Results indicated that all four personality traits had significant interactions with interruptions in predicting recovery experiences. This pattern of significant results existed even after controlling for pre-break negative affect. Results are presented in Table 2. Based on the pattern of results, all four variables worked as a buffer to reduce the negative effects of interruptions on recovery experiences. That is, when participants were high in agreeableness, extraversion, emotional stability, or polychronicity, interruptions had less of a negative impact on recovery. The strongest effects were observed for extraversion and the slopes plotted at one standard deviation above and below the mean for all four personality variable interactions are presented in Figures 1-4.

Table 2.
Interaction between Personality and Break Interruptions with Recovery Experiences

	Agreeableness		Extraversion		Emotional Stability		Polychronicity	
Variable	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*
Intercept	5.95	1.21	8.57	1.55	7.15	1.15	14.75	3.86
Personality	-0.30	0.41	**-1.03**	0.49	-0.70	0.41	**-0.91**	0.37
Interruptions	**-2.83**	0.54	**-4.70**	0.87	**-3.09**	0.50	**-9.72**	1.77
Interaction	**0.66**	0.18	**1.15**	0.26	**0.76**	0.17	**0.83**	0.17

Note. $n = 55$. Coefficients in bold are significant at the $p < .05$ level, two tailed.

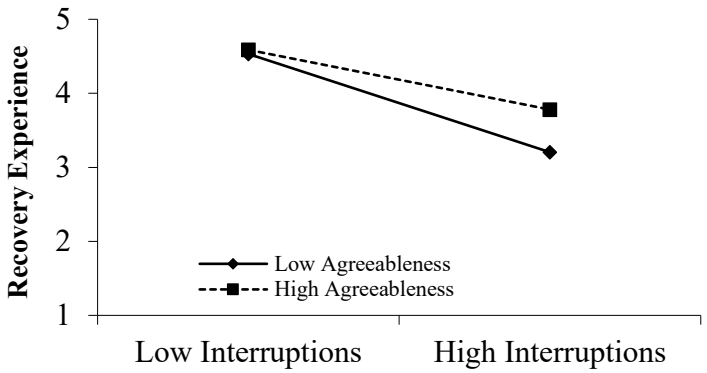

Figure 1. *Interaction between Agreeableness and Break Interruptions with Recovery Experiences*

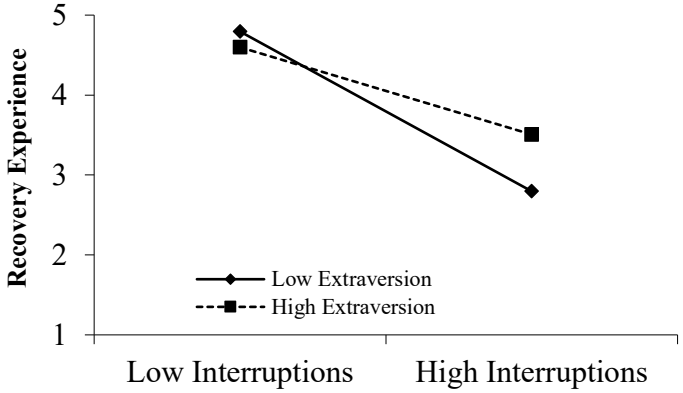

Figure 2. *Interaction between Extraversion and Break Interruptions with Recovery Experiences*

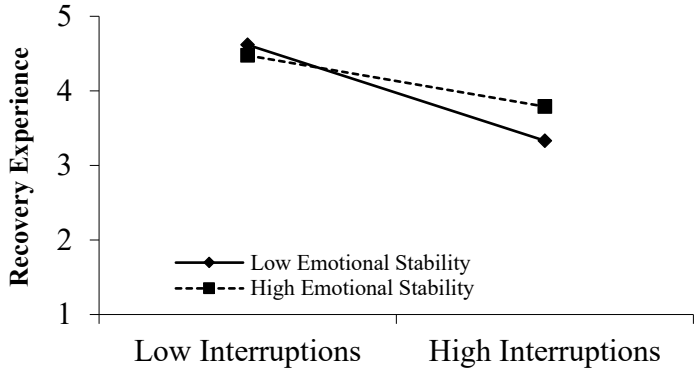

Figure 3. *Interaction between Emotional Stability and Break Interruptions with Recovery Experiences*

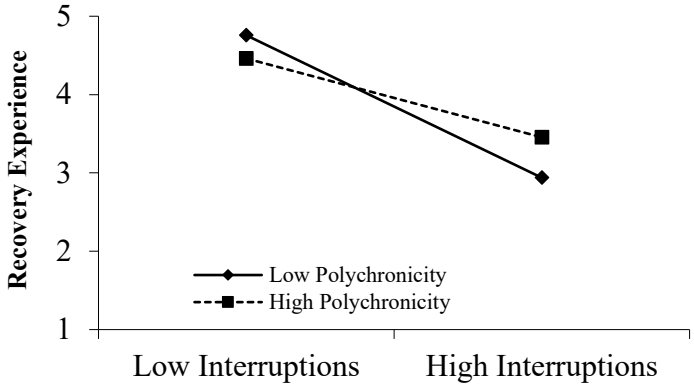

Figure 4. *Interaction between Polychronicity and Break Interruptions with Recovery Experiences*

I also conducted an exploratory analysis to determine the role break duration (in secs) played in the relationship between work breaks and recovery experiences and found this relationship was non-significant (b = .0002, SE = .0002, p = .237). In the final recovery analysis, I added all three break characteristics, interruptions, and break duration. In this analysis effort (b = -.15, SE = .07, p = .027) and interruptions (b = -.66, SE = .11, p < .001) were negatively related to recovery experiences but preference (b = .22, SE = .06, p < .001) and duration (b = .0004, SE = .0001, p = .04) were positively related to recovery experiences.

Chapter 5: Discussion

The present study found on-the-job work breaks as an effective means to both enhance opportunities for recovery experiences and decrease negative affect. Negative affect showed a significant decrease between time 1 (pre-break) and time 2 (post-break). Moreover, in line with results from Hunter and Wu (2016), who found only preferred breaks to predict decreases somatic symptoms, I found that as preference for break activities increased, recovery experiences increased and negative affect reduced. On the other hand, contrary to Hunter and Wu (2016), I found significant results regarding the influence of effortful breaks. Specifically, as effort expended during a break increases, recovery experiences decreased. These results are in line with the effort-recovery model, positing that as effort increases so does strain which ultimately results in a need for recovery.

Interestingly, effortful breaks did not have an influence on post-break negative affect once pre-break negative affect was controlled for. It seems effortful breaks may positively influence some aspects of recovery (e.g., recovery experiences), but not others (e.g., recovery outcomes such as reduced somatic symptoms or negative affect). Similar results were found for work-related activities, which were found to decrease recovery experiences, yet had no significant effects on negative affect. Taken together, these results suggest that supervisors should encourage employees not only to take breaks, but to partake in

break activities they prefer and, if possible, activities that are not related to work nor require much effort, in order to get the most out of their breaks.

Interruptions to breaks were shown to reduce the positive outcomes of breaks. Specifically, breaks that were interrupted did not show the same reduction in negative affect and increases in recovery experiences as did breaks that were not interrupted. This is an especially important finding because while the current literature has begun to establish that on-the-job recovery can improve performance, engagement, well-being, and somatic symptoms of strain (Kim et al., 2018; Hunter & Wu, 2016; Zacher et al., 2014; Zhu et al., 2019), the boundary conditions to these positive outcomes are unknown. This study found interruptions to breaks to be a significant boundary condition which negates the positive effect of breaks on negative affect and recovery experiences. Further complicating this, the exploratory analyses with the personality variables indicated that there was systematic variability across participants that was related to stable individual differences. These results suggest the need for more defined and controlled work break environments available to employees. Encouraging boundaries and respect for others time while opposing the need for instant response and feedback, can help to decrease the amount of breaks interrupted by work tasks. In turn, this helps adjust the way work breaks are seen by employers because it enhances the likelihood that breaks taken by employees be effective. Understanding the influence of break characteristics on the dynamic nature of the recovery processes will help

organizations accommodate and encourage the idea that work breaks are in fact beneficial and not counterproductive.

Strengths and Limitations

This study does come with a few limitations, one being the sample size. A larger number of participants and break observations would have allowed for a more informative and reliable examination of breaks and recovery, and would also have enabled us to more adequately examine the moderating influence of specific personality variables to relationships examined in this study. Another limitation was the significant number of break observations excluded from data analysis due to insufficient effort or careless responding. Experiential studies examining breaks must take care to include mechanisms within surveys to detect participant faking, such as reporting a break length longer than the actual break time or reporting multiple breaks back to back in an effort to receive study participation rewards. Measuring breaks as they occur naturally throughout the day comes with difficulties, as requiring participants to essentially adapt their break activity in such a way that allows for both a pre-break and post-break assessment may in itself dampen the effects of the break by producing more demands for the individual. Further, the exploratory analyses section regarding post-break negative affect utilizes a data analysis structure that does not account for the multi-level, pre-/post-break data structure. I still report these results because I was able to control for pre-break levels of negative affect when running these analyses.

Theoretically, this study furthers our understanding of which break characteristics are conducive to recovery experiences as well as positive post-break outcomes. Examining within-person variance in interruptions to breaks at work and subsequent recovery experiences and outcomes allowed us to determine how unexpected changes to a work break influence the effectiveness of said work break in facilitating recovery. This study was the first of its kind to examine the role interruptions to breaks play in on-the-job recovery, and is just the beginning of uncovering the characteristics that define whether or not a break is effective.

Methodologically, examining work breaks in a sample of Amazon Mechanical Turk (MTurk) workers allowed us to reach a broad range of individuals coming from a wide variety of backgrounds, occupations, and industries to provide a more generalizable sample. Further, existing studies in this area have yet to formally examine potential moderators to the relationship between work breaks and recovery experiences and or outcomes using an experience sampling methodology. What is more, only one other published study examines work breaks using an experience sampling method that assesses recovery both pre- and post-break (Zhu et al., 2019), and thus effectively tests the effort-recovery model in on-the-job recovery. As discussed, this method more effectively adheres to the theoretical framework of the effort-recovery model, which suggests in order to accurately understand the momentary recovery processes at work, an assessment of strain

reduction through measurement points before and after activities aimed at recovery is essential (Zhu et al., 2019).

Conclusion

The present study provides support for work breaks as a method to reducing negative affect on-the-job, and increasing experiences of recovery. The finding that interruptions can negatively influence recovery experiences and outcomes resulting from a work break suggests there are situational characteristics that are important factors determining how effective a break may be. Further research examining breaks and person characteristics will help to discover other key boundary conditions to break effectiveness, ultimately informing proper on-the-job recovery processes. Moreover, examining the role an individual's job demands, job satisfaction, and engagement play in the relationship between breaks and recovery outcomes will help us to better understand the recovery process and the factors that influence our need for recovery while at work and our ability to become recovered during a work break.

References

Bakker, A. B., Sanz-Vergel, A. I., Rodríguez-Muñoz, A., & Oerlemans, W. G. M. (2015). The state version of the recovery experience questionnaire: A multilevel confirmatory factor analysis. *European Journal of Work and Organizational Psychology*, *24*(3), 350–359. https://doi.org/10.1080/1359432X.2014.903242

Binnewies, C., Sonnentag, S., & Mojza, E V A J. (2009a). Daily performance at work: Feeling recovered in the morning as a predictor of day-level job performance. *Journal of organizational behavior*, 304(1), 67-93.*30*(1009), 67-93.

Binnewies, C., Sonnentag, S., & Mojza, E. J. (2009). Feeling recovered and thinking about the good sides of one's work. *Journal of Occupational Health Psychology, 14*(3), 243-256. doi:10.1037/a0014933

Blasche, G., Pasalic, S., Baub ock, V. M., Haluza, D., & Schoberberger, R. (2017). Effects of rest-break intention on rest-break frequency and work-related fatigue. *Human Factors, 59*(2), 289-298. doi:10.1177/0018720816671605

Bosch, C., Sonnentag, S., & Pinck, A. S. (2018). What makes for a good break? A diary study on recovery experiences during lunch break. *Journal of Occupational and Organizational Psychology, 91*(1), 134-157. doi:10.1111/joop.12195

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2013). *Applied multiple regression/correlation analysis for the behavioral sciences.* Routledge.

de Bloom J., Kinnunen, U., & Korpela, K. (2015). Recovery processes during and after work: Associations with health, work engagement, and job performance. *Journal of Occupational and Environmental Medicine, 57*(7), 732-742. doi:10.1097/JOM.0000000000000475

de Bloom, J., Radstaak, M., & Geurts, S. (2014). Vacation Effects on Behaviour, Cognition and Emotions of Compulsive and Non-compulsive Workers: Do Obsessive Workers Go 'Cold Turkey'?. *Stress and Health, 30*(3), 232-243.

de Bloom, J., Sianoja, M., Korpela, K., Tuomisto, M., Lilja, A., Geurts, S., & Kinnunen, U. (2017). Effects of park walks and relaxation exercises during lunch breaks on recovery from job stress: Two randomized controlled trials. *Journal of Environmental Psychology, 51*, 14-30. doi:10.1016/j.jenvp.2017.03.006

Demerouti, E., Bakker, A. B., Geurts, S. A., & Taris, T. W. (2009). Daily recovery from work-related effort during non-work time. In *Current perspectives on job-stress recovery* (pp. 85-123). Emerald Group Publishing Limited.

Ferreira, A. I., da, C. F., Cooper, C. L., & Oliveira, D. (2018). How daily negative affect and emotional exhaustion correlates with work engagement and presenteeism-constrained productivity. *International Journal of Stress Management,* doi:http://dx.doi.org.portal.lib.fit.edu/10.1037/str0000114

Finch, W. H., Bolin, J. E., & Kelley, K. (2019). *Multilevel modeling using R.* Crc Press.

Fletcher, K. A., Potter, S. M., & Telford, B. N. (2018). Stress outcomes of four types of perceived interruptions. *Human factors, 60*(2), 222-235.

Fritz, C., Ellis, A. M., Demsky, C. A., Lin, B. C., & Guros, F. (2013). Embracing work breaks. recovering from work stress. *Organizational Dynamics, 42*(4), 274-280. doi:10.1016/j.orgdyn.2013.07.005

Fritz, C., Lam, C. F., & Spreitzer, G. M. (2011). It's the little things that matter: An examination of knowledge workers' energy management. *Academy of Management Perspectives*, *25*(3), 28-39.

Goldberg, L. R., Johnson, J. A., Eber, H. W., Hogan, R., Ashton, M. C., Cloninger, C. R., & Gough, H. C. (2006). The International Personality Item Pool and the future of public-domain personality measures. *Journal of Research in Personality, 40*, 84-96.

Helton, W. S., & Russell, P. N. (2017). Rest is still best: The role of the qualitative and quantitative load of interruptions on vigilance. *Human Factors, 59*(1), 91-100. doi:10.1177/0018720816683509

Hennfng, R. A., Sauter, S. L., Salvendy, G., & Krieg, E. F. (1989). Microbreak length, performance, and stress in a data entry task. *Ergonomics*, *32*(7), 855–864. https://doi.org/10.1080/00140138908966848

Hox, J. (2002). Quantitative methodology series. *Multilevel analysis techniques and applications.* Mahwah, NJ, US: Lawrence Erlbaum Associates Publishers.

Hunter, E.M.; Wu, C. (2016) Give me a better break: Choosing workday break activities to maximize resource recovery. *Journal of Applied Psychology, 101*(2), 302-311. doi:10.5465/AMBPP.2013.

International Personality Item Pool: A Scientific Collaboratory for the Development of Advanced Measures of Personality Traits and Other Individual Differences (http://ipip.ori.org/). Internet Web Site.

Jett, Q. R., & George, J. M. (2003). Work interrupted: A closer look at the role of interruptions in organizational life. *Academy of management Review*, *28*(3), 494-507.

Kim, S., Park, Y., & Headrick, L. (2018). Daily micro-breaks and job performance: General work engagement as a cross-level moderator. *Journal of Applied Psychology, 103*(7), 772-786. doi:http://dx.doi.org.portal.lib.fit.edu/10.1037/apl0000308

Kim, S., Park, Y., and Niu, Q. (2017) Micro-break activities at work to recover from daily work demands. *J. Organiz. Behav.*, 38: 28–44. doi: 10.1002/job.2109.

Kreft, I. G., De Leeuw, J., & Aiken, L. S. (1995). The effect of different forms of centering in hierarchical linear models. *Multivariate behavioral research, 30*(1), 1-21.

Kühnel, J., Zacher, H., de Bloom, J., & Bledow, R. (2017). Take a break! Benefits of sleep and short breaks for daily work engagement. *European Journal of Work and Organizational Psychology*, *26*(4), 481–491. https://doi.org/10.1080/1359432X.2016.1269750

Lee, K. E., Williams, K. J. H., Sargent, L. D., Williams, N. S. G., & Johnson, K. A. (2015). 40-second green roof views sustain attention: The role of micro-breaks in attention restoration. *Journal of Environmental Psychology*, *42*, 182–189. https://doi.org/10.1016/j.jenvp.2015.04.003

Lin, B. C., Kain, J. M., & Fritz, C. (2013). Don't interrupt me! An examination of the relationship between intrusions at work and employee strain. *International Journal of Stress Management, 20*(2), 77.

Lischetzke, T., Reis, D., & Arndt, C. (2015). Data-analytic strategies for examining the effectiveness of daily interventions. *Journal of Occupational and Organizational Psychology, 88*(3), 587-622.

Rhee, H., & Kim, S. (2016). Effects of breaks on regaining vitality at work: An empirical comparison of 'conventional' and 'smart phone' breaks. *Computers in Human Behavior, 57*, 160-167. doi:10.1016/j.chb.2015.11.056

Sackett, P. R., & DeVore, C. J. (2001). Counterproductive behaviors at work. In. N. Anderson, DS Ones, HK Sinangil, & C. Viswesvaran (Eds.). *Handbook of industrial, work and organizational psychology* (145-164).

Sianoja, M., Kinnunen, U., Bloom, J., Korpela, K. & Geurts, S. (2016). Recovery during Lunch Breaks: Testing Long-Term Relations with Energy Levels at Work. *Scandinavian Journal of Work and Organizational Psychology,* 1, 1-12. 10.16993/sjwop.13.

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

Sonnentag, S., Mojza, E. J., Demerouti, E., & Bakker, A. B. (2012). Reciprocal relations between recovery and work engagement: the moderating role of job stressors. Journal of Applied Psychology, 97(4), 842.

Sonnentag, S., Venz, L., & Casper, A. (2017). Advances in recovery research: What have we learned? What should be done next?. *Journal of Occupational Health Psychology*, *22*(3), 365.

Sonnentag, S., Venz, L., & Casper, A. (2017). Journal of occupational health psychology advances in recovery research: What have we learned? What should be done next? Advances in recovery research: What have we learned? What should be done next? *Journal of Occupational Health Psychology, 22*(3), 365-380. doi:10.1037/ocp0000079

Thomsen, D. K. (2006). The association between ruminations and negative affect: A review. Cognition and Emotion, 20, 1216–1235. http://dx.doi .org/10.1080/02699930500473533

Trougakos, J. P., & Hideg, I. (2009). Momentary work recovery: The role of within-day work breaks. In *Current perspectives on job-stress recovery* (pp. 37-84). Emerald Group Publishing Limited.

Trougakos, J. P., Beal, D. J., Green, S. G., & Weiss, H. M. (2008). Making the break count: An episodic examination of recovery activities, emotional experiences, and positive affective displays. *Academy of Management Journal, 51*(1), 131-146.

Trougakos, J. P., Hideg, I., Cheng, B. H., & Beal, D. J. (2014). Lunch breaks unpacked: The role of autonomy as a moderator of recovery during lunch. *Academy of Management Journal, 57*(2), 405-421.

Tyler, J. M., & Burns, K. C. (2008). After depletion: The replenishment of the self's regulatory resources. *Self and Identity*, 7(3), 305-321.

van Hooff, M. L., Flaxman, P. E., Söderberg, M., Stride, C. B., & Geurts, S. A. (2018). Basic psychological need satisfaction, recovery state, and recovery timing. *Human Performance, 31*(2), 125-143.

Van Katwyk, P. T., Fox, S., Spector, P. E., & Kelloway, E. K. (2000). Using the Job-Related Affective Well-Being Scale (JAWS) to investigate affective responses to work stressors. *Journal of Occupational Health Psychology, 5*(2), 219-230.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*(6), 1063-1070.

Wendsche, J., Lohmann-Haislah, A., & Wegge, J. U. (2016). The impact of supplementary short rest breaks on task performance – A meta-analysis. *Sozialpolotik,*, 1-24. doi:10.18753/2297-8224-75

Zacher, H., Brailsford, H. A., & Parker, S. L. (2014). Micro-breaks matter: A diary study on the effects of energy management strategies on occupational well-being. *Journal of Vocational Behavior, 85*(3), 287-297. doi:10.1016/j.jvb.2014.08.005

Zhu, Z., Kuykendall, L., & Zhang, X. (2019). The impact of within-day work breaks on daily recovery processes: An event-based pre-/post-experience sampling study. *Journal of Occupational and Organizational Psychology*, *92*(1), 191–211. https://doi.org/10.1111/joop.12246

Appendix

Appendix A

Break Interruption Measure

Intrusion

1. Other people prevented me from enjoying my break.

2. Unexpected demands from others stopped me from enjoying my break.

Distraction

3. Nearby coworker conversations distracted me from my break.

4. A noise or other distraction interrupted my break.

Discrepancy

5. I had a plan of action for my break, but things changed unexpectedly.

6. An unexpected demand threw off my original plan for my break.

Items are rated on a 6-point scale (1: Never; 2: Very Rarely; 3: Rarely; 4: Occasionally; 5: Frequently; 6: Very Frequently).

Appendix B

IPIP-NEO

Emotional Stability

10-item scale (Alpha = .86)

+ keyed	Often feel blue.
	Dislike myself.
	Am often down in the dumps.
	Have frequent mood swings.
	Panic easily.
– keyed	Rarely get irritated.
	Seldom feel blue.
	Feel comfortable with myself.
	Am not easily bothered by things.
	Am very pleased with myself.

Extraversion

10-item scale (Alpha = .86)

+ keyed	Feel comfortable around people.
	Make friends easily.
	Am skilled in handling social situations.
	Am the life of the party.
	Know how to captivate people.
– keyed	Have little to say.
	Keep in the background.
	Would describe my experiences as somewhat dull.
	Don't like to draw attention to myself.
	Don't talk a lot.

Agreeableness

10-item scale (Alpha = .77)

+ keyed	Have a good word for everyone.
	Believe that others have good intentions.
	Respect others.
	Accept people as they are.
	Make people feel at ease.
– keyed	Have a sharp tongue.
	Cut others to pieces.

Suspect hidden motives in others.
Get back at others.
Insult people.

Appendix C

14-Item Multitasking Preference Inventory

1. I prefer to work on several projects in a day, rather than completing one project and then switching to another.

2. I would like to work in a job where I was constantly shifting from one task to another, like a receptionist or an air traffic controller.

3. I lose interest in what I am doing if I have to focus on the same task for long periods of time, without thinking about or doing something else.

4. When doing a number of assignments, I like to switch back and forth between them rather than do one at a time.

5. I like to finish one task completely before focusing on anything else. (R)

6. It makes me uncomfortable when I am not able to finish one task completely before focusing on another task. (R)

7. I am much more engaged in what I am doing if I am able to switch between several different tasks.

8. I do not like having to shift my attention between multiple tasks. (R)

9. I would rather switch back and forth between several projects than concentrate my efforts on just one.

10. I would prefer to work in an environment where I can finish one task before starting the next. (R)

11. I don't like when I have to stop in the middle of a task to work on something else. (R)

12. When I have a task to complete, I like to break it up by switching to other tasks intermittently

13. I have a "one-track" mind. (R)

14. I prefer not to be interrupted when working on a task. (R) (.41)

Note. Items followed by (R) are reverse-scored. Numbers in parentheses following each item represent corrected item-total correlations.