TAKE BETTER BREAKS: RELATIONSHIPS BETWEEN MICROBREAKS AND FATIGUE

by

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Abstract

Employee fatigue has a detrimental impact on job performance, physical health, and psychological distress. Work breaks are able to effectively reduce fatigue, but their efficacy depends on the type of activities employees engage in during the break (e.g., relaxation, nutrition intake, socialization, or cognitive activity breaks). This study intends to examine the efficacy of different microbreak activities, or short, informal break activities, at reducing three types of fatigue (e.g., physical, mental, and emotional fatigue). These findings will provide new information about effective and ineffective types of breaks to take to reduce fatigue, which can be shared with employees to help build better break-taking practices.

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Introduction

Employee fatigue has a detrimental impact on job performance, physical health, and psychological distress (Dawson, Noy, Härmä, Åkerstedt, & Belenky, 2011). Thus, it is critical for employees to effectively cope with and efficiently recover from fatigue both at the end of the workday and during the workday. Work breaks can reduce fatigue by restoring psychological resources that are drained during the workday (Meijman & Mulder, 1998). Although the work break literature shows that breaks can effectively reduce fatigue, not all breaks are equally effective. For example, taking a break to listen to music or drink a cup of coffee can relieve employee fatigue (Chen, Sugi, Shirakawa, Zou, & Nakamura, 2008; Kennedy & Scholey, 2004; Maridakis, O'Connor, & Tomporowski, 2009). However, using a lunch break to prepare for upcoming work tasks has the opposite effect, increasing fatigue (Trougakos, Hideg, Cheng, & Beal, 2014).

While relationships between some types of breaks (e.g., lunch breaks or evenings after work) and fatigue have been explored in past research (Trougakos et al., 2014; Winwood, Bakker, & Winefield, 2007), relationships between microbreaks, or short breaks taken during the workday (Fritz, Ellis, Demsky, Lin, & Guros, 2013), and fatigue still require investigation. Specifically, one area in need of research is the identification of microbreak activities that are effective at reducing fatigue. To answer this question, the type of fatigue, such as physical, mental, or emotional, (Frone & Tidwell, 2015) also needs to be specified, as the types of break activities that effectively reduce fatigue may vary across types of fatigue. For instance, nutrition intake breaks may be more likely to reduce physical fatigue than emotional fatigue. It is even possible that, in some cases, taking the wrong type of break will increase fatigue. The aim of this study is to align effective break

activities with specific types of fatigue. A better understanding of the relationships between break content and types of fatigue can help develop best practices in taking short, but effective breaks throughout the workday, which can be shared with employees.

COR Theory and the Effort-Recovery Model

Conservation of resources (COR) theory describes the process of experiencing stress (Hobfoll, 1989). According to this model, stress results from the loss, or potential loss, of psychological resources as a result of resource-depleting demands. Such resources are defined as "objects, personal characteristics, conditions, or energies" that a person values or that help a person attain other valued resources (Hobfoll, 1989, p.516). When exposed to stressors, people activate and utilize resources in an effort to minimize the threat. Job demands constitute one such threat to psychological resources. When demands outweigh available resources, job demands can lead to stress and fatigue. Employees are therefore motivated to seek out resource maintenance or recovery strategies to assuage the strain caused by work tasks (Frone & Tidwell, 2015; Hobfoll, 1989).

Similarly, Meijman and Mulder's (1998) effort-recovery theory proposes that employees exert effort in response to work demands, and that continuous effort can drain employees of their resources (e.g., energy, concentration, and motivation), resulting in stress. Again, this resource depletion can be prevented if the employee engages in some type of recovery strategy that restores resources (Fritz et al., 2013; Hunter & Wu, 2016; Kim, Park, & Niu, 2016).

Both effort-recovery and COR theory assert the importance of maintaining resources for psychological and physical health. Employees may restore or replace resources using various strategies, such as finding shortcuts for a demanding project,

reinterpreting job demands as challenges, or taking a break from work tasks (Fritz et al., 2013; Frone & Tidwell, 2015; Hobfoll, 1989). As the next section will discuss in more detail, work breaks are associated with employee well-being outcomes, suggesting that breaks from work successfully restore resources (Fritz et al., 2013).

Work Breaks

Work breaks may be defined as times when employees are not engaged in work tasks. This time away is critical to the successful and accurate completion of work, as it allows workers to replenish resources that were drained while attending to work demands (Hunter & Wu, 2016). Work breaks may refer to vacations, days off, time after work, or breaks taken during the workday (Fritz et al., 2013). Thus, work breaks vary on characteristics such as length, frequency, and location (Hunter & Wu, 2016; Kim et al., 2016).

Breaks also vary based on activities performed during the break (Hunter & Wu, 2016; Kim et al., 2016). For example, Trougakos and Hideg (2009) labeled some break activities "respites" and others "chores." Respite activities are characterized as activities that employees prefer to engage in and require low effort. Respite breaks are able to restore resources by temporarily pausing the strain of attending to work demands and allowing employees to enjoy themselves. Other break activities are "chores," or effortful activities that continue to require resources and thus do not facilitate recovery. Socializing with friends may be a respite activity, whereas running errands during a break may be a chore depending on the effort required and the employee's preference for each activity (Trougakos & Hideg, 2009).

Microbreaks. The focus of this study will be relatively brief breaks taken during

the workday, which are often referred to as microbreaks (Fritz et al., 2013). Unlike a formally scheduled lunch break, microbreaks are very short, informal breaks that employees take throughout the workday (Fritz et al., 2013). For instance, an employee might pause his or her work tasks to get a cup of coffee, take a short nap, or chat with a coworker (Kim et al., 2016). Even these brief pauses from work tasks can critically improve employee well-being and performance. Microbreaks have been shown to increase vitality and vigor, decrease fatigue in the short term (Bennett, 2015; Zacher, Brailsford, & Parker, 2014), increase attention (Bennett, 2015; Mijović et al., 2015), reduce discomfort (McLean, Tingley, Scott, & Rickards, 2001), and increase employee engagement and commitment (Rzeszotarski, Chi, Paritosh, & Dai, 2013).

Microbreak activities. Although microbreaks have been related to positive work outcomes and are clearly pertinent to understanding recovery at work, not all microbreaks are alike, and therefore their potential to restore resources is not alike. Employees may engage in an array of activities during a microbreak. Some activities are specific to a job, such as targeted stretching microbreaks for surgeons (Park et al., 2016) or firefighters removing their gear and consuming cold beverages during a short break (Mani et al., 2013). Other microbreak activities include watching a funny video, reading a comic (Rzeszotarski, Chi, Paritosh, & Dai, 2013), or smoking a cigarette (Fritz et al., 2013). Smoking a cigarette differs from watching a funny video or reading a comic, however, in that it is detrimental to physical health (Fritz et al., 2013). We may therefore expect that a smoking microbreak would impact physical recovery differently than the other two microbreak activities. Accordingly, it is important to differentiate between types of microbreak activities when investigating the influence of microbreaks on employee well-being (Fritz et al., 2013).

Recent studies from Kim, Park, and Headrick (2015) and Kim et al. (2016) identified four categories of microbreak activities based on past research: relaxation, nutrition intake, socialization, and cognitive activity. The researchers examined relationships among these four types of microbreak activities and positive and negative affect. Relaxation, socialization, and cognitive activity breaks were positively related to positive affect. Furthermore, relaxation and socialization breaks were negatively related to negative affect, while cognitive activity breaks were positively related to negative affect, and there was no significant relationship for nutrition intake breaks. However, caffeine intake, a type of nutrition intake, did have a negative relationship with negative affect (Kim et al., 2015; Kim et al., 2016).

These studies provide evidence that relaxation and socialization microbreaks improve employee well-being by reducing negative affect and increasing positive affect. Their influence on affect is a potential indicator that relaxation and socialization breaks effectively restore psychological resources. The results for cognitive activity and nutrition intake microbreaks were inconsistent, suggesting that other factors influence the effect that these types of breaks have on employee outcomes. Taken as a whole, the results suggest that the effects of microbreaks on workplace outcomes do indeed depend on the nature of the break. These four activity categories will be the focus of this study. Furthermore, given that the outcomes examined in these recent studies were limited to affect, it is prudent and timely to expand the focus to other outcomes.

Breaks and Fatigue

Fatigue is a state of low energy that reduces an individual's ability to attend to stimuli or tasks (Frone & Tidwell, 2015). Because employee fatigue is a precursor to more

serious consequences, including reductions in performance and physical health problems (Dawson et al., 2011), it is important to find ways to reduce and prevent fatigue among employees. In line with the effort-recovery model and COR theory, job demands drain resources, resulting in fatigue (Meijman & Mulder, 1998; Sonnentag & Zijlstra, 2006). Heavy job demands, including long hours, high demand to work during off-work time, and perceived work overload have been related to fatigue among employees (Macky & Boxall, 2008), which presents a need for recovery.

As discussed previously, employees have the opportunity to restore resources during work breaks, as the removal of job demands allows recovery processes to occur (Fritz et al., 2013). Recovery may occur because employees on break have the opportunity to detach from job tasks, thereby reducing fatigue. Detachment refers to "refraining from job-related activities and mentally disengaging from work during time off the job" (Sonnentag & Fritz, 2015, p. S72), which is possible during work breaks and critical to recovery. Detachment from work in the evening has been shown to decrease employee fatigue, while failing to sufficiently detach from work predicts fatigue (Sonnentag & Bayer, 2005; Sonnentag, Binnewies, & Mojza, 2008).

The role of detachment suggests that the relation between break activities and fatigue is complex. This complexity is apparent in the way that some break activities reduce fatigue while others increase fatigue. For instance, watching funny videos during a short work break reduces fatigue (Bennett, 2015), as do other lunch break activities that employees consider relaxing (Trougakos et al., 2014). On the other hand, engaging in work tasks during a lunch break increases fatigue (Trougakos et al., 2014). Likewise, Hunter and Wu (2016) found that mentally or physically demanding work break activities do not

facilitate resource recovery. Hence, the relationship between taking a work break and feeling fatigued depends on the characteristics of activities one participates in during the break, such as the potential to detach during an activity.

The Present Study

Although links between other types of work breaks and fatigue have been explored in past research, relatively little research has examined the relationships between microbreak activities and fatigue. The little research that exists suggests that even these short breaks are related to meaningful decreases in employee fatigue. Indeed, microbreaks are related to lower fatigue, as well as increased vigor, attention, and vitality (Bennett, 2015; Zacher et al., 2014). Additionally, Chen et al. (2008) found that relaxing to music during microbreaks related to decreases in mental fatigue. These results suggest that microbreaks are a viable strategy for offsetting the resource drain that accumulates throughout the workday, resulting in fatigue. However, not all microbreaks are equally effective. Thus, if employees intend to take microbreaks that minimize fatigue, knowledge of the types of microbreak activities that facilitate recovery from fatigue is essential. Understanding the differences between activities that facilitate or hinder recovery is critical to choosing better break activities.

Another emerging area of research is type of fatigue. Recent literature has identified different subtypes of fatigue, but predictors of these subtypes still require investigation. By identifying relationships between subtypes of fatigue and other variables, like break type, recommendations may be devised for eliminating the type of fatigue that is most prevalent in a specific situation. For instance, physical fatigue is more likely to result from manual labor, whereas mental fatigue is more likely to occur during cognitively loaded tasks.

Therefore, identifying break activities that reduce physical fatigue would be more relevant for the former, whereas activities that reduce mental fatigue would be more relevant for the latter type of tasks. Thus, to the extent that types of break activities may reduce different types of fatigue, it is useful to discriminate between types of fatigue.

The Fatigue Questionnaire is one example of a measure that separates fatigue into subtypes; namely, the measure distinguishes between physical and mental fatigue (Neuberger, 2003). More recently, Frone and Tidwell (2015) introduced an additional type of work fatigue, emotional fatigue, in their measure. Their subtypes – physical, mental, and emotional fatigue – are based on literature that defines fatigue in terms of resource loss in these three domains. Physical fatigue is the result of exerting muscle movement. Prolonged cognitive activity drains mental resources and results in mental fatigue (Boksem & Tops, 2008). Finally, emotional fatigue results from the expression and regulation of emotions (Frone & Tidwell, 2015).

As research in this area has only recently begun to focus on the content of fatigue, this area is not well understood. However, it is clear that not all breaks are beneficial for reducing fatigue, and it is likely that break types differentially relate to fatigue types. Thus, the present study will examine the effects of specific types of microbreak activities on physical, mental, and emotional fatigue. The specific expected relations will be described next.

Relaxation breaks and fatigue. According to the COR and effort-recovery theories, when employees are not attending to work demands, the resource loss that accompanies these demands is put on hold. During this time, employees can recover (Hobfoll, 1989; Meijman & Mulder, 1998). By their nature, relaxation breaks require low

effort and therefore provide an opportunity for employees to detach and recover from work during the workday. These low-effort activities are likely perceived as respites, relieving employees of the resource-draining demands of their work.

Evidence suggests that this is, indeed, the case. Relaxation-based stress management training has been shown to effectively reduce work-related stress (Van der Klink, Blonk, Schene, & Van Dijk, 2001), and relaxing to music reduces mental fatigue (Chen et al., 2008). Sherman (2004) similarly suggests that relaxing activities like meditating or taking a nap may strengthen emotional and physical health. Furthermore, relaxing break activities like taking a stroll around the office, or daydreaming, are related to lower negative affect and higher positive affect (Kim et al., 2015; Kim et al., 2016). Because relaxation activities appear to reduce various forms of strain, Hypotheses 1a, 1b and 1c predict that relaxation breaks will be negatively related to all three subtypes of fatigue.

Hypothesis 1a: Relaxation breaks will be negatively related to mental fatigue.

Hypothesis 1b: Relaxation breaks will be negatively related to physical fatigue.

Hypothesis 1c: Relaxation breaks will be negatively related to emotional fatigue.

Nutrition intake breaks and fatigue. Effort-recovery theory posits that the expenditure and loss of physiological resources, such as nutritional resources, accumulate and lead to negative health effects (Meijman & Mulder, 1998). COR theory similarly makes the point that resource drain can occur in different domains (Hobfoll, 1989), which may include nutrition. Nutrition intake breaks, which include food and drink consumption, may assist in the recovery of these physiological resources. However, there is not a strong theoretical link between nutrition intake and mental or emotional resources.

Kim et al. (2016) found that caffeine intake, but not nutrition intake as a whole, was related to reduced negative affect, and other studies have related caffeine intake to decreased physical and mental fatigue (Kennedy & Scholey, 2004; Maridakis et al., 2009). While caffeine may reduce physical and mental fatigue, carbohydrate intake has had mixed associations with fatigue (Maridakis et al., 2009). Given the association between caffeine intake, which is included in nutrition intake, and reduced mental fatigue, Hypothesis 2a predicts that nutrition intake will have a negative relationship with mental fatigue. Furthermore, in line with the connection between physical resources and nutrition intake, Hypothesis 2b predicts that nutrition intake breaks will be negatively related to physical fatigue. Due to the absent theoretical and empirical link between nutrition intake and emotional fatigue, no relationship is hypothesized for emotional fatigue.

Hypothesis 2a: Nutrition intake breaks will be negatively related to mental fatigue.

Hypothesis 2b: Nutrition intake breaks will be negatively related to physical fatigue.

Socialization breaks and fatigue. Research examining relations between socialization work breaks and employee well-being has had inconsistent results. Socializing during microbreaks is associated with lower negative affect and higher positive affect (Kim et al., 2015; Kim et al., 2016), and engaging in social activities during evenings after work can reduce fatigue (Winwood et al., 2007). However, some research has indicated that social activities after work or during lunch breaks may actually increase or have no effect on fatigue (Rook & Zijlstra, 2006; Trougakos et al., 2014). Consistent with these mixed results, Aaronson, Pallikkathayil, and Crighton (2003) reported that most working adults believe that social support protects against fatigue, but some employees believe that social support adds to their fatigue.

The mixed past results for socialization breaks highlight the need for further research and clearer theory. Effort-recovery theory notes that social relationships in the workplace factor into work demands, which in turn influence mental resource drain and recovery (Meijman & Mulder, 1998). COR theory similarly identifies social support as a resource that can be helpful or harmful to one's mental or emotional state, depending on situational context of the social interaction (Hobfoll, 1989). The research suggests that socializing during breaks typically restores resources, although this may not always be the case. However, socializing does not directly affect physical resources, and therefore, may not relate to physical fatigue. Thus, Hypotheses 3a and 3b predict that socialization breaks will be negatively related to mental and emotional fatigue, while no relationship is predicted for physical fatigue.

Hypothesis 3a: Socialization breaks will be negatively related to mental fatigue.

Hypothesis 3b: Socialization breaks will be negatively related to emotional fatigue.

Cognitive activity breaks and fatigue. Unlike the other types of breaks discussed previously, cognitive activity breaks, such as reading a book or making plans for after work, do not enable employees to disengage. Instead, their brains remain "turned on" throughout the break, thereby continuing to use resources and preventing restoration. Mental resources are required for these breaks, and expending those resources is straining (Hobfoll, 1989; Meijman & Mulder, 1998). Hence, cognitive activity breaks are likely to increase, rather than reduce fatigue.

This assumption is supported by the finding that work-based lunch activities, requiring greater cognitive processing, increase fatigue (Trougakos et al., 2014). Moreover, research has shown that cognitive processing hinders recovery from a physical endurance

task (Mehta & Agnew, 2012). Thus, Hypotheses 4a and 4b predict positive relationships between cognitive activity breaks and mental and physical fatigue. Given the lack of connection between cognitive activities and emotional resources, no relationship is predicted between cognitive activities and emotional fatigue.

Hypothesis 4a: Cognitive activity breaks will be positively related to mental fatigue.

Hypothesis 4b: Cognitive activity breaks will be positively related to physical fatigue.

Hypotheses 1a-4b are depicted in Table 1. The full hypothesized model is displayed in Figure 1.

Method

Participants

Over the course of 7 weeks, a sample of 371 participants was recruited to take a survey on work breaks and fatigue. Participants were directly messaged by the researcher on their personal Facebook, LinkedIn, and email accounts. The survey was additionally posted by the researcher on student group pages on Facebook and LinkedIn, as well as the researcher's Facebook and LinkedIn pages. Those invited to participate in the survey were asked to forward the survey to any contacts who met the participation criteria. The invitation specified that participants must be at least 18 years old and currently employed.

Participants who did not meet the inclusion criteria (aged 18 and older, and employed for at least 6 months in their current job) were eliminated from the dataset. Out of 371 original responses, 27 participants were excluded from analyses for not meeting the criteria of employment for 6 months. Another 33 participants were excluded for not meeting the age criterion, either because they fell below the age of 18 or did not report age.

An additional 23 participants were excluded for working fewer than 20 hours per week. Finally, 28 participants were excluded for working at their most recent job for less than 6 months, and another 32 participants were excluded for missing data, leaving 228 participants for the final analyses.

The average age of the analysis sample was 35.52 years (*SD* = 12.75). On average, participants worked 41.58 hours per week (*SD* = 9.70). Frequencies were calculated to examine employment schedule, race, and gender in the sample. The largest percentage of participants, 67.5%, reported that their primary work schedule for their primary job over the last 6 months was a regular daytime shift. Additionally, the majority of participants, 88.2%, indicated that they were Caucasian/White, and 55.3% of the sample was female. Demographic information can be found in Table 2.

Procedures

Participants were directly contacted by the researcher through the researcher's personal Facebook, LinkedIn, and email accounts. Those contacted received an invitation to participate in an approximately 10-minute long survey on work breaks and fatigue, and were also asked to forward the survey to any contacts who met the participation criteria. The invitation specified that participants must be at least 18 years old and currently employed. Participants accessed the survey by clicking on a link in the electronic invitation. Clicking on the link directed participants to the electronic informed consent page where they provided consent by clicking the "next" button. Participants then responded to the survey items. A full copy of the survey can be found in Appendix A.

Measures

The survey consisted of a measure of microbreak activities, a measure of fatigue, and several demographic items (see Appendix A).

Microbreak activities. The extent to which participants engage in different types of microbreak activities (i.e., relaxation, nutrition intake, socialization, and cognitive activity) while at work was measured using nine items devised by Kim et al. (2016; see Appendix A). Relaxation, nutrition intake, and cognitive activity microbreaks were assessed by two items each, while three items assessed the frequency of socialization microbreaks. In the instructions for rating, participants were asked to consider "short, nonwork respite activities" that they pursued voluntarily during a typical workday (Kim et al., 2016) over the past 6 months. A 6-month timeframe was included to align with the minimum requirement for employment over the last 6 months in order for responses to be included in analyses. Participants were instructed to rate the nine items based on how often they engaged in the activities listed in each item. Items will be rated on a 5-point scale ranging from 1 (never) to 5 (very frequently).

Fatigue. Fatigue was measured using the scale created by Frone and Tidwell (2015; see Appendix A). The three subscales for physical ($\alpha = .96$), mental ($\alpha = .96$), and emotional ($\alpha = .97$) fatigue were each assessed by six items, resulting in 18 total items. Instructions described fatigue and informed participants that the following questions would refer to their physical, mental, and emotional fatigue experiences. Participants were provided with a definition for each subtype of fatigue and then instructed to rate each item based on how often it applied to their experiences over the last 6 months. These instructions were adapted from the measure's original instructions, which asked participants to consider

how often they were fatigued over the last 12 months, to fit the 6-month employment criteria for this study. Items were rated on a 5-point scale with “Never” and “Everyday” as endpoints.

Results

Means, standard deviations, and correlations for the microbreak and fatigue scales can be found in Table 3. All of the microbreak scales were intercorrelated except for relaxation and nutrition intake microbreaks, and all fatigue scales were intercorrelated as well. Between types of microbreaks and fatigue, only nutrition intake microbreaks were significantly related to fatigue, which is inconsistent with expectations. Nutrition intake microbreaks correlated with mental fatigue, $r = .15$, $p < .05$, emotional fatigue, $r = .15$, $p < .05$, and physical fatigue, $r = .14$, $p < .05$.

Figure 1 depicts the hypothesized model relating four types of microbreaks and three types of fatigue. Hypotheses were tested using MPlus version 7.11 (Muthén & Muthén, 2015). Responses from 228 participants were included in the analyses. Path analysis was used to test individual hypothesized relationships between variables. While initially the model was to be tested using structural equation modeling (SEM), the original model would not converge. Path analysis was therefore used in an attempt to stay true to testing the original hypotheses.

The chi-square test, root mean square error of approximation (RMSEA) and comparative fit index (CFI) were calculated to assess model fit. To indicate good model fit, chi-square should be nonsignificant. The chi-square results were significant, $\chi 2\ (192) = 543.96$, $p = 0$, suggesting that the present model is not a good fit. Similarly, the RMSEA (.09) indicates that the model is not a good fit, based on the standard for an RMSEA value

of .06 or lower to indicate good model fit. The CFI (.94) was likewise unable to meet the standard for a CFI value of .95 or above to suggest good model fit (Hu & Bentler, 1999).

To test the hypotheses, specific path estimates were examined. As can be seen in Figure 1, relaxation breaks were not significantly related to mental, physical, nor emotional fatigue, and so Hypotheses 1a-1c were unsupported. Hypotheses 2a-2b were unsupported in that nutrition intake breaks were not negatively related to mental or physical fatigue. However, nutrition intake breaks were significantly and positively related to mental, physical, and emotional fatigue. Socialization breaks were not related to mental or emotional fatigue, suggesting that Hypotheses 3a-3b were unsupported. Likewise, Hypotheses 4a and 4b were unsupported, as cognitive activity breaks were not related to mental or physical fatigue.

Discussion

While previous research has found relaxation, nutrition intake, socialization, and cognitive activity microbreaks relate to negative and positive affect (Kim et al., 2015; Kim et al., 2016), this study sought to extend the exploration of microbreak outcomes to fatigue. Because work breaks offer time in which employees can disengage from job demands (Sonnentag & Fritz, 2015), it was expected that most breaks, including relaxation, nutrition intake, and socialization microbreaks, would reduce some types of fatigue. Only cognitive activity microbreaks were expected to increase fatigue because they may demand psychological resources.

The results of this study did not support any of the hypothesized relationships between microbreaks and fatigue. Only nutrition intake microbreaks related to fatigue. Specifically, nutrition intake breaks were positively related to all three types of fatigue.

These significant correlations and path analysis results contradict the hypotheses that nutrition intake breaks would be negatively related to mental and physical fatigue.

The positive correlations between nutrition intake microbreaks and all three types of fatigue are surprising, given the expectation that snacking or drinking a beverage would recover resources. Previous research has linked caffeine intake, a subset of nutrition intake, to decreases in physical and mental fatigue (Kennedy & Scholey, 2004; Maridakis et al., 2009) and negative affect (Kim et al., 2016). On the other hand, carbohydrate intake has been related to increases in fatigue, although a combination of carbohydrate and caffeine intake has been related to decreases in fatigue (Maridakis et al., 2009). It may be that caffeine intake reduces fatigue, while other types of nutrition intake have the opposite effect.

While sources of nutrition are expected to recover resources, there may be a limit. Overeating or choosing unhealthy snacks may have a draining effect instead of an energizing one given the low nutritional value. Potentially damaging nutrition intake behaviors such as these may have a detrimental impact on physical, mental, and emotional resources. Therefore, some food and drink breaks may be associated with increases in fatigue. This study only examined the extent to which participants engaged in snacking and drinking caffeinated or non-caffeinated beverages at work. It did not examine the effects of eating a full meal or differentiate between the nutritional content of different types of snacks or beverages. Separate scales for caffeine intake and different types of snacks based on nutritional content could reveal different relationships with fatigue.

The other non-significant findings from the path analysis are likely related to a number of limitations to the study, detailed in the next section. However, an alternative

explanation is that these types of microbreaks are indeed unrelated to the three types of fatigue identified in this study. Previous research found that microbreaks were related to lower fatigue (Bennett, 2015), but did not distinguish between physical, mental, and emotional fatigue or relate these types of fatigue to different types of microbreaks. It is possible that microbreaks are simply more effective at improving affect, as discovered by Kim et al. (2015) and Kim et al. (2016), than they are at reducing fatigue. It may also be that types of microbreaks other than those identified in this study could be effective at reducing fatigue, or certain types of fatigue. The present study cannot determine whether these insignificant relationships were due to a true disconnect between microbreaks and fatigue or the specific limitations of this study.

Limitations

A number of limitations were present in this study, primarily relating to sampling and subsequent analyses. This study relied on a convenience sampling method, where the survey was sent to working adults connected to the researcher on social media who were asked to send the survey to their own connections. The sample may therefore have been biased according to characteristics that were shared among the researcher's connections.

Additionally, this study was limited to testing the model using path analysis rather than the originally proposed SEM analyses, as the model would not converge. The inability to converge appeared to be tied to the given model and measures, suggesting the need for an alternative conceptualization of breaks and fatigue that may allow these hypotheses to be tested using an SEM framework.

Future Directions

A replication of this study with alternative measures of microbreaks of fatigue may allow the original model proposed in this study to be tested in SEM. Furthermore, nutrition intake breaks could be separated to account for differences in caffeine intake and nutritional resources in different types of snacks and drinks, which could lead to an explanation for the unexpected positive relationships between nutrition intake breaks and fatigue discovered in this study. Future research may therefore look for other measures to use to test these hypotheses using SEM.

Correlations and path analyses in this study indicated that employees who spend more time snacking or drinking a beverage tend to experience more physical, mental, and emotional fatigue. Kim et al. (2016) did not find significant relationships between nutrition intake microbreaks and negative affect, but their subscale for caffeine intake indicated that caffeine intake reduces negative affect. Future studies relating nutrition intake to fatigue might specifically relate caffeine intake microbreaks to physical or mental fatigue to see if its relationship with types of fatigue differs in line with previous research when separated from other types of nutrition intake breaks. Additionally, what would be considered healthy snacks based on their nutrient content may be measured separately from unhealthy snacks and compared on their relationships with types of fatigue.

Conclusion

This study sought to determine the relationships between different types of microbreaks (i.e., relaxation, nutrition intake, socialization, and cognitive activity), and physical, mental, and emotional fatigue. A path analysis procedure did not support the hypotheses, although there were unexpected positive correlations between nutrition intake

microbreaks and all of the types of fatigue. This suggests the effects of nutrition intake breaks may be more complex than previously thought, and not all nutrition intake breaks are beneficial for reducing fatigue. Future research should investigate this further. Additionally, sampling issues suggest the need for further research on the relationships between microbreaks and types of fatigue. This study highlights the continuing need for clarification of the benefits of taking microbreaks at work.

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Table 1
Hypotheses 1a-4b

Break Type	Mental Fatigue	Physical Fatigue	Emotional Fatigue
Relaxation	-	-	-
Nutrition intake	-	-	N/A
Socialization	-	N/A	-
Cognitive activity	+	+	N/A

Table 2
Demographic Characteristics of the Main Study Participants

Demographic Characteristics	Category	Percentage (%)	Mean	S.D.
Age		-	35.52	12.75
Work Hours per Week		-	41.58	9.70
Gender			-	-
	Male	44.2		
	Female	55.3		
	Other	0.4		
Ethnicity			-	-
	Caucasian/White	88.2		
	Black/African American	1.3		
	Hispanic/Latino	4.4		
	Asian/Pacific Islander	5.7		
	American Indian or Alaskan Native	0.4		
	Other	1.3		
	Decline to Answer	0.4		
Work Schedule			-	-
	Daytime shift	67.5		
	Evening shift	3.5		
	Night shift	0.4		
	Rotating shift	3.5		
	Split shift	1.3		
	Flexible or variable shift	20.6		
	Other	3.1		

Table 3
Means, Standard Deviations, and Intercorrelations

Variable	M	SD	1	2	3	4	5	6	7
1. Relaxation microbreaks	2.57	0.88	-						
2. Nutrition intake microbreaks	3.15	0.85	.09	-					
3. Socialization microbreaks	2.66	0.84	.26**	.25**	-				
4. Cognitive ability microbreaks	2.13	0.93	.35**	.15*	.55**	-			
5. Physical fatigue	3.21	1.17	-.11	.14*	.01	-.05	-		
6. Mental fatigue	3.48	1.03	-.07	.15*	.06	.04	.64**	-	
7. Emotional fatigue	2.74	1.21	-.01	.16*	.12	.08	.55**	.63**	-

Note. $n = 228$.
*$p<.05$. **$p<.01$.

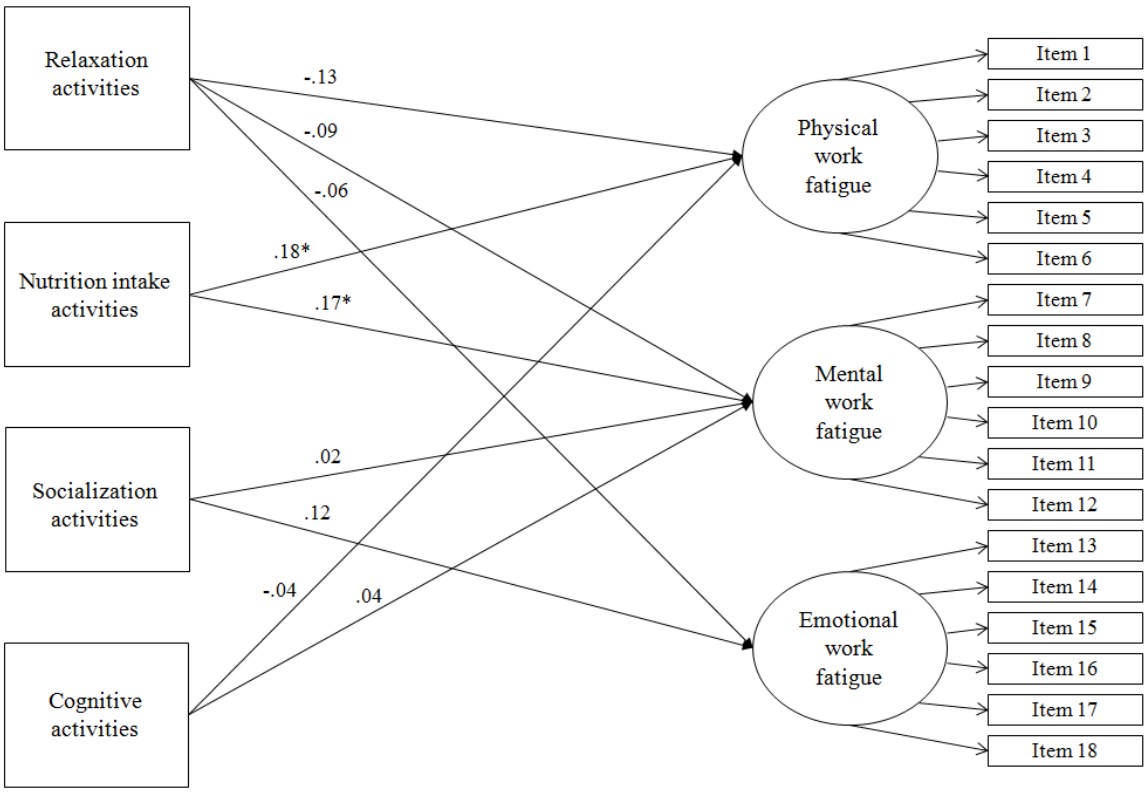

Figure 1. Path analysis results. *$p<.05$. **$p<.01$.

Appendix A

Survey Demographics

Please answer the following questions.

Have you been employed (either part-time or full-time) over the last 6 months?

- ❍ Yes
- ❍ No

On average, how many hours per week do you work? Please enter a number. For your primary job, which of the following best describes your work schedule?

- ❍ A regular daytime shift
- ❍ A regular evening shift (shift starts between 12 p.m. and 6 p.m)
- ❍ A regular night shift (shift starts after 6 p.m.)
- ❍ A rotating shift (one that changes periodically from day to evening or night)
- ❍ A split shift consisting of two distinct periods each workday
- ❍ A flexible or variable schedule with no set hours
- ❍ Some other schedule (please specify) _____

The next two questions ask how long you have been at your current job in years and months. For example, if you have been at your current job for 6 months enter 0 for years and 6 for months. If you have been at your job for 2.5 years, enter 2 for years and 6 for months.

How many years have you worked at your current job?

How many months have you worked at your current job? What is your racial heritage (Select all that apply)?

- ❑ American Indian or Alaskan native
- ❑ Asian/Pacific Islander
- ❑ Black/African American
- ❑ Caucasian/White
- ❑ Hispanic/Latino
- ❑ Other

- ❑ Decline to answer

What is your gender?

- ❍ Male
- ❍ Female
- ❍ Other
- ❍ Decline to answer

Please enter your age in years.

Breaks Measure

For the following items, consider short, nonwork respite activities that you pursue voluntarily during a typical workday. Rate the following items based on how often you engaged in the activities over the past 6 months.

Stretching, walking around the office, relaxing briefly

- (1) Never
- (2) Occasionally
- (3) Sometimes
- (4) Often
- (5) Very frequently

Daydreaming, gazing out the office windows, taking quick naps, any other psychological relaxation

- (1) Never
- (2) Occasionally
- (3) Sometimes
- (4) Often
- (5) Very frequently

Drinking coffee, black tea, green tea, or other caffeinated beverages

- (1) Never
- (2) Occasionally
- (3) Sometimes
- (4) Often
- (5) Very frequently

Snacking or drinking noncaffeinated beverages (e.g., juice)

- (1) Never
- (2) Occasionally
- (3) Sometimes
- (4) Often
- (5) Very frequently

Texting, using instant messenger, or phoning friends or family members

- (1) Never
- (2) Occasionally

- (3) Sometimes
- (4) Often
- (5) Very frequently

Chatting with coworkers on nonwork-related topics

- (1) Never
- (2) Occasionally
- (3) Sometimes
- (4) Often
- (5) Very frequently

Checking personal SNS (e.g., Facebook, Twitter, and personal blogs)

- (1) Never
- (2) Occasionally
- (3) Sometimes
- (4) Often
- (5) Very frequently

Reading nonwork-related books, newspapers, and magazines

- (1) Never
- (2) Occasionally
- (3) Sometimes
- (4) Often
- (5) Very frequently

Surfing the web for nonwork purposes (e.g., online shopping, banking, checking personal emails, and watching short news or video clips), or learning activities

- (1) Never
- (2) Occasionally
- (3) Sometimes
- (4) Often
- (5) Very frequently

Fatigue Measure

For each question, mark the circle that most accurately reflects how often you have experienced each aspect of fatigue over the last 6 months.

Physical fatigue involves extreme physical tiredness and an inability to engage in physical activity. During the PAST 6 MONTHS, how often did you...

	Never	Less than once a	At least once a month	At least once a week	Everyday
1. feel physically exhausted	❍	❍	❍	❍	❍
2. have difficulty engaging in physical	❍	❍	❍	❍	❍
3. feel physically worn out at	❍	❍	❍	❍	❍
4. want to physically shut	❍	❍	❍	❍	❍
5. feel physically drained	❍	❍	❍	❍	❍
6. want to avoid anything that took too much	❍	❍	❍	❍	❍

Mental fatigue involves extreme mental tiredness and an inability to think or concentrate. During the PAST 6 MONTHS, how often did you...

	Never	Less than once a	At least once a month	At least once a week	Everyday
7. feel mentally exhausted at	❍	❍	❍	❍	❍
8. have difficulty thinking and concentr	❍	❍	❍	❍	❍
9. feel mentally worn out at	❍	❍	❍	❍	❍
10. want to mentally shut	❍	❍	❍	❍	❍
11. feel mentally drained at the	❍	❍	❍	❍	❍
12. want to avoid anything that took too	❍	❍	❍	❍	❍

Emotional fatigue involves extreme emotional tiredness and an inability to feel or show emotions. During the PAST 6 MONTHS, how often did you...

	Never	Less than once a	At least once a month	At least once a week	Everyday
13. feel emotionally exhaust	❍	❍	❍	❍	❍
14. have difficulty showing and dealing	❍	❍	❍	❍	❍
15. feel emotionally worn out	❍	❍	❍	❍	❍
16. want to emotionally shut	❍	❍	❍	❍	❍
17. feel emotionally drained	❍	❍	❍	❍	❍
18. want to avoid anything that took too much emotional	❍	❍	❍	❍	❍