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Running head: Lunchtime recovery and daily well-being

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Abstract

Only few studies so far have examined recovery from work during workday breaks. In this intervention study, based on the effort-recovery model and the conservation of resources theory, we examined how to enhance recovery during lunch breaks. More specifically, we examined the within-person effects of lunchtime park walks and relaxation exercises on employees' levels of concentration, strain, and fatigue experienced at the end of a working day. We moreover tested whether detachment from work and enjoyment experienced during lunch breaks transmitted the effects of these activities to well-being outcomes. Participants in the park walk (n = 51) and relaxation (n = 46) groups were asked to complete a 15-minute exercise during their lunch break on 10 consecutive working days. Afternoon well-being, lunchtime detachment, and lunchtime enjoyment were assessed twice a week before, during, and after the intervention, altogether for five weeks. Multilevel analysis results showed that park walks at lunchtime were related to better concentration and less fatigue in the afternoon through enjoyment. Relaxation exercises were related to better concentration in the afternoon via detachment. In addition, relaxation exercises were directly linked to lower levels of strain and fatigue in the afternoon. Our study suggests that on days on which employees engage in recovering activities during lunch breaks, they experience higher levels of well-being at the end of a working day. These results add to the theory-based knowledge on recovery during workday breaks and highlight the importance of breaks for organizational practices.

Keywords: lunchtime recovery, park walking, relaxation exercise, detachment, enjoyment

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Breaks from work are necessary to replenish resources lost due to work demands. Earlier research has identified recovery from work in the evenings, at weekends, and on vacations as a mechanism which protects against the negative effects of stress on employees, such as health complaints, exhaustion, and impaired job performance (de Bloom et al., 2010; Fritz & Sonnentag, 2005; Sonnentag, Binnewies, & Mojza, 2008). Although some recent studies have acknowledged the importance of workday breaks (Hunter & Wu, 2015; Krajewski, Wieland, & Sauerland, 2010; Trougakos, Hideg, Cheng, & Beal, 2014), the evidence of how to best recover during breaks remains scarce. Workday breaks have potential in restoring resource levels to maintain performance throughout the day (Trougakos, Beal, Green, & Weiss, 2008), and in protecting against high need for recovery at the end of a working day (Coffeng, van Sluijs, Hendriksen, van Mechelen, & Boot, 2015). Furthermore, recovery potential of workday breaks may be of particular interest to organizations as they have influence on how employees spend their breaks. As contemporary working life is characterized by high demands (American Psychological Association, 2015; Eurofound, 2012), it is important to gain theory-based knowledge on how to maximize the recovery potential of lunch breaks, which are the most common and often longest workday breaks.

Our aim was to contribute to the knowledge of this issue by examining how lunchtime recovery can be enhanced. More specifically, we conducted an intervention study consisting of either a 15-minute park walk or a relaxation exercise during lunch breaks over two weeks, and adopted a within-person perspective to test if employees experience higher levels of well-being in the afternoon on the days when they engage in these activities. In addition, we examined whether lunchtime recovery experiences (i.e., psychological detachment from work and

enjoyment), mediated the within-person effects between lunchtime activities and afternoon well-being.

Our study contributes to the literature in several ways. First, this study tested the effects of two different lunchtime activities; and it did so with a sample of employees from multiple organizations. This enabled us to examine whether introducing a new activity into employees' lunch break routines improved their daily well-being. Second, we used a within-person perspective in analyzing the data to investigate the day-to-day fluctuations of well-being in relation to these lunchtime activities and experiences. Third, by including lunchtime detachment and enjoyment as mediators in our model, we were able to examine the underlying mechanisms through which the intervention activities may affect well-being.

Theoretical Perspectives on Recovery during Lunch Breaks

Recovery can be defined as a process during which psycho-physiological functioning returns to its pre-stressor level, and employees' energy and mental resources are restored (Geurts & Sonnentag, 2006; Zijlstra & Sonnentag, 2006). According to the effort-recovery (E-R) model (Meijman & Mulder, 1998), recovery occurs when job demands are no longer present. This process can be described as passive recovery, which follows from the relief from work demands (Geurts & Sonnentag, 2006). Incomplete recovery may lead to suboptimal working condition, requiring additional compensatory effort at work, and resulting in short-term load effects, such as strain and fatigue (Meijman & Mulder, 1998). Furthermore, if allowed to accumulate, stress can lead to more serious negative effects in the long-term (McEwen, 1998).

It is also known that engaging in recovering activities such as social activities and physical exercise promotes recovery (Sonnentag & Zijlstra, 2006). Earlier research on workday breaks has found physical exercise (Coffeng et al., 2015) and relaxing activities (Krajewski et al., 2010; Trougakos et al., 2014) to benefit recovery. Thus, recovery may also take a more active form (Geurts & Sonnentag, 2006). According to the conservation of resources (COR) theory (Hobfoll,

1989), people aim to gain new and protect existing resources (e.g., energy and positive mood). When resources are lost, or not regained after effort investment, stress occurs. To recover from stress, individuals need to replenish their lost resources. This can occur by engaging in activities that either restore old or generate new resources. When adapting these views on passive and active recovery to lunch breaks, we may conclude that breaks have recovery potential when work demands are not present and employees engage in resource replenishing activities.

In addition to taking a break from work and engaging in recovering activities, previous research has identified experiences that are beneficial in promoting recovery (Sonnentag & Fritz, 2007). Particularly psychological detachment from work (i.e., not thinking about work during off-job time) has been shown to advance resource recovery (Sonnentag & Fritz, 2015). Mental detachment is important, as according to the E-R model (Meijman & Mulder, 1998) absence of work demands is a necessary condition for recovery. Merely pausing work is not enough to ensure sufficient recovery, as continuing to think about job related issues may also result in prolonged stress reactions (Brosschot, Pieper, & Thayer, 2005). In fact, earlier studies have linked detachment during evenings and weekends to various well-being outcomes (Sonnentag & Fritz, 2015), but its effect on well-being during shorter breaks has so far received little attention. However, one cross-sectional study found that detachment during breaks was related to less need for recovery at the end of a working day (Coffeng et al., 2015).

Enjoyment may be another experience enhancing recovery during breaks in addition to detachment. According to the broaden-and-build theory (Fredrickson, Mancuso, Branigan, & Tugade, 2000), positive emotions broaden people's awareness and encourage novel thoughts and actions. Additionally, positive emotions may undo the effects of negative affect, thereby alleviating work stress and enhancing recovery. Enjoying workday breaks, or spending them in preferred ways, has previously been linked to positive recovery outcomes (Hunter & Wu, 2015; Trougakos et al., 2008). For example, Trougakos et al. (2008) compared the effects of engaging

in enjoyable activities to engaging in effortful activities during workday breaks. They found that enjoyable break activities, as opposed to effortful activities, were related to better job performance (i.e., showing more positive emotions when interacting with customers) and experiencing more positive emotions after the breaks.

Park Walks and Relaxation Exercises Promoting Lunchtime Recovery

Park walks. Park walking during lunch breaks can enhance recovery from work in several ways. First, being away from the office environment ensures the physical absence of work demands (Meijman & Mulder, 1998). Second, in addition to increasing distance from demands and providing a change of scenery, exposure to natural surroundings has specific restorative effects (Berto, 2014; Hartig, Mitchell, De Vries, & Frumkin, 2014; Kaplan, 1995; Ulrich et al., 1991). According to the attention restoration theory (Kaplan, 1995), natural environmental stimuli attract attention effortlessly, thereby providing respite for the cognitive processes required to direct or sustain attention. Additionally, psycho-evolutionary theory (Ulrich, 1983) suggests that people are well adapted, and respond positively, to natural environments signaling chances of survival. Therefore, natural environments allow for psycho-physiological stress recovery and induce positive affect[1]. Third, park walking may also promote recovery through engaging employees in light physical activity. Physical activity has been found to enhance recovery, and as mentioned earlier, there is tentative support for a positive relationship between physical activity at lunchtime and less need for recovery at the end of a working day (Coffeng et al., 2015).

Despite its potential, only one earlier intervention study has been presented on lunchtime recovery through park walks. Brown, Barton, Pretty, and Gladwell (2014) compared lunchtime walks in natural or built environment and spending the break as usual among 73 office workers. Self-reported mental health and systolic blood pressure improved in the nature walking group, but no changes occurred in several other health parameters measured. As the instruction was to

undertake walking exercise twice a week, and adherence to this regime was low, the exposure period may have been insufficient to yield more positive effects.

As recovery outcomes, we focused on afternoon concentration, fatigue, and strain reflecting daily well-being at work. *Concentration*, which is also beneficial in terms of daily job performance, refers to the ability to focus on the task at hand without attention shifting away (cf. Demerouti, Taris, & Bakker, 2007). As fatigue increases after prolonged mental activity (Gergelyfi, Jacob, Olivier, & Zénon, 2015), concentration may become more effortful towards the end of the working day. Involuntary attention towards natural surroundings has been proposed to replenish the cognitive mechanisms involved in directing and sustaining attention (Kaplan, 1995). According to Kaplan (1995), natural content, such as vegetation and water, evoke innate interest and draw attention effortlessly, that is, they evoke fascination. Consequently, during a break spent in natural surroundings, attentive resources can be restored and concentration at work may improve after the break. Studies in the field of environmental psychology have provided evidence of improved attention after interacting with natural surroundings (Berman, Jonides, & Kaplan, 2008; Bowler, Buyung-Ali, Knight, & Pullin, 2010; Lee, Williams, Sargent, Williams, & Johnson, 2015).

Spending time in natural environments has previously been shown to increase energy and decrease *fatigue* (Bowler et al., 2010). Fatigue can be defined as a subjective feeling of tiredness and low energy, associated with low mood and disinclination to engage in demanding or effortful activities (Hockey, 2013). Spending time in natural environments may reduce fatigue by decreasing attentional fatigue (Hartig, Evans, Jamner, Davis, & Gärling, 2003), providing a break from demands, and increasing positive affect. In experimental studies, direct exposure to natural surroundings has been consistently associated with less fatigue, most commonly examined among university students (Bowler et al., 2010).

Natural environments may also be effective in decreasing strain and evoking a calming response. *Strain* is characterized by high arousal and negative affect, and it occurs when employees are exposed to stressors at work, or when individuals evaluate some characteristics of work as threatening (Darr & Johns, 2008; Podsakoff, LePine, & LePine, 2007). Compared to urban or indoor environments, natural environments are characterized by lower complexity and fewer features eliciting arousal (e.g., fewer loud and sudden noises), allowing for a rapid decrease in tension and strain (Berto, 2014). In environmental psychology, exposure to natural surroundings has been associated with low level of anxiety and high level of tranquility (Bowler et al., 2010).

Focusing on within-person differences, we examined whether individuals experience higher levels of concentration and lower levels of strain and fatigue in the afternoon on days when they engage in lunchtime park walks compared to the days without the walk. Following Ilies, Aw, and Pluut (2015) in their call for intra-individual models of well-being, we treated afternoon recovery as a state that fluctuates over time and investigated why one employee recovers better on some days than on others. We chose to measure outcomes in the afternoon about one hour before the participants left work to test if the potential benefits persisted until the end of the working day. We also considered this time point appropriate because we did not expect longer lasting effects from an intervention lasting only 15 minutes per working day. The time before leaving work is also important when thinking about recovery occurring after work. It can be expected that the more energy is left at the end of a working day, the better the recovery process may proceed after work (de Bloom, Kinnunen, & Korpela, 2015).

Hypothesis 1: Within persons, park walking during lunch breaks is positively associated with a) concentration, and negatively associated with b) strain, and c) fatigue experienced in the afternoon.

We propose that recovery from work during park walks is enhanced through lunchtime *detachment and enjoyment*. First, being away from the office building may help employees to detach from work-related thoughts, as work-related cues are absent. Natural environments attract attention to the natural content of surroundings (Kaplan, 1995). This evokes novel thoughts and feelings, thus shifting the focus away from work-related thoughts. Furthermore, physical exercise after work has been shown to benefit psychological detachment from work (Feuerhahn, Sonnentag, & Woll, 2014). Second, people may find spending time in natural surroundings very enjoyable. This may result, for example, from congruence between an individual's aims and desires, and the degree to which they are supported by the environment, experiencing the extent of the surroundings (Kaplan, 1995), or enjoying the beauty of the scenery. In addition to pleasant visual stimuli, park walking may engage other senses, thereby adding to the enjoyable experience, for example, hearing the birds singing (Ratcliffe, Gatersleben, & Sowden, 2013), or feeling the sun or wind on the skin. Research in environmental psychology has shown that walking in natural environments elicits more positive emotions than walking in urban environments (McMahan & Estes, 2015), and one study found similar effects among working adults taking walks after work (Tyrväinen et al., 2014).

Earlier studies suggest that detachment and enjoyment experienced during short breaks may improve concentration, and reduce strain and fatigue. Among university students, a short break between tasks inducing detachment (watching a funny video) increased attention and decreased fatigue compared to no break (Bennett, 2015). Another study demonstrated that detachment during workday breaks was related to less need for recovery after the working day (Coffeng et al., 2015), which may indicate less fatigue, strain, and tension. In addition, engaging in preferred activities during breaks was related to better concentration and more energy after breaks (Hunter & Wu, 2015). To the best of our knowledge, studies so far on recovery during workday breaks have not addressed the relationship between enjoyment and strain. However, as

positive emotions may undo the effect of negative emotions and therefore alleviate stress (Fredrickson et al., 2000), enjoyment during breaks may lessen strain.

Hypothesis 2: The effect of park walking during lunch breaks on concentration, strain, and fatigue experienced in the afternoon, is transmitted via lunchtime detachment from work and enjoyment.

Relaxation exercises. Relaxation is a state characterized by low psycho-physiological activation, often resulting from a situation with few external demands (Meijman & Mulder, 1998; Sonnentag & Fritz, 2007). This state may ensue from purposely chosen strategies aiming at the relaxation of body and mind, or occur less deliberately, for example, by taking a walk or listening to music. Relaxation exercises have been widely studied and applied as stress reduction methods at workplaces (Richardson & Rothstein, 2008). They aim to change bodily experiences from those associated with stress (e.g., tense muscles, quick and shallow breathing) to a more relaxed state to experience physical and mental relaxation (cf. Jacobson, 1938). In a meta-analysis, Richardson and Rothstein (2008) found different occupational stress management interventions utilizing relaxation (e.g., progressive muscle relaxation, meditation, and deep breathing) effective in reducing strain, and in improving mental health and productivity.

Our lunchtime intervention combined the use of *progressive muscle relaxation* (PMR), *deep breathing,* and acceptance of thoughts and experiences, a component of *mindfulness*. PMR is a technique where all the major muscle groups are systematically tensed, after which the tension is released to produce relaxation (Jacobson, 1938). Deep breathing is designed to induce relaxation via focusing on breathing, taking longer and deeper breaths than normally, and pausing briefly between breaths (Richardson & Rothstein, 2008). Mindfulness can be defined as self-regulation of attention aiming at nonjudgmental, full awareness of the present moment (Baer, 2003). Our exercise focused on acceptance of constantly arising thoughts, emotions, and bodily sensations, which means observing them without evaluation or judgment. These three

techniques have been found to activate the parasympathetic nervous system (Jerath, Edry, Barnes, & Jerath, 2006; Nickel et al., 2005; Takahashi et al., 2005), thus calming the body and alleviating stress and tension. Additionally, they may benefit health and reduce stress-related symptoms, such as tension headaches (McCallie, Blum, & Hood, 2006), hypertension (Kaushik, Kaushik, Mahajan, & Rajesh, 2006), and anxiety (Goyal et al., 2014).

As the primary goal of relaxation is to reduce physical and psychological activation and release tension, when successful, a lunchtime relaxation exercise should alleviate *strain*. One intervention study examined the effects of lunchtime relaxation exercise on strain (Krajewski et al., 2010). Seven call center agents engaged in a 20-minute PMR during lunch breaks every day for a period of six months. Compared to a control group, the PMR group showed less mental, emotional, and motivational strain in the afternoons. Using the same data, the relaxation exercise reduced cortisol levels after the lunch break and at bedtime, and after continuing the PMR for several months also reduced cortisol awakening response, further supporting its effectiveness in reducing strain (Krajewski, Sauerland, & Wieland, 2011).

Moreover, during relaxation exercise physical and mental *fatigue* are reduced. Relaxation provides an optimal condition for recovery of mental and physical energy resources as it requires no effort of any kind but enhances positive affect (Fredrickson et al., 2000; Fritz, Sonnentag, Spector, & McInroe, 2010; Sonnentag & Fritz, 2007), thus alleviating fatigue. Mindfulness exercises have previously been associated with reduced fatigue among university students (Zeidan, Johnson, Diamond, David, & Goolkasian, 2010). Schnieder et al. (2013) also found that PMR during lunch breaks reduced afternoon sleepiness at work among the same seven call center agents examined by Krajewski and colleagues (cf. Krajewski et al., 2011; Krajewski et al., 2010).

Relaxation exercise may also benefit *concentration*. Mindfulness exercises in particular have been associated with improvements in sustained attention (Chiesa, Calati, & Serretti, 2011).

One study with university students found that 20 minutes of mindfulness training across four days was enough to improve sustained attention compared to a control group (Zeidan et al., 2010). Two explanations were offered: First, it is possible that mindfulness training improves meta-cognitive skills, which in turn helps people to notice task-irrelevant thoughts and let go of them, returning the focus to the task at hand. Second, fatigue and anxiety may adversely affect the ability to sustain attention, therefore making concentration at work more difficult. Consequently, as relaxation exercise should reduce fatigue and anxiety, it should also improve concentration.

Hypothesis 3: Within persons, a relaxation exercise during lunch breaks is positively associated with a) concentration, and negatively with b) strain, and c) fatigue experienced in the afternoon.

As with park walking, we hypothesize that lunchtime *detachment* and *enjoyment* are mechanisms enhancing recovery from work during lunchtime relaxation exercise. First, during a relaxation exercise employees focus their attention on releasing tension from the muscles and on breathing (i.e., away from work-related thoughts), thus, when successful, it should facilitate psychological detachment from work. Furthermore, the acceptance component of mindfulness should help people to let go of work-related thoughts and feelings, and therefore be especially helpful in promoting detachment. This is because an attempt to fully control inner experiences often fails and may even lead to more repetitive appearance of unwanted thoughts or feelings (Hayes, 2004). Second, low demands and the release of tension during a relaxation exercise may increase enjoyment. Relaxation exercises have been found to increase positive mood, for example experiencing more pleasure and restfulness (Jain et al., 2007). Furthermore, acceptance and relaxation as daily coping mechanisms have been found to relate to less negative and more positive mood in the evenings (Stone, Kennedy-Moore, & Neale, 1995).

Hypothesis 4: The effect of a relaxation exercise during lunch breaks on concentration, strain, and fatigue experienced in the afternoon, is transmitted via lunchtime detachment from work and enjoyment.

Methods

Participants

We contacted approximately 2,226 employees working mainly in knowledge-intensive and emotionally demanding jobs. We imposed the following exclusion criteria on participation: a) shift work or irregular working hours and b) inability to engage in the 15-minute park walk (e.g., because of seasonal allergies or physical disability). Initially 279 employees volunteered to participate in our study, yielding a response rate of 12.5%. To have several participants in each intervention group from each organization, we included companies only when at least six of their employees volunteered to participate, thus reducing the number of participants to 225. The participants of this sample were randomly assigned within each organization to one of the three groups: 1) park walk, 2) relaxation, and 3) control group (spending the lunch break as usual). Later on 48 employees dropped out before the study started (e.g., due to sickness, too busy to participate, change of employer), and five persons during the study. Additionally, 13 persons did not complete the intervention activities regularly enough (i.e., less than 6 times out of 10 exercises completed) and from six persons data were largely missing. When analyzing sample attrition, we found that participants did not differ from drop-outs in terms of intervention group or background characteristics (i.e., gender, age, education, occupational status, type of employment contract, working hours). However, drop-outs experienced more exhaustion than participants (M = 2.57 versus M = 2.03; $t(177) = 2.22$, $p < .05$).

In this study, we focused on the within-person effects of completing a park walk or relaxation exercise in order to analyze if employees' recovery was better on days on which they engaged in a certain lunch break activity compared to days on which they did not engage in a

park walk or relaxation. Due to this focus on within-person effects, the control group (n = 56) was excluded from the study as they did not walk or relax during lunch breaks. The study was thus conducted among 97 voluntary employees, of whom 51 were from the park walk and 46 from the relaxation group.

The participants worked at seven different organizations and in various sectors, including public administration (n = 44), education (n = 29), health care (n = 7), media (n = 6), engineering (n = 7) and finance (n = 4). The majority of the participants were women (91.8%) and the average age was 46.8 years (range 25-62, SD = 9.6). Most of the participants (83.5%) were living with a partner (either married or cohabiting), and 58.2% had children (average of two) living at home. Of the participants, 49.0% held an academic degree (master's or higher), 18.8% a bachelor's or polytechnic degree, and the rest (32.3%) had a vocational school education or less. Most of the participants had a permanent employment contract (90.6%) and worked full time (95.8%), on average 38.4 hours per week (range 25-50, SD = 3.50).

Procedure

The data were collected in two phases with two identical studies in spring (51 participants) and fall (46 participants) 2014 to optimize the deployment of our material and personnel resources. Each study lasted six working weeks, two of which were the intervention period (second and third weeks). During the two intervention weeks (altogether 10 working days), participants were asked to complete one of the activities they were randomly assigned to, namely park walking or a relaxation exercise, daily for 15 minutes during lunch breaks.

Before and after the study, participants were asked to complete an online questionnaire eliciting general information. Daily measurements were completed each Tuesday and Thursday one week before (baseline), two weeks during (intervention), and one and three weeks after (follow-up) the intervention, altogether on 10 days. Thus, four of these data collection days were during the two-week intervention period. A short SMS questionnaire was sent to participants'

cell phones in the afternoon about one hour before they usually left work. We instructed the participants to complete this SMS questionnaire 30-60 minutes before leaving work. Additionally, participants completed a pencil-and-paper questionnaire each morning and evening. Due to practical reasons (to minimize the costs of the SMS questionnaires and interruptions during working days), some questions were answered retrospectively in the evening, reflecting on the earlier events and experiences of that day. To measure compliance with the intervention protocol, we asked the participants to complete an additional booklet every day from Monday to Friday during the two intervention weeks. Figure 1 illustrates the study design.

Before the intervention, all participants were asked to participate in a training session, where they were informed about the data collection procedure and practiced the park walking or relaxation exercises. Park walks were carried out in urban parks close to each participant's place of work. Participants were instructed to walk the predetermined route at a slow pace and focus on the natural surroundings. They could walk alone or in a group, but they were advised not to talk with others. The relaxation group was asked to find a quiet place inside the office building to complete the exercise based on the training session and the written instructions for the relaxation exercise. This exercise consisted of the release-only version of PMR (Öst, 1987), deep breathing, and the acceptance component of mindfulness (Tuomisto, 2007).

Before the intervention the majority of the participants (93.8%) took lunch breaks 4-5 times a week and the lunch break was on average 27.6 minutes long. During the intervention participants completed the exercise on average 8.6 times out of 10 and there were no differences in the number of times participants engaged in park walking or relaxation exercises [$F(1,95) = 0.14$, $p = .71$]. In both groups lunch breaks lasted 33 minutes (including the exercise). The park walking group engaged in the exercise on average for 15 minutes (range: 8-20), and the relaxation group for 14 minutes (range: 8-20). Thus the park walks lasted on average one minute

longer than the relaxation exercises [$F(1,88) = 15.2$, $p < .01$]. About three weeks after the intervention period, 29% ($n = 14$) of the participants in the park walk group and 38% ($n = 17$) in the relaxation group had continued the lunchtime exercise at least once a week.

After the study, all participants received written individual feedback on their well-being and were invited to attend a lecture about the benefits of natural environments and relaxation. We also raffled three travel vouchers worth 400€ in total among all those completing the online questionnaires. The study protocol describing the complete procedure has been published elsewhere (de Bloom, Kinnunen, & Korpela, 2014), and the research plan was duly approved by the Ethics Committee of the Tampere Region (Statement 10/2014).

Measures

As we measured multiple constructs daily, altogether on 10 days, we used one-item measures to minimize respondent burden, prevent dropout, and maximize response rates. Earlier studies have demonstrated that multiple-item measures can often be validly replaced by single-item measures (Elo, Leppänen, & Jahkola, 2003; Fisher, Matthews, & Gibbons, 2016; Van Hooff, Geurts, Kompier, & Taris, 2007).

Park walks and relaxation exercises. To measure whether the participants completed a *park walk* or *relaxation exercise* on a specific day, we asked "Did you go for a walk during your lunch break?" or "Did you engage in relaxation exercise during your lunch break?" (*no = 0, yes = 1*) in the pencil-and-paper evening questionnaire. A similar measure was also included in the booklet. We used the data from the pencil-and-paper evening questionnaire in the main analyses, and the data from the booklet was only used to calculate the compliance with the intervention protocol.

Lunchtime detachment and enjoyment. Detachment and enjoyment during lunch breaks were each assessed with one item in the evening questionnaire. *Detachment from work* was assessed with the item "During my lunch break, I distanced myself from my work" adapted from

the Finnish version of the Recovery Experience Questionnaire (Kinnunen, Feldt, Siltaloppi, & Sonnentag, 2011; Sonnentag & Fritz, 2007) and *enjoyment* with "I enjoyed my lunch break" (adapted from Trougakos et al., 2008). Both items were rated on a scale from 1 (= *strongly disagree*) to 5 (= *strongly agree*).

Afternoon well-being. Afternoon concentration, strain, and fatigue were measured each with one item via SMS questionnaires completed before leaving work. On average, the participants replied at 3:44 p.m. (typical working hours in Finland are from 8 a.m. to 4 p.m.). *Concentration* was measured with an item developed for this study (cf. Hunter & Wu, 2015). Participants were asked to rate their ability to concentrate ("My ability to concentrate is…") on a scale from 1 (= *very poor*) to 7 (= *very good*). Additionally, we measured *strain* with the item "I feel stressed and tense" (adapted from Elo et al., 2003) and *fatigue* with the item "I feel fatigued" (adapted from Van Hooff et al., 2007) on a scale from 1 (= *strongly disagree*) to 7 (= *strongly agree*).

Day-level control variables. We included three controls: sleep quality from the previous night, daily work demands and length of the lunch break. These were considered to be possible confounding variables as, first, they may relate to how eager participants are to complete the intervention exercise or how much they benefit from it, and, second, they may relate to afternoon well-being (Pilcher, Ginter, & Sadowsky, 1997; Sonnentag, 2001). *Sleep quality* from the previous night was assessed with one item in the morning "How well did you sleep last night?" (1 = *very poorly*, 5 = *very well*). *Work demands* and *length of the lunch break* were both assessed with one item in the evening questionnaire, respectively "Today at work, my work demands were…" (1 = *very low*, 5 = *very high*) and "How long was your lunch break in total?" (*in minutes*). As our focus was on explaining variance within persons, we did not include control variables at the between-person level.

Person-level characteristics. To determine whether the hypothesized relationships between predictors and outcomes differed across persons, we conducted additional analyses and tested potential cross-level moderators. As moderator variables we included several personal characteristics (exhaustion and age), job characteristics (workload and autonomy), and compliance with the intervention protocol (number of completed exercises, average duration of the exercises). Our aim was to examine whether these factors played a role in how strongly the intervention exercises or lunchtime recovery experiences were related to well-being outcomes. All personal and job characteristics were measured in the online questionnaire before the study. *Exhaustion* was measured with five items (e.g., "I feel emotionally drained from my work") from the Maslach Burnout Inventory (*0 = never, 6 = always/every day*; Kalimo, Hakanen, & Toppinen-Tanner, 2006; Maslach, Jackson, & Leiter, 1996). *Workload* was measured with three items (e.g., "How often does your job require you to work very fast?") from the Quantitative Workload Inventory (*1 = very seldom or never, 5 = very often or always*; Spector & Jex, 1998). *Autonomy* was measured with five items (e.g., "I can set my own work pace") from the QPS Nordic-ADW (*1 = very seldom or never, 5 = very often or always*; Dallner et al., 2000). Cronbach's alphas were .91, .87, and .81 for these measures respectively. Compliance with the intervention protocol was measured in the booklet completed each day during the two-week intervention period. The participants reported whether they had completed the park walk or relaxation exercise (*no = 0, yes = 1*) and the duration of the exercise *in minutes*.

Statistical Analysis

We collected day-level data twice a week for five working weeks. As each person completed the questionnaires on several days, day-level data were nested within persons. Therefore, we used multilevel modeling to account for the non-independence of the data and time.

We followed Bliese and Ployhart (2002) in their five-step approach, and estimated multilevel models in R using the NLME library written by Pinheiro and Bates (2000). For estimation, we used restricted maximum likelihood. Following Raudenbush and Bryk (2002), we centered all the independent variables measured at day-level around the person mean (group-mean centering). First, we estimated a null model (i.e., a model where the intercept is the only predictor) separately for each outcome, which provides information on variance in between- and within-person levels. Based on this information we calculated the intraclass correlation coefficients (ICC1) to ascertain if a multilevel approach was warranted. ICC1 shows the proportion of the total variance explained by the between-person variance, for example, an ICC1 of .10 indicates that 10 percent of the variability in daily responses is explained by person membership, meaning that there is non-independence and multilevel modeling is indicated (Bliese, 2000).

Second, we tested for linear time trends and assessed the error structure of the model (Model 1). More specifically, we tested the significance of time as a predictor, and whether including a random time trend would improve the model fit. The independence of within-person errors was tested by including autocorrelation (when responses close in time are more strongly related than responses far in time) or heteroscedasticity (when responses become more or less variable over time). The best model fit was estimated by using likelihood ratio difference test and comparing the fit indices of the tested models (BIC and AIC). Third, we followed a hierarchical data analysis strategy by subsequently adding complexity: estimating the impact of daily control variables (Model 2), then examining daily predictors (Model 3), and finally including daily mediators (Model 4).

Mediation. When testing for mediation, we followed recent research and, in addition to the group-mean centered variables, we also entered the person means of the predictor and mediator variables (i.e., their aggregated daily measures) to capture the within-person indirect

effects (Lachowicz, Sterba, & Preacher, 2015; Zhang, Zyphur, & Preacher, 2009). Following Preacher and Hayes, we focused on the specific indirect effect of the predictor on the outcome through the mediator (Preacher & Hayes, 2008; Preacher, Zyphur, & Zhang, 2010). The indirect effect is quantified as *ab*, which is equal to the difference between total and direct effect, and is used to assess the presence, strength, and significance of the indirect effect (Preacher & Hayes, 2008; Preacher, Rucker, & Hayes, 2007). To take the multilevel structure of our data into account, we used the R mediation package, which allowed us to estimate indirect effects and the respective 95% quasi-Bayesian confidence intervals (Tingley, Yamamoto, Hirose, Keele, & Imai, 2014). To estimate path *a*, we predicted the mediator variables (i.e., detachment and enjoyment) with engaging in park walk or relaxation exercise. Path *b* was estimated within the full model (Model 4), which included control variables, predictors, and both mediators in order to test the specific indirect effect of one mediator variable controlling for the other mediator variable. When both the direct effect between the predictor and the outcome and the indirect effect via the mediators were significant, we reported the proportion of the mediated effect. This describes the ratio of the indirect effect to the total effect (total effect = indirect effect plus the direct effect), thus showing how much of the total effect between the predictor and the outcome is explained by the mediator.

Cross-Level Moderators. Finally, if any of the predictors (daily predictors and daily mediators) were significant, we also tested whether the slope of the predictor was random by comparing the model fit with fixed and random slopes. A random slope indicates that the relationship between predictors and outcomes differs across persons, demonstrating possible moderators of these relationships. Therefore we predicted the slope variance by potential cross-level moderators (personal characteristics, job characteristics, and compliance with the intervention protocol) to account for the differences across persons.

Results

Table 1 displays the means, standard deviations, and zero-order correlations.

Preliminary Analysis

We first examined the strength of the non-independence of the data by estimating the ICC1 for each outcome, and assessed linear time trends and the error structure of the model. The ICC1 for afternoon concentration was .42, for afternoon strain .26, and for afternoon fatigue .39. Therefore non-independence could be assumed and a multilevel approach seemed warranted. There was no significant time trend for concentration, strain, and fatigue. For concentration, but not for strain or fatigue, a random time trend improved the model fit ($\Delta\chi^2(2) = 11.00$, $p < .001$). For all outcome variables, a model including autocorrelation, but not incorporating heteroscedasticity, fitted the data best (Tables 2-4, Model 1).

Test of Hypotheses

In the subsequent steps we examined the impact of control (sleep quality, daily work demands, break length), predictor (park walk, relaxation), and mediator (detachment, enjoyment) variables for concentration, strain, and fatigue.

Concentration. Of the control variables analyzed, only sleep quality ($\beta = .08$, $SE = .05$, $p < .10$) was marginally significant (Table 2, Model 2). Of the within-person variance, 1% was explained by time and the control variables. Next we entered the predictive variables (Table 2, Model 3). In line with the hypotheses regarding the main effects (hypotheses 1a and 3a), on the within-person level both park walking ($\beta = .36$, $SE = .12$, $p < .01$) and relaxation exercises ($\beta = .37$, $SE = .13$, $p < .01$) significantly predicted better afternoon concentration, increasing the explained variance to 8%. This suggests that employees' concentration in the afternoon was better on days when they engaged in park walks or relaxation exercises compared to days without these activities.

In the last step, we tested the mediation hypotheses (2, 4) and added lunchtime detachment and enjoyment (Table 2, Model 4). Both lunchtime detachment ($\beta = .11$, $SE = .05$, $p < .05$) and

enjoyment (β = .16, *SE* = .06, *p* < .01) significantly predicted an increase in afternoon concentration. Considering the indirect effects, our analysis showed two significant indirect effects: the indirect effect of park walking via enjoyment was significant (*ab* = .07, 95 % CI {.02, .13}, *p* < .05); the proportion of the mediated effect was .16 (CI {.04, .42}, *p* < .05). Also, the indirect effect of relaxation exercise via detachment was significant (*ab* = .03, 95 % CI {.002, .07}, *p* < .05); the proportion of the mediated effect was .08 (CI {.002, .29}, *p* = .05). The indirect effects of park walks via detachment, or relaxation exercises via enjoyment, were non-significant. The full model explained 10% of the within-person variance in afternoon concentration. Both hypotheses 2 and 4 received partial support, as daily lunchtime enjoyment transmitted the impact of park walks, and daily lunchtime detachment transmitted the impact of relaxation exercises, on afternoon concentration.[2]

Strain. With afternoon *strain* as an outcome, we followed similar steps first including the control variables (Table 3, Model 2), of which only daily work demands significantly predicted afternoon strain (β = .45, *SE* = .08, *p* < .001). Of the within-person variance, 5% was explained after adding the control variables. Further, we entered the predictive variables (Table 3, Model 3). In line with hypothesis 1b, park walks predicted lower levels of afternoon strain on the within-person level (β = -.34, *SE* = .17, *p* < .05). Additionally, in line with hypothesis 3b, relaxation exercises (β = -.60, *SE* = .18, *p* < .01) significantly predicted lower levels of afternoon strain on the within-person level. After adding the predictors, the model explained 10% of the within-person variance in strain. Hence, on days when employees engaged in park walks or relaxation exercises they experienced less strain in the afternoon compared to days without these activities.

In the last step, we added lunchtime detachment and enjoyment as mediators (Table 3, Model 4), but neither of them predicted afternoon strain. After the inclusion of the mediator variables the main effects remained significant for relaxation exercises, but only marginally

significant for park walks. Thus the effects of walking and relaxation were not mediated via detachment and enjoyment, and hypotheses 2 and 4 were not supported with regard to strain.

Fatigue. Finally, with afternoon *fatigue* as an outcome, we found (Table 4, Model 2) that of the control variables, only good sleep quality predicted lower levels of afternoon fatigue (β = -.23, *SE* = .06, $p < .001$). Of the within-person variance, 3% was explained by time and the control variables. Of the predictive variables (Table 4, Model 3), relaxation exercises (β = -.59, *SE* = .16, $p < .001$), but not park walking, significantly predicted a decrease in afternoon fatigue on the within-person level. The model including predictors explained 6% of the within-person variance in fatigue. Thus, hypothesis 3c gained support while hypothesis 1c did not. These results show that on those days when employees engaged in relaxation exercises their level of fatigue was significantly lower than on days without the exercise, while park walking did not have a direct effect on employees' afternoon fatigue.

In the last step, we added lunchtime detachment and enjoyment as mediators (Table 4, Model 4). Only enjoyment (β = -.28, *SE* = .08, $p < .05$), but not detachment, significantly predicted lower levels of afternoon fatigue. The specific indirect effect of park walking via enjoyment was significant (*ab* = -.12, 95 % CI {-.20, -.05}, $p < .01$). However, the indirect effect of relaxation via enjoyment was not significant. Our final model explained 9% of the within-person variance in fatigue. In support of hypothesis 2, we found an indirect effect from park walking via enjoyment to less afternoon fatigue. Contradicting hypothesis 4, enjoyment did not serve as a mediator in the relationship between relaxation exercises and fatigue.

Cross-Level Moderators

Our additional analyses showed that the slope of enjoyment was random when predicting fatigue ($\Delta\chi^2(2) = 9.45$, $p < .01$). This indicates that the relationship between enjoyment and fatigue differed across persons, demonstrating possible moderators of these relationships. Of the possible moderators tested (personal and job characteristics as well as compliance with the

intervention protocol), we found only one significant cross-level interaction: The interaction of enjoyment and exhaustion was significant ($\beta = -.16$, $SE = .08$, $t = -1.99$, $p < .05$). When lunchtime enjoyment increased, afternoon fatigue decreased more for those employees who experienced more exhaustion. For all other relationships between daily predictors, mediators, and outcome variables, there was no improvement in model fit when specifying the slope as random, indicating that the direction and strength of the relationships were rather similar for all participants.

Discussion

Research on recovery from work has mainly focused on recovery during free evenings, weekends, and vacations. We investigated whether completing a park walk or relaxation exercise at lunchtime was related to an increase in well-being in the afternoon compared to days without these activities, and whether these effects were mediated by lunchtime detachment and enjoyment. Both park walks and relaxation exercises offered a break free from work demands, thereby facilitating passive recovery from work as explained in the E-R model (Meijman & Mulder, 1998). Furthermore, both activities allow employees to replenish their internal resources (e.g., attentional resources, energy levels, and positive mood) thus enhancing active recovery, according to the COR theory (Hobfoll, 1989). Supporting our hypotheses drawn from these theories, both lunchtime park walks and relaxation exercises were related to positive recovery outcomes in the afternoon.

According to our expectations, on days when employees engaged in park walking during lunch breaks, they experienced better concentration and less strain in the afternoon compared to days without park walks. These results are in line with attention restoration theory (Kaplan, 1995), suggesting that spending time in natural environments can restore attentional resources (hence improving concentration). They are also in line with psycho-evolutionary theory (Ulrich et al., 1991), proposing that natural environments are conducive to recovery from stress, thereby

reducing feelings of strain. Our results showed effects similar to those reported in earlier studies in the field of environmental psychology, where spending time in natural environments has been found to relate to better concentration (Berman et al., 2008) and less strain (Bowler et al., 2010). However, these earlier studies were not conducted in an occupational context. Thus our results extend the existing research by demonstrating that park walking is beneficial for recovery from work during workday breaks in terms of improved well-being at the end of a working day.

Our results further suggest that lunchtime enjoyment is important in mediating the effects of lunchtime park walks on well-being. We found indirect effects of park walking on concentration and fatigue via enjoyment. This means that on days when employees engaged in park walking, they also experienced more enjoyment during lunch breaks, which in turn was related to better concentration and less fatigue in the afternoon. Earlier research has demonstrated that spending time in natural surroundings is related to positive mood (McMahan & Estes, 2015). Our study showed that 15-minute park walks suffice to make employees enjoy their lunch breaks more than usual, perhaps because they provided an opportunity to spend the lunch break outside the workplace in different surroundings, with a change of scenery. It is important to note that the weather conditions were favorable during the intervention weeks (both during spring and fall data collection) making it possible to enjoy the walks. Furthermore, contradicting our hypotheses, lunchtime detachment from work did not mediate the effects of park walking on afternoon well-being. As park walking was done at a slow pace, it may be less beneficial for detachment than more strenuous exercise (Van Hooff & Geurts, 2016).

When looking at the direct relationships between lunchtime recovery experiences and well-being, detachment was related to higher levels of afternoon concentration, but not to strain or fatigue. Lunchtime enjoyment was related to higher levels of concentration and less fatigue, which was in line with earlier studies linking lunchtime enjoyment to positive well-being outcomes (Hunter & Wu, 2015; Trougakos et al., 2008). Although lunchtime detachment (i.e.,

refraining from both positive and negative work events and thoughts) and enjoyment (i.e., the state of gratification or pleasure) are theoretically distinct concepts, these experiences correlated moderately on the daily level in our models. Thus it is difficult to draw clear-cut conclusions on their independent roles in terms of afternoon well-being, as the daily experiences of lunchtime detachment and enjoyment seem to some extent to go hand in hand.

On days when employees engaged in the relaxation exercise during lunch break, they experienced better concentration, less strain, and less fatigue in the afternoon. Concerning strain and fatigue, our within-person results are similar to the between-person effects found in an earlier intervention, where PMR among seven employees during lunch breaks was related to less strain and sleepiness compared to a control group (Krajewski et al., 2010; Schnieder et al., 2013). Our study goes beyond this by using a larger and more diverse sample. Earlier research on relaxation exercises outside work settings has found mindfulness to benefit sustained attention (Chiesa et al., 2011). Along with these findings, our results show that on days when employees engaged in the relaxation exercises at work, their concentration was better than on days without the exercise.

Our study also goes beyond the earlier literature by demonstrating that the beneficial effects of relaxation exercises on improved concentration were mediated by detachment from work. More specifically, on days when participants engaged in the relaxation exercise they also experienced more detachment from work during their lunch breaks, and more lunchtime detachment was related to higher levels of concentration in the afternoon. The finding further supports the E-R model, as it demonstrates that detachment during lunch breaks (an experience reflecting total absence of work demands) was important for concentration. It seems likely that focusing on bodily sensations and breathing, and learning to let go of thoughts during the relaxation exercise, helped employees not to think about work. Our finding is in line with the idea that trying to control thoughts makes it harder to forget about them (Hayes, 2004), and

therefore learning acceptance of thoughts and feelings can be linked to better detachment from work related thoughts. Contradicting our hypothesis, lunchtime enjoyment did not mediate any effects of the relaxation exercise on afternoon well-being. Our results suggest that although low demands and release of tension during relaxation exercises have previously been linked to positive mood (Jain et al., 2007), the effects of lunchtime relaxation exercises on enjoyment are not greater than those of regular lunch break activities. Completing a relaxation exercise may initially require high self-regulation from the participants, and this may also make it less enjoyable. Therefore, lunchtime detachment seems to be more important in transmitting the effect of relaxation exercises on afternoon well-being than enjoyment.

Taken together, our results suggest that both park walks and relaxation exercises are related to a higher levels of concentration and lower levels of strain in the afternoon. Only relaxation exercises were directly related to lower levels of fatigue, but park walks were related to lower levels of fatigue through enjoyment. Of the two mechanisms tested, lunchtime enjoyment may be more essential for the positive effects of park walks, whereas detachment may better explain the positive effects of relaxation exercises. However, as our results present within-person effects, such a comparison would have been more adequate if the same employees had engaged in both types of exercises over time.

Additionally, our results showed that the relationships between park walks or relaxation exercises and afternoon well-being were similar among all participants. However, the relationship between lunchtime enjoyment and fatigue varied across individuals. For those participants experiencing more exhaustion when this study started, enjoyment during the lunch breaks was related to a steeper decrease in afternoon fatigue, than for participants experiencing less exhaustion. This may be because participants who initially experience less exhaustion likely also experience relatively low levels of afternoon fatigue. Thus, there is more room for improvement in terms of fatigue for those who experience more exhaustion to begin with.

Limitations and Suggestions for Future Research

Although conducting an intervention study gives some certainty that the intervention activities likely caused the observed changes in outcomes measured, we cannot rule out all alternative explanations, and therefore we cannot establish causality. Nevertheless, our results took into account sleep quality, daily work demands, and the length of the lunch breaks as control variables. We found that good sleep quality was important in terms of lower fatigue and high daily work demands were strongly related to higher levels of strain in the afternoon. As we used retrospective evaluations for measuring lunch break detachment and enjoyment, our results concerning the mediators may have been biased by experiences that participants had later that day. We can be more certain of the validity of our results concerning the direct effects, as our outcomes were measured with SMS questionnaires to which participants replied before leaving work. Although research has found daily single-item measures to be valid substitutes for longer scales (Elo et al., 2003; Fisher et al., 2016; Van Hooff et al., 2007), future studies may benefit from using multiple item measures when measuring lunchtime recovery experiences.

In line with earlier research (Demerouti et al., 2007), we used a self-report item to measure concentration, which might raise some concerns about measurement validity. As our results were based on within-person comparisons, a person-dependent bias to generally over- or underestimate one's concentration at work does not influence our results. However, to some extent self-reports and objective tests of concentration may have different implications. Our results are relevant when employees' perception of poor concentration may result in low engagement or avoiding (difficult) work tasks. Our results do not allow drawing conclusions for work tasks where the objective level of concentration is crucial, for example, when poor concentration may impair safety (e.g., when employees are operating heavy machinery or driving vehicles). With our study design, including an additional vigilance test to measure concentration

would have been too burdensome for the participants. We recommend that future studies incorporate objective tests of concentration when appropriate.

We strongly recommend that future studies adopt designs enabling a direct comparison of the relative value of different recovery activities. This means that intervention studies seeking to compare within-person differences should adapt designs where each participant alternates between engaging in the different recovery activities of interest. When implementing our study, our resources in terms of time and research staff were limited and did not allow us to implement a more complex design. With the organizations involved time was restricted. Testing multiple exercises with the same individuals would have required a longer intervention period than the two-week period now available to us. Additionally, we provided training for the participants on how to complete these exercises at their workplaces, which meant visiting multiple organizational sites. We would not have been able to add a second training session for the other activity later (and learning to do both activities at once might have confused the participants or contaminated the effects).

Our sample consisted mostly of well-educated females who were less exhausted than those who dropped out of our study. Therefore it is unclear whether other groups would benefit similarly from these lunchtime interventions, and a replication of this study using a larger and more gender-balanced sample would be desirable. Our results suggest that the effect of lunchtime enjoyment on afternoon fatigue may be more pronounced among employees who experience higher levels of exhaustion. If a sample including employees with higher levels of exhaustion is sought, researchers must find ways to lower the demands the study design makes on the participants (i.e., consider how many questionnaires and other measurements are required from them). Our aim was to include employees with knowledge-intensive and emotionally demanding jobs as they may represent a group with high need for psychological recovery (Allvin, Aronsson, Hagström, Johansson, & Lundberg, 2011; Hülsheger & Schewe, 2011). Thus,

our results do not apply to manual work, for example, where physical recovery may be the most important goal of breaks; or to jobs where taking such breaks is not possible (e.g., if there are no parks nearby or if work tasks do not allow flexible breaks). Future research should still pay more attention to testing who actually benefits and who does not benefit from different intervention exercises.

As our relaxation exercises combined three different elements of relaxation (PMR, deep breathing, and mindfulness), we cannot distinguish which of them might have been most beneficial for lunchtime recovery. Future studies could compare the effectiveness of different types of relaxation exercises in occupational settings. Furthermore, based on participant feedback we recommend the use of audio recordings of the instructions. With our park walk intervention we are not able to differentiate between the effects of light physical activity and natural surroundings. However, theoretical background from environmental psychology and the evidence of the benefits of natural environments compared to urban environments, support the benefits of natural over urban environments for well-being (Berto, 2014; Hartig et al., 2014; Kaplan, 1995; Ulrich et al., 1991). We also recommend that future studies take more carefully into account how participants spend their lunch breaks on the days when they do not complete the intervention exercise. Future intervention studies should also pay more attention to the autonomous choice of the recovery activity, as self-chosen break activities have been shown to relate to greater well-being (Trougakos et al., 2014). This could mean, for example, including one intervention group where the participants can choose their intervention activity according to their own preferences.

As the compliance with the intervention protocol was measured solely using participant reports, there is some uncertainty if the participants always did exactly what they told us. However, as completing the park walk or relaxation exercise was truly voluntary (the incentives to participate were the same for those who completed no exercises and for those who completed

all the exercises), we have no reason to believe that our participants were not truthful in their reports. Future research may benefit from including co-worker reports or trackers to measure compliance, especially if they offer incentives based on the number of exercises completed.

Despite these limitations, our study has several strengths. First, it is among the first intervention studies to focus on recovery during lunch breaks. Moreover, compared to earlier intervention studies aiming at improving lunchtime recovery (Brown et al., 2014; Krajewski et al., 2010), our study had a relatively large and diverse sample, and among participants adherence to the protocol was good. Our study also broadened the scope of earlier studies by testing two different lunchtime activities and examining the role of lunchtime recovery experiences as mechanisms underlying lunchtime activities in relation to recovery outcomes. Furthermore, we focused on within-person perspective, and thus our results extend the existing research by demonstrating that employees' recovery is enhanced on days on which they engage in these lunchtime activities. Capturing these episodic situational influences on recovery (Ilies et al., 2015), our study shows that afternoon recovery depends on how employees spend their workday breaks.

Practical Implications

Our results suggest that engaging in park walks or relaxation exercises during lunch breaks may promote employees' well-being in the afternoon. Relaxation exercises could be an ideal lunch break activity on days when employees experience high work demands, as they also seem to relate to better detachment on lunch breaks, which in turn relates to higher levels of concentration in the afternoon. Park walks may be ideal when employees long for a change of scenery and more enjoyment during lunch breaks, as park walks are related to higher levels of enjoyment, which in turn is related to increased well-being in the afternoon. Additionally, as our participants were randomized to the intervention groups, they were not able to choose the lunchtime activities according to their own preferences. In practice the effects might be even

greater if the employees are free to choose their preferred activities (Trougakos et al., 2014). Offering employees instructions and an extra 15 minutes during lunch breaks to engage in these activities may be one way for organizations to enhance and maintain occupational well-being.

Conclusions

Our study contributes to the literature by demonstrating the importance of lunchtime activities and experiences for recovery from work. As current working life is very demanding, it is important to gain theory-based knowledge on how to successfully recover from work during workday breaks. Our results show that lunchtime park walks and relaxation exercises are related to better well-being before leaving work. Enjoyment seems to function as an underlying mechanism through which park walking relates to better afternoon well-being, while detachment from work appears to be of more importance in mediating the benefits of relaxation exercises.

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Time of day		Baseline	Intervention	Intervention	Follow-up	Follow-up	
Morning		PP	PP	PP	PP	PP	
Lunch			15 min park walk or relaxation Booklet	15 min park walk or relaxation Booklet			
Afternoon	Training & Online questionnaire	SMS	SMS	SMS	SMS	SMS	Online questionnaire
Evening		PP	PP	PP	PP	PP	
Week		Week 19 or Week 36	Week 20 or Week 37	Week 21 or Week 38	Week 22 or Week 39	Week 24 or Week 41	

Figure 1. Study design. Daily data were collected twice a week, on Tuesdays and Thursdays. The intervention exercise was completed every day from Monday to Friday during the two intervention weeks. During the 10 intervention days the participants completed an additional booklet reporting compliance with the intervention protocol. Participants took part either in the spring (weeks 19-24) or in the fall (weeks 36-41). SMS = SMS-questionnaire sent to participants' cell phones; PP = pencil-and-paper questionnaire.

Table 1. *Means, standard deviations, and zero-order correlations between study variables*

	M	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 Sleep quality	3.42	0.63		.07*	.00	.04	.00	.01	.08*	.07*	-.03	-.14***					
2 Work demands	3.16	0.59	-.03		-.10**	-.00	.01	-.08*	-.04	-.05	.21***	.03					
3 Lunch break length	29.95	7.76	-.14	.13		.28***	.21***	.19***	.35***	.06	-.06	-.07					
4 Park walking [a]	0.24	0.23	-.00	-.02	.12		-.01	.10**	.17***	.10**	-.10**	-.06					
5 Relaxation exercise [b]	0.21	0.24	.00	.14	-.01	-.75***		.12***	.07*	.11**	-.12**	-.16***					
6 Lunchtime detachment	3.02	0.83	.14	-.20*	.07	.11	-.07		.50***	.19***	-.11**	-.15***					
7 Lunchtime enjoyment	3.84	0.61	.15	-.15	.07	.08	.03	.64***		.20***	-.12**	-.21***					
8 Concentration	4.69	0.97	.38***	-.20*	-.22*	-.12	.18	.21*	.36***		-.31***	-.44***					
9 Strain	3.75	1.04	-.19	.13	.26**	.01	-.04	-.27**	-.31**	-.50***		.31***					
10 Fatigue	3.81	1.15	-.39***	.03	.23*	.04	-.02	-.08	-.13	-.53***	.58***						
11 Age	46.84	9.57	.09	-.06	-.28**	.05	-.01	.13	.19	.41***	-.17	-.28**					
12 Exhaustion	1.93	1.12	-.16	.03	-.06	.09	-.12	-.26*	-.28**	-.35***	.43***	.34***	.01				
13 Workload	3.82	0.79	.14	.16	-.18	.05	.06	-.29**	-.19	-.05	.14	.03	.08	.44***			
14 Autonomy	3.33	0.78	-.02	.03	.11	.10	-.08	.17	.16	.09	-.07	.01	-.05	-.42***	-.49***		
15 Number of exercises [c]	8.56	1.41	.20*	-.20*	-.12	-.01	.12	.13	.15	.25*	-.22*	-.29**	.10	-.22*	-.08	-.04	
16 Average duration [d]	14.59	2.33	-.17	-.02	.06	.27*	-.24*	.02	-.11	-.18	.13	.04	.06	.24*	.06	-.06	.01

Note. Correlations below the diagonal are between-person level correlations (person means aggregated over the repeated daily observations; $N = 97$), correlations above the diagonal are within-person (day level) correlations ($N = 970$). [a] 0 = no, 1 = yes, a park walk during lunch break; [b] 0 = no, 1 = yes, a relaxation exercise during lunch break; [c] number of completed intervention exercises during the two intervention weeks; [d] = the average duration of intervention exercises during the two intervention weeks.
*** $p < .001$, ** $p < .01$, * $p < .05$.

Table 2

Multi-level regression analyses predicting afternoon concentration

	Model 1			*Model 2*			*Model 3*			*Model 4*		
	Est	*SE*	*t*	*Est*	*SE*	*t*	*Est*	*SE*	*t*	*Est*	*SE*	*t*
Intercept	4.59	.13	35.79	4.58	.13	35.49	4.47	.16	28.36	4.50	.16	29.01
Time	.02	.02	1.28	.02	.02	1.21	.03	.02	1.69†	.03	.02	1.86†
Sleep quality				.08	.05	1.82†	.09	.05	1.82†	.07	.05	1.43
Work demands				-.08	.06	-1.43	-.09	.06	-1.57	-.07	.06	-1.24
Lunch break length				.01	.004	1.19	-.0001	.005	-.03	-.01	.01	-1.38
Park walking [a]							.36	.12	2.98**	.31	.12	2.61**
Relaxation exercise [b]							.37	.13	2.96**	.34	.12	2.78**
Lunchtime detachment										.11	.05	2.27*
Lunchtime enjoyment										.16	.06	2.62**
Level-1 intercept variance (SE)	.98 (.99)			.97 (.99)			.91 (.95)			.88 (.94)		
Pseudo R^2 (Level-1)				.01			.08			.10		
BIC	2477.06			2372.40			2157.31			2146.16		
AIC	2444.59			2326.56			2094.53			2065.66		
-2*log(lh)	2430.58			2306.56			2066.53			2029.66		

Note. All variables were measured at the day level. [a] 0 = no, 1 = yes, a park walk during lunch break; [b] 0 = no, 1 = yes, a relaxation exercise during lunch break. BIC = Bayesian Information Criterion; AIC = Akaike's Information Criterion. When comparing nested models, the smallest indices indicate the best model fit.
*** $p < .001$, ** $p < .01$, * $p < .05$, † < .10.

Table 3

Multi-level regression analyses predicting afternoon strain

	Model 1			*Model 2*			*Model 3*			*Model 4*		
	Est	*SE*	*t*	*Est*	*SE*	*t*	*Est*	*SE*	*t*	*Est*	*SE*	*t*
Intercept	3.85	.15	25.27	3.84	.15	25.09	4.00	.19	21.51	3.96	.18	21.92
Time	-.02	.02	-.81	-.01	.02	-.43	-.02	.02	-1.14	-.02	.02	-1.10
Sleep quality				-.06	.07	-.85	-.07	.07	-1.02	-.05	.07	-.74
Work demands				.45	.08	5.34***	.56	.09	6.31***	.54	.09	6.09***
Lunch break length				-.003	.01	-.60	.004	.01	.63	.01	.01	1.31
Park walking [a]							-.34	.17	-1.97*	-.29	.17	-1.68†
Relaxation exercise [b]							-.60	.18	-3.37**	-.59	.18	-3.31**
Lunchtime detachment										-.06	.07	-.93
Lunchtime enjoyment										-.15	.09	-1.65†
Level-1 intercept variance (SE)	2.24(1.50)			2.12 (1.46)			2.01 (1.42)			1.99 (1.41)		
Pseudo R^2 (Level-1)				.05			.10			.11		
BIC	2934.31			2807.34			2564.41			2565.59		
AIC	2911.14			2770.71			2510.64			2494.11		
-2*log(lh)	2901.14			2754.71			2486.64			2462.11		

Note. All variables were measured at the day level. [a] 0 = no, 1 = yes, a park walk during lunch break; [b] 0 = no, 1 = yes, a relaxation exercise during lunch break. BIC = Bayesian Information Criterion; AIC = Akaike's Information Criterion. When comparing nested models, the smallest indices indicate the best model fit.
*** $p < .001$, ** $p < .01$, * $p < .05$, † < .10.

Table 4

Multi-level regression analyses predicting afternoon fatigue

	Model 1			*Model 2*			*Model 3*			*Model 4*		
	Est	*SE*	*t*	*Est*	*SE*	*t*	*Est*	*SE*	*t*	*Est*	*SE*	*t*
Intercept	3.82	.15	25.49	3.78	.15	24.62	3.82	.19	20.33	3.81	.19	20.14
Time	-.00	.02	-.24	.01	.02	.42	-.002	.02	-.09	-.001	.02	-.07
Sleep quality				-.23	.06	-3.97***	-.24	.06	-4.08***	-.21	.06	-3.58**
Work demands				.07	.07	.96	.11	.08	1.39	.08	.08	1.06
Lunch break length				-.01	.01	-.99	-.0003	.01	-.05	.01	.01	1.13
Park walking [a]							-.15	.15	-1.01	-.06	.15	-.42
Relaxation exercise [b]							-.59	.16	-3.71***	-.58	.16	-3.73***
Lunchtime detachment										-.06	.06	-.92
Lunchtime enjoyment										-.28	.08	-3.50*
Level-1 intercept variance (SE)	1.67 (1.29)			1.62 (1.27)			1.56(1.25)			1.51 (1.23)		
Pseudo R^2 (Level-1)				.03			.06			.09		
BIC	2790.51			2669.53			2450.88			2448.05		
AIC	2767.29			2632.82			2397.03			2376.45		
-2*log(lh)	2757.29			2616.82			2373.03			2344.45		

Note. All variables were measured at the day level. [a] 0 = no, 1 = yes, a park walk during lunch break; [b] 0 = no, 1 = yes, a relaxation exercise during lunch break. BIC = Bayesian Information Criterion; AIC = Akaike's Information Criterion. When comparing nested models, the smallest indices indicate the best model fit.
*** $p < .001$, ** $p < .01$, * $p < .05$, † $< .10$.

Footnotes

1 We use the term affect as a synonym for emotions or feelings, excluding drive states (similarly to Ulrich, 1983). We use mood for more sustained emotional states (i.e., lasting for many hours, days, or weeks).

2 To make sure that including daily control variables in the models did not cause any inflated effects, we also tested the relationships between predictor, mediator, and each outcome without them. There were no decisive changes in the results.