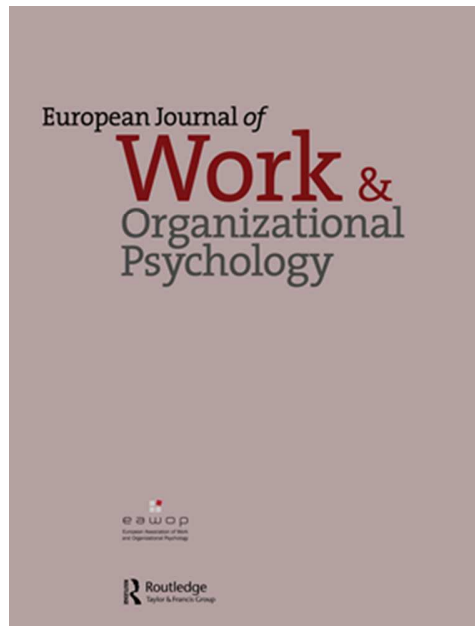


# ULRR

## Energizing respites from work: a randomized controlled study on respite interventions.

Item Type	Article
Authors	Steidle, Anna;González-Morales, Gloria M.;Hoppe, Annekatriin;Michel, Alexandra;O'Shea, Deirdre
Citation	European Journal of Work and Organizational Psychology;26 (5), pp. 650-662
Publisher	Taylor & Francis - Routledge
Download date	2026-03-06 14:32:11
Item License	<a href="https://creativecommons.org/licenses/by-nc-sa/1.0/">https://creativecommons.org/licenses/by-nc-sa/1.0/</a>
Link to Item	<a href="https://hdl.handle.net/10344/6443">https://hdl.handle.net/10344/6443</a>



**Energizing respites from work: A randomized controlled study on respite interventions**

Journal:	<i>European Journal of Work and Organizational Psychology</i>
Manuscript ID	EWO 169.16.R3
Manuscript Type:	Original Article
Keywords:	energy management, vigor, savoring nature, progressive muscle relaxation, respite intervention, fatigue

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## ENERGIZING RESPITE INTERVENTIONS AT WORK

Energizing respites from work: A randomized controlled study on respite interventions

**Abstract**

Increasing and new work demands drain employees' energy resources at work. This four-week longitudinal field experiment investigated the energizing potential of a respite intervention conducted at the workplace (either a simulated savoring nature intervention or a progressive muscle relaxation intervention). First, growth modeling analyses confirmed a linear trend for the growth of vigor and decline in fatigue across the days of the intervention group, indicating a typical upward resource trajectory. No changes appeared in the control group. Mediation analyses indicated that repeatedly engaging in a daily respite intervention influenced more stable energy levels after the intervention period indirectly through the immediate changes in daily energy levels during the intervention period. Findings suggest that, in some cases, respite interventions may present a useful tool to replenish and build energy resources at work. Implications for using respite intervention in organizational research and practice are discussed.

*Keywords:* energy management, vigor, fatigue, savoring nature, progressive muscle relaxation, respite intervention

## ENERGIZING RESPITE INTERVENTIONS AT WORK

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**Energizing respites from work: A randomized controlled study on respite interventions**

Due to increasing and new work demands more and more employees feel exhausted, stressed and burned out, which endangers not only employee health and well-being, but also an organization's productivity and innovation (e.g. Fritz, Lam, & Spreitzer, 2011; Pfeffer, 2010). This link between employees' energy and organizational outcomes becomes increasingly relevant because knowledge workers' performance depends on their ability and willingness to produce knowledge, which is closely related to individual's mood, motivation, and perseverance (Newell, Robertson, Scarbrough, & Swan, 2009). Moreover, longer working hours reinforce employees' need to conserve their energy. As a result, protecting, replenishing, and managing energy resources (i.e. promoting the human dimension of sustainability; Pfeffer, 2010) has become a crucial goal for individuals and organizations. This struggle for energy can be understood in the broader frame of the conversation of resources theory (COR; Halbesleben, Neveu, Paustian-Underdahl, & Westman, 2014; Hobfoll, 1989), which proposes a general motivation to protect current resources and acquire new resources.

Human energy is scarce and valuable because all acts depend on this resource (e.g. persistence on boring tasks, emotion control; for a recent overview see Quinn, Spreitzer, & Lam, 2012). Quinn et al. (2012) show that vigor and fatigue can be considered as two types of energetic activation in organizations. Energetic activation at work is defined as "the subjective component of the bio-behavioral system of activation experienced as vitality, vigor, enthusiasm, zest, etc." (Quinn et al., 2012, p. 341), which accounts for the degree to which people feel energized, rather than an objective indicator of their physical energy (Quinn et al., 2012). Vigor can be defined as an intrinsic energy resource (Gorgievski & Hobfoll, 2008), experienced as "high levels of energy and mental resilience while working" (Bakker, Demerouti, & Sanz-Vergel, 2014, p. 391). Fatigue refers to a state of being tired

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(Barnes & Van Dyne, 2009), and is an adaptive response of an individual, which causes attention to shift from the external environment towards internal cues, with the purpose of resource conservation (Gorgievski & Hobfoll, 2008; Hancock & Desmond, 2001).

Energy management represents a pressing and constant challenge for workers (Fritz et al., 2011; Zacher, Brailsford, & Parker, 2014). For example, Kühnel, Zacher, de Bloom, & Bledow (2016) suggested that a self-initiated work break helps to restore energetic and self-regulatory resources, and demonstrated that taking self-initiated short breaks from work in the afternoon boosted daily work engagement. Only recently, studies have suggested that micro-activities, which can be performed across the workday, can support sustainable daily energy management at work (Clauss et al., 2016; Kinnunen, Feldt, de Bloom, & Korpela, 2015). To the best of our knowledge, no other research has evaluated whether micro-intervention can also be designed to promote respite from work. Thus, the aim of this study is to design two short daily respite interventions and to examine the extent to which these impact energetic activation in the form of vigor and fatigue.

We define *respite intervention* as a micro-intervention with a length of 5 to 10 minutes that can be completed at the workplace and gives an employee a reprieve from work, during which employees shift their attention away from work tasks (Hunter & Wu, 2015; Kühnel et al., 2016). We focus on two types of respite intervention: savoring nature and progressive muscle relaxation. With our study we seek to advance theory and research in three ways. First, past research on respites has mainly focused on employee's formal work breaks, demonstrating that whether recovery from work during breaks is effective depends on the activities people perform during this time and how they perceive these activities (Trougakos & Hideg, 2009; Zacher et al., 2014). Other research has focused on natural break activities (Kinnunen et al., 2015; Trougakos, Hideg, Cheng, & Beal, 2014; Zacher et al., 2014), on break interventions which were longer, could only be completed away from the

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workplace (e.g., de Bloom, Kinnunen, & Korpela, 2014), or interventions completed after work (Bono, Glomb, Shen, Kim, & Koch, 2013; Pilotti, Klein, Golem, Piepenbrink, & Kaplan, 2015). However, we aim to investigate if individuals can be trained to engage in respites from work during the day (i.e. short periods of rest or relief, which restore their energy resources).

Second, conservation of resources theory (Hobfoll, 1989) proposes that gains in resources are likely to facilitate further resource gain. Our study provides an empirical test of this assumption by evaluating the upward resource trajectory: examining the linear trend for the growth of vigor and the decline in fatigue over a period of ten days. Furthermore, we investigate whether these trajectories translate into more stable resource gains following the intervention period. Thus, we propose that respite interventions work by directly influencing employees' energy resources or energetic activation (Quinn et al., 2012). To understand the process, we focus on (i) the cumulative gain of energy resources over time and (ii) the translation of these immediate gains into more stable increases in energy resource levels.

Third, we utilize a randomized controlled trial (RCT) design following recent calls to strengthen research designs examining interventions in work environments (O'Shea, O'Connell, & Gallagher, 2016). Such designs are relatively rare in organizational studies, but are considered the gold standard in health research (Richardson & Rothstein, 2008). Overall, we contribute to furthering our understanding of the role of micro-interventions on personal resources at work (Clauss et al., 2016; Michel, O'Shea, & Hoppe, 2015).

### Cumulative effects of respite interventions

Resources are "anything perceived by the individual to help attain his or her goals" (Halbesleben et al., 2014, p. 1338). Our main idea is that respite interventions provide a resource that helps to recover and build up energy levels. Energy (i.e. energetic activation, Quinn et al., 2012) itself can be seen as a rather volatile personal resource, which can change

## ENERGIZING RESPITE INTERVENTIONS AT WORK

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3 quickly (Halbesleben et al., 2014; ten Brummelhuis & Bakker, 2012). We expect that respite  
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5 interventions will unfold their energizing effect over time leading to a cumulative effect.  
6  
7 Although single events may lead to a dramatic loss of energy (Zohar, Tzischinski, & Epstein,  
8  
9 2003), energy levels, like other resources, generally change over time (Halbesleben et al.,  
10  
11 2014; Hülshager, 2016; Sonnentag, 2003). A stable increase in resources requires repetition,  
12  
13 in a similar way that exercise needs to be repeated in order to translate into stable increases in  
14  
15 fitness levels. Thus, we expect that the more times participants engage in a respite activity,  
16  
17 the more energetic they will feel. Building on COR theory (Hobfoll, 1989), energy gains due  
18  
19 to repeated exercise of a respite intervention can be described as a typical upward resource  
20  
21 trajectory. Recent research has demonstrated that short daily interventions can indeed lead to  
22  
23 such an upward resource trajectory (Pogrebtsova et al., in press).  
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26  
27 *Hypothesis 1: Those in the respite intervention group will demonstrate (a) a sharper positive*  
28  
29 *growth curve in daily vigor and (b) a sharper negative growth in daily fatigue over the*  
30  
31 *course of the intervention period, compared to the control group.*  
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**Translating immediate resource gains into stable energy resources**

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36 In addition to the daily building of resources, high energy levels over a longer time  
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38 period are also important to consider as they are part of more stable personal resources,  
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40 which comprise not only skills and knowledge, but also health, well-being and experiences  
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42 (ten Brummelhuis & Bakker, 2012). Hence, high levels of vigor and low levels of emotional  
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44 exhaustion during a longer period of time (weeks or months) can be seen as indicators of  
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46 stable resources like health and well-being.  
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50 Daily vigor and fatigue may translate into more stable manifestations, and this is  
51  
52 important for longer-term management of energy resources at work. For example, vigor has  
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54 been shown to fluctuate across the workday, and such daily fluctuations are influenced by  
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56 one's general or trait level of vigor (Sonnentag & Niessen, 2008). Thus, vigor is both a trait  
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3 and a state concept, meaning that it has both individual and within-individual variation  
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5 (Sonnentag & Niessen, 2008). In a similar manner, burnout is considered an end-state or  
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7 syndrome experienced by workers overwhelmed by the demands of their work (Leiter, 1992;  
8  
9 Xanthopoulou & Meier, 2014) and a dynamic phenomenon (Dunford, et al., 2012) that can be  
10  
11 examined in a daily basis (Sonnentag, 2005). At this level, burnout can be considered as daily  
12  
13 experiences of exhaustion, cynicism and reduced personal efficacy (Xanthopoulou & Meier,  
14  
15 2014). Daily fatigue, has similarities with the daily exhaustion component of daily burnout,  
16  
17 but is less extreme (Van Hooff, Guerts, Kompier, & Taris, 2007).  
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20  
21 We propose that engaging in a respite intervention at work will promote immediate  
22  
23 energy resources (i.e. increase daily vigor and reduce daily fatigue after the respite activity)  
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25 compared to the control condition, which will in turn, be translated into a stable resource gain  
26  
27 over time after the intervention is completed (see Figure 1). This idea is in line with a  
28  
29 previous finding showing that the cumulative experience of daily resources promoted the  
30  
31 development of more stable resources (Cohn, Fredrickson, Brown, Mikels, & Conway,  
32  
33 2009). Conversely, from a COR perspective, burnout results through the continued loss or  
34  
35 threat to resources or the insufficient return of resources following an investment of resources  
36  
37 (Halbesleben & Buckley, 2004). We expect our resource interventions to prevent this  
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39 continued resource loss: Thus, we hypothesize:  
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42  
43 *Hypothesis 2a: Engaging in a respite intervention will increase afternoon vigor, which will*  
44  
45 *indirectly lead to an increase in vigor after completion of the intervention period.*  
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48 *Hypothesis 2b: Engaging in a respite intervention will decrease evening fatigue, which will*  
49  
50 *indirectly lead to a decrease in exhaustion after completion of the intervention period.*  
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### 52 **Creating a respite intervention**

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54 What kinds of respite activities provide a good basis for a respite intervention? When  
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56 employees are fatigued and need to restore their energy at work, they often try to relax (e.g.,  
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3 napping, closing eyes for a moment) or savor nature (e.g., looking out of the window, going  
4 for a walk; e.g., Fritz et al., 2011). Both activities can be performed in a great variety of ways  
5 and have been turned into interventions, which have been investigated in work, health, and  
6 environmental psychology. Hence, these activities may possess the potential to create small  
7 respite interventions, which support employee's energy resources even when performed for a  
8 short time at the work desk. We thus focused on these two interventions in the present study.  
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16 First, the restorative benefits of nature, and in particular its positive effects for health,  
17 have been widely acknowledged and researched (for a recent overview see Hartig, Mitchell,  
18 de Fries, & Frumkin, 2014). Exposure to nature promotes restoration and the recovery of  
19 depleted energy resources (Beute & de Kort, 2014), but is not restricted to contact with real  
20 natural sites, and can include indirect exposure through simulations of natural environments  
21 in the form of media, scents, or sounds of nature (Keniger, Gaston, Irvine, & Fuller, 2013).  
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30 Few studies have investigated the restorative effects of simulated natural stimuli in the  
31 work context. In one cross-sectional study with university employees (Largo-Wight, Chen,  
32 Dodd, & Weiler, 2011), indirect nature contact through exposure to photographs or sounds  
33 was negatively related to perceived stress. In another study conducted in a simulated open  
34 plan office (Jahncke, Hygge, Halin, Green, & Dimberg, 2011), participants worked for two  
35 hours and then took a 7-minute break in one of four different restorative conditions: (1)  
36 nature movie with river sounds, (2) river sounds only, (3) silence, and (4) noise. Watching the  
37 nature video improved self-rated energy compared to only listening to the river sound or  
38 continued noise. Korpela, de Bloom and Kinnunen (2015) point out the potential of using  
39 natural environments and stimuli for recovery at work through exposure to nature during the  
40 workday, which provide interesting opportunities for respite interventions. Hence, savoring  
41 nature, even through indirect contact, may be suitable way of creating short respites at work.  
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## ENERGIZING RESPITE INTERVENTIONS AT WORK

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3 Second, the use of relaxation techniques has frequently been associated with  
4 improved well-being, health, and performance. A meta-analysis on stress-management  
5 training revealed that relaxation interventions are both effective and frequently used in stress  
6 prevention in clinical and non-clinical individuals (Richardson & Rothstein, 2008). However,  
7 few studies have considered the benefits of training workers to relax during work breaks,  
8 although doing so has been shown to reduce end-of-workday fatigue (Trogakos et al., 2014).  
9 To our knowledge, only one study directly tested relaxation interventions in the work context,  
10 demonstrating a reduction in strain for the Progressive Muscle Relaxation (PMR) group  
11 compared to a ‘small talk’ break group (Krajewski, Wieland, & Sauerland, 2010).  
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23 Despite these first steps, there is still much to learn about implementing savoring  
24 nature and relaxation interventions in the workplace. Specifically, we need to understand  
25 whether very short daily exercises during work promote energy resources among employees.  
26 Overall, savoring nature and relaxation interventions may well be able to offer an energizing  
27 respite from work, which also helps to fuel energy levels over time.  
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### Method

#### Sample

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36 To recruit participants, administrative employees and knowledge workers from  
37 different companies in and around Stuttgart, Germany, were approached via company  
38 mailing lists or individually and invited to participate in the study. The companies were  
39 informed about the study goals and procedure beforehand and supported it. Depending on  
40 company regulations, the works councils were informed and gave permission. Potential  
41 participants were informed about the goals and procedures of the study, the benefits of small  
42 respite interventions, and practical considerations such as confidentiality, the length of the  
43 study, and the training sessions. Participants received no payment for their participation.  
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56 A total of 122 employees arranged a personal meeting to learn more about the study.  
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3 Five of the 122 employees did not attend the first meeting and were excluded from the  
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5 sample. Participants ( $N = 117$ ) who attended this first meeting were randomly assigned to a  
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7 respite intervention group ( $N = 78$ ; savoring nature intervention group SNI  $N = 39$ ;  
8  
9 progressive muscle relaxation intervention group PMRI  $N = 39$ ) or the waitlist control group  
10  
11 (CG;  $N = 39$ ). Randomization was held constant within each organization to avoid  
12  
13 organization effects. A total of 35 individuals dropped out after the first meeting (refer to  
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15 Figure 2 for reasons). The final sample consisted of 82 participants comprising 52 individuals  
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17 in the respite intervention group (SNI  $N = 26$ , PMRI  $N = 26$ ), and 30 individuals in the CG  
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19 (see Figure 2 for the Consort flow diagram; Moher, Schulz, & Altman, 2001; Schulz, Altman,  
20  
21 & Moher, 2010). No differences in dropout between conditions were found ( $\chi^2(2, 117) =$   
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23  $1.31, p = .52$ ). Analyses of trait differences between compliant and non-compliant  
24  
25 participants revealed no differences before the intervention for exhaustion ( $t(115) = -1.25, p$   
26  
27  $= .213$ ) or vigor ( $t(115) < 1, p = .809$ ; see Table 1 for means and SD).

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32 Participants in the final sample were 36 women and 46 men with a mean age of 36.94  
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34 years ( $SD = 11.40$ ), average job tenure of 7.14 years ( $SD = 6.84$ ), and an average weekly  
35  
36 work time of 41 hours ( $SD = 8.05$ ). Most participants were permanently employed (87.8.2%)  
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38 full-time employees (89.0%) who reported a university degree as their highest educational  
39  
40 qualifications (6.1% PhD; 37.8% Master degree; 17.1% Bachelor degree; other  
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42 qualifications: 23.2 % completed professional training; 15.9% high school diploma).

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45 Participants worked in a wide variety of sectors.

#### 46 47 48 **Procedure**

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50 The study lasted four weeks overall: In week 1, participants had the first meeting  
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52 where they completed the baseline survey and were subsequently trained in one of the two  
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54 interventions (if in the intervention group). In weeks 2 and 3, participants completed the daily  
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56 measures and the interventions (for the intervention group). In week 4, participants  
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3 completed the post-questionnaire.

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5 Using standardized manuals, trained researchers explained and practiced the  
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7 interventions with the intervention participants in order to facilitate their practice and avoid  
8  
9 potential difficulties (Andersson, Carlbring, Berger, Amlöv, & Cuijpers, 2009). At the first  
10  
11 meeting, participants received a diary booklet including the written instructions for one of the  
12  
13 respite interventions and a flyer describing the procedures and including the links to the  
14  
15 online surveys and online interventions. The audio files included in the interventions could be  
16  
17 accessed via the internet using all kinds of internet-enabled devices (e.g., computer,  
18  
19 smartphone, iPads etc.) and listened to privately using ear plugs. Participants were free to  
20  
21 choose between the online and the paper-and-pencil versions of diary survey and intervention  
22  
23 manuals. Daily emails (three in the intervention groups and two in the CG) reminded  
24  
25 participants to complete the surveys and intervention at the appropriate times of the day.  
26  
27 After completion of the study, CG participants received training in both interventions.  
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32 All participants answered two general online surveys: one assessing demographic  
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34 information and baseline measures in the week before starting the diaries and another  
35  
36 assessing the post measures in the week after finishing the diaries. Participants completed  
37  
38 daily surveys on 10 consecutive work days during April 2013. Each day, participants were  
39  
40 asked to assess their current well-being in the morning before starting work (morning survey)  
41  
42 and in the evenings after at least two hours of leisure time (evening survey). Additionally,  
43  
44 participants in the intervention group were instructed to do their respective intervention  
45  
46 during their lunch break as previous research has shown that relaxing interventions during  
47  
48 lunch breaks are more effective than interventions at other times (Krajewski et al., 2010).  
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51 **Respite intervention.** Participants executed one of two respite interventions: savoring  
52  
53 nature (SNI) or progress muscle relaxation (PMRI). The SNI combined the presentation of  
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55 auditory stimuli of a natural environment with a guided imagination technique (Gierra &  
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3 Klinkenberg, 2005), using positive imagination and visualization processes to provide  
4 relaxation and detachment. To facilitate the savoring of a natural environment, participants  
5 listened to a natural soundscape while completing the interventions (Alvarsson, Wiens, &  
6 Nilsson, 2010; Ratcliffe, Gatersleben, & Sowden, 2013). Participants could choose between  
7 five natural soundscapes, which had the highest restorative potential in a pilot study with ten  
8 participants: bird song, bird song at a forest stream, rain forest, seagulls at the seaside, and  
9 summer rain. To facilitate focusing on the intervention, the intervention started with a short  
10 mindfulness component in which participants were instructed to concentrate on their  
11 breathing for a few moments (Michel, Bosch, & Rexroth, 2014). The subsequent imagination  
12 intervention requested participants to first imagine the natural surroundings and perceive their  
13 environment with their different senses (adapted from Gierra & Klinkenberg, 2005).  
14  
15 Participants were instructed to fully immerse themselves in the situation and enjoy it in order  
16 to promote the savoring component of the intervention and to help participants to focus on  
17 the positive experience. After two additional minutes of savoring, the intervention ended with  
18 another mindfulness section to soften the transition from imagination to reality. Participants  
19 were instructed to concentrate on the here and now, deepen their breathing and start moving  
20 their fingers. During the intervention phase, participants could chose to listen to natural  
21 sounds with instructions (7:54 minutes) or without instructions.  
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43 As described for the SNI, the PMRI started with a first short mindfulness component  
44 followed by the muscle relaxation intervention and ended with the described savoring  
45 intervention and second mindfulness section. Participants could choose to do the PMRI either  
46 by following verbal instructions (7:05 min.) and listening to relaxing music (7:05 min.) or by  
47 instructing themselves while listening to the same music file or by not using any audio file.  
48  
49 Instructions for self-intervention were given in the booklet. Progressive Muscle Relaxation is  
50 an established and widely applied relaxation technique, which uses tension and relaxation of  
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3 different muscle groups. Following the shortened PMR protocol by Bernstein and Borkovec  
4  
5 (2002), participants progressed through a series of 7 muscle contraction-relaxation sequences  
6  
7 starting with the dominant arm followed by the non-dominant arm, the facial muscles, the  
8  
9 neck muscles, the muscles of the torso, the dominant leg and ending with the non-dominant  
10  
11 leg. Each group of muscles was contracted for 5 to 7 seconds followed by relaxation of the  
12  
13 muscles for 20 seconds in each sequence. Crucial for the positive impact was that participants  
14  
15 experienced and savored the difference between the tension and the relaxation.  
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17

**Pre-Post Assessments**

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20 The two general online surveys in the weeks before and after the two intervention  
21  
22 weeks included measures of vigor, exhaustion, and demographic items including age, gender,  
23  
24 tenure, and level of education. Vigor and exhaustion served as contrasting indicators of  
25  
26 energetic activation (Quinn et al., 2012). Cronbach alpha coefficients are shown in Table 1.  
27  
28

29  
30 **Vigor** was assessed with the vigor subscale of the *Utrecht Work Engagement Scale*  
31  
32 (UWES- 9; Schaufeli, Bakker, & Salanova, 2006). Participants rated three statements on a 7-  
33  
34 point scale (1=*never*, 7 = *always*). A sample item is “At my job, I feel strong and vigorous”.  
35

36  
37 **Emotional exhaustion** was measured with the *Maslach Burnout Inventory – General*  
38  
39 *Survey* (MBI-GS, Maslach & Jackson, 1986; Schaufeli, Leiter, Maslach, & Jackson, 1996;  
40  
41 German translation: Enzmann & Kleiber; 1989). The participants were asked to rate five  
42  
43 statements on a six-point Likert scale (1 = *never*, 6 = *every day*). A sample item is “I feel  
44  
45 emotionally drained by my work”.  
46

47  
48 As emotional exhaustion and vigor are highly related variables, we conducted  
49  
50 confirmatory factor analyses with the T1 study variables using MPLUS 7.3. We found that  
51  
52 the two-factor model with independent but correlated factors for vigor and emotional  
53  
54 exhaustion showed an acceptable fit to the data ( $\chi^2(19, N= 83) = 40.90, p = .01; CFI = 0.95;$   
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3 RMSEA = 0.12; SRMR = .06) and was superior to a one-factor model combining vigor and  
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5 exhaustion ( $\chi^2(20, N= 83) = 113.20, p = .001$ ; CFI = 0.77; RMSEA = 0.24; SRMR = .12).

### 7 8 **Daily Assessments**

9  
10 During the two intervention weeks, all participants assessed their energy levels in  
11  
12 morning upon starting work, and after work by completing evening diaries. Vigor and fatigue  
13  
14 served as momentary indicators of energy resources. Finally, participants in the intervention  
15  
16 group rated the intervention experience after intervention completion during the lunch break.

17  
18 **Afternoon vigor.** Participants rated their levels of vigor referring to their working  
19  
20 time after lunch in the afternoon. Afternoon vigor was assessed with the three-item vigor  
21  
22 subscale of the UWES-9 on a five-point Likert scale (1 = *strongly disagree*, 5 = *strongly*  
23  
24 *agree*). We adapted the items to measure momentary fluctuations in vigor following the  
25  
26 procedure by Bakker and Xanthopoulou (2009; e.g., “This afternoon at work, I felt bursting  
27  
28 with energy.”).

29  
30  
31 **Evening fatigue** was measured with the item “How fatigued do you currently feel?”  
32  
33 on a five-point Likert scale (1 = *not at all tired*, 5 = *very tired*). The validity of this single-  
34  
35 item measure has been previously established (Van Hooff et al, 2007).

### 36 37 **Analysis Strategy**

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39  
40 SNI and PMRI were treated as one respite intervention condition because we had  
41  
42 parallel hypotheses for the effects and underlying mechanisms of both interventions. Due to  
43  
44 the rather small number of participants per intervention group, we did not analyze the two  
45  
46 groups separately as we had initially planned.<sup>1</sup> Treating SNI and PMRI participants as one  
47  
48 respite intervention condition was possible because the groups did not differ in vigor or  
49  
50 emotional exhaustion before and after the intervention (all  $t$ 's < 1.75, all  $p$ 's > .05). There  
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52 were no differences in the number of completed respite exercises between the SNI ( $M = 9.08$ ,  
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<sup>1</sup> We thank an anonymous reviewer for this suggestion.

## ENERGIZING RESPITE INTERVENTIONS AT WORK

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3  $SD = 1.23$ ) and PMRI groups ( $M = 9.12$ ,  $SD = 1.21$ ;  $t(50) = -0.11$ ,  $p = .91$ ). Hence, there was  
4  
5 no reason to consider the intervention activities separately.  
6

7 Hypothesis 1 was tested through growth modeling, using random coefficient models  
8 and following the sequence suggested by Bliese and Ployhart (2002) with R (R Core Team,  
9 2014) using the multilevel package (Bliese, 2013a). The two daily dependent variables  
10 (afternoon vigor and evening fatigue) were nested within participants. Two separate two-  
11 level growth modeling sequences were estimated, one for afternoon vigor (658 days) and  
12 another for evening fatigue (654 days). Each participant responded an average of 8.2 days.  
13 Each growth modeling sequence started with the estimation of increasingly complex models  
14 and Log likelihood tests to compare the goodness of fit across the models to ensure the  
15 greatest power and parsimony (Bliese & Ployhart, 2002). Net increases in log likelihood  
16 values were examined to make decisions about model fit in relation to random or fixed  
17 intercepts, random or fixed slopes and autocorrelation. Before adding level 2 predictors, we  
18 examined: 1) the null-model to check intercept variation (participants randomly vary or not in  
19 terms of their mean levels of the dependent variable), 2) the form of the level-1 relationship  
20 between time and the dependent variable (model 1 indicates if the relationship is positive or  
21 negative; linear, quadratic or cubic), 3) if the strength of the relationship between time and  
22 the dependent variable randomly varies among individuals, and 4) if there is significant  
23 autocorrelation in the data. Once this was checked, the next step was to add level-2 variables  
24 (e.g., condition) to explain the random variation in intercepts (model 2, explain differences in  
25 mean levels of the dependent variable) and to add the interaction between time and condition  
26 to explain the time-dependent variable slope (model 3, explains the differences between  
27 slopes based on condition).<sup>2</sup>  
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57 <sup>2</sup> A more detailed description of this process can be found in Bliese and Ployhart (2002), and specific  
58 instructions on how to run it in R are available from Bliese (2013b).  
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3 We expected that participants in the intervention condition would show sharper  
4 positive growth of daily afternoon vigor and sharper negative growth of evening fatigue over  
5 the course of the two-week intervention period, in comparison to the participants in the  
6 control condition. This is indicated by a significant interaction effect between time and  
7 condition in model 3. However, given that the expected effect sizes tend to be small, simple  
8 post hoc T-tests were run to detect if the slopes for the intervention condition were  
9 significantly different from 0, and therefore not flat, so we could show the presence of  
10 cumulative effects of the intervention.  
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20 Hypothesis 2 was tested at the person level using the pre-post data and indicators of  
21 daily change of vigor and fatigue by using the estimated intercept and slopes of the growth  
22 models for each person. This operationalization of the daily changes in vigor/fatigue provides  
23 us with the necessary information to operationalize the mechanism of gains in daily energy  
24 during the intervention. In contrast to change scores, intercepts indicate the starting energy  
25 levels during the first intervention day (time 0), which can be interpreted as an initial  
26 resource gain, and slopes indicate the rate of consistent change over the days of the  
27 intervention, which can be interpreted as the cumulative resource gain. To separate between  
28 initial and cumulative resource gains, two multiple mediation models were tested, in which  
29 the intercept and the slope coefficients of afternoon vigor and evening fatigue respectively  
30 served as parallel mediators. This provides a direct connection between the growth analyses  
31 (hypothesis 1) and the mediation analyses (hypothesis 2).  
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47 The proposed mediations were tested in regression analyses using 10000 bootstrap  
48 samples (SPSS macro PROCESS, model 4; Hayes, 2013). Condition was coded as a binary  
49 variable (1 = respite intervention, 0 = control group). To test H2, condition was used as a  
50 predictor (Mediation model 1: condition → intercept of afternoon vigor (mediator 1) and  
51 slope coefficient of afternoon vigor (mediator 2) → post-intervention vigor; mediation model  
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## ENERGIZING RESPITE INTERVENTIONS AT WORK

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3 2: condition → intercept of evening fatigue (mediator 1) and slope coefficient of evening  
4 fatigue (mediator 2) → post-intervention emotional exhaustion). Pre-intervention energy  
5 levels (pre-intervention vigor in mediation model 1 and pre-intervention emotional  
6 exhaustion in mediation model 2) were included as control variables. An absence of zero in  
7 the 95% bias-corrected confidence intervals (95% BCCI) of an indirect effect indicates  
8 significant mediation. The total indirect effect describes the overall mediation effect of the  
9 two mediators and, hence, the overall mediation by the daily energy trajectories during the  
10 intervention period. Here, we expected significant total indirect effects and explored the  
11 respective contribution of initial and cumulative resource gains.  
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23 Sensitivity analyses using G\*Power version 3.9.1.2 (Faul, Erdfelder, Lang, &  
24 Buchner, 2007; Faul, Erdfelder, Buchner, & Lang, 2009) indicated that we had sufficient  
25 power to detect medium effect sizes given our sample size, hypotheses and assuming a power  
26 of .80 with alpha error probability set to .05 (Murphy, Myors, & Wolach, 2009). We  
27 additionally conducted post-hoc power analyses using G\*Power version 3.9.1.2 (Faul et al.,  
28 2007; Faul et al., 2009), which demonstrated that the observed power was higher than the  
29 conventional level of 0.80 (Murphy, Myors, & Wolach, 2009) for all analyses conducted,  
30 based on the number of predictors, sample size, observed effect size ( $f^2$ ) and alpha error  
31 probability set to .05. To save power, only the baseline energy levels were included as control  
32 variables, although this was not strictly necessary due to successful randomization of our  
33 subjects to conditions which resulted in no baseline differences in demographic variables or  
34 variables used in the analyses (see Bernerth & Aguinis, 2016 for recommendations on control  
35 variable usage). As we controlled for baseline vigor and baseline emotional exhaustion, the  
36 remaining variance which can be explained by condition and the mediators is rather small;  
37 thus, even small and marginally significant effects should be considered carefully.  
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### Results

### Preliminary Analyses

Means, standard deviations, and intercorrelations between the study variables are displayed in Table 1. Demographic variables age, sex, and working hours were not associated with any of the dependent variables (all  $r < .20$ , all  $p$ 's  $> .05$ ). Moreover, no significant differences between intervention and control group were found in sex ( $\chi^2(1) = .30, p = .59$ ), age, working hours, vigor, and exhaustion before the intervention period (all  $t$ 's  $< 1.27$ , all  $p$ 's  $> .05$ ; see Table 1 for descriptives). This indicates a successful randomization between intervention and control group. On average, participants completed a respite intervention nine times out of ten during the intervention period ( $M = 9.10, SD = 1.21$ ).

### Cumulative Growth of Energy Resources

Growth Modeling was used to examine how daily afternoon vigor and evening fatigue changed during the intervention period in the different experimental groups. The ICC(1) value for afternoon vigor was 0.47 and for evening fatigue was 0.35, indicating that 47% of the variance in afternoon vigor and 35% of variance in evening fatigue can be explained by between-person differences. The information from the ICC(1)'s indicates that a substantial percentage of variance of afternoon vigor and evening fatigue is explained by both between and within-person differences, and this indicates that it is appropriate to conduct a multilevel analysis of the data that is nested within participants (Bliese & Ployhart, 2002).

Table 2 summarizes the results of the growth multilevel modeling for afternoon vigor. The initial model showed a significant positive linear relationship between time and afternoon vigor indicating that all participants (experimental and control) were reporting higher levels of vigor as they continued through the intervention period. Specific tests of sequential intermediate models (not presented in the table) revealed that (a) individuals randomly vary in terms of their mean levels of afternoon vigor, (b) there is a linear, but not quadratic, relationship between time and afternoon vigor, (c) the strength of the linear

## ENERGIZING RESPITE INTERVENTIONS AT WORK

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3 relationships randomly varies among individuals, and (d) there is significant autocorrelation  
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5 in the data and this needs to be controlled for in model 2. In model 2, we added the level-2  
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7 variable, condition, to explain the random variation in intercepts using participant differences  
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9 based on control or experimental manipulation. In our case, we found that condition was a  
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11 significant factor: those in the experimental condition reported higher mean levels of  
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13 afternoon vigor than control participants. The final step, model 3, involved examining  
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15 attributes of individual respondents that are related to the time-afternoon vigor slope  
16  
17 variability. Because this is an intervention study we examined if condition could explain  
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19 some of the variation in the time-afternoon vigor slope. We did not find a significant effect  
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21 for the interaction term between time and condition using this two-tailed test. To further  
22  
23 examine the results, Figure 3 was created by using the parameter estimates of model 3 and  
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25 applying it to the multilevel growth equation to predict the afternoon vigor scores over a 10  
26  
27 day period (this strategy is the same as one interaction terms are plotted from regression  
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29 equations). This figure shows the positive growth trend of the time-afternoon vigor slope  
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31 over the ten intervention days for the participants in the intervention conditions as compared  
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33 to the control condition. Post-hoc slope tests were calculated using the parameter estimates  
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35 and the values from the variance-covariance matrix of model 3 to further explore the visual  
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37 data. Using one-tailed t-tests and a liberal critical  $p$ -value to avoid type II errors, the  
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39 intervention condition slope was significantly different from the control condition slope  
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41 (reference group,  $t(658) = 1.38, p = .08$ ). Moreover, a detailed analysis of the slopes for each  
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43 condition shows that the control group slope was not significantly different from 0 and  
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45 therefore flat ( $t(658) = 0.90, p = .18$ ). Yet, the intervention group slope showed a significant  
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47 positive slope ( $t(658) = 3.41, p < .001$ ) indicating that participants in the intervention  
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49 condition, as compared to the control condition, showed a positive increment of their daily  
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51 afternoon vigor over the intervention days.  
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3 Table 3 summarizes the results of the growth multilevel modeling for evening fatigue.  
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5 Model 1 did not show a significant positive linear relationship between time and evening  
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7 fatigue indicating that when taking the data all together, participants' evening fatigue did not  
8  
9 change as they continued through the intervention period. However, this result is expected as  
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11 it may be confounded by the fact that intervention and control participants are included  
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13 without controlling for their assigned manipulation. Specific tests of sequential intermediate  
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15 models (not presented in the table) revealed that (a) individuals randomly vary in terms of  
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17 their mean levels of evening fatigue, (b) there is not a significant linear, nor quadratic,  
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19 relationship between time and evening fatigue, however (c) the strength of the non-significant  
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21 linear relationship randomly varies among individuals, and (d) there is no significant  
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23 autocorrelation in the data and it does not need to be controlled. In model 2, the level-2  
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25 variable condition explained the random variation in intercepts using participant differences  
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27 based on control or experimental manipulation: condition was a significant predictor  
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29 indicating that those in the experimental condition reported lower mean levels of evening  
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31 fatigue than control participants. The final model 3 shows a significant effect for the  
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33 interaction term between time and condition using a liberal critical  $p$ -value of 0.10. Like  
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35 Figure 3, Figure 4 was created to explore the nature of the interaction effect and shows the  
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37 negative growth trend of the time-evening fatigue slope over the ten intervention days for the  
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39 participants in the intervention condition as compared to the control condition. Post-hoc slope  
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41 tests were conducted using one-tailed  $t$ -tests and a liberal critical  $p$ -value, the intervention  
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43 condition slope was significantly different from the control condition slope (reference group,  
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45  $t(654) = -1.76, p = .04$ ). Moreover, a detailed analysis of the slopes for each condition shows  
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47 that the control group slope was not significantly different from 0 and therefore flat ( $t(654) =$   
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49  $0.65, p = .26$ ). The intervention group slope showed a significant negative slope ( $t(654) = -$   
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51  $2.02, p = .02$ ) indicating that participants in the intervention condition, as compared to the  
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## ENERGIZING RESPITE INTERVENTIONS AT WORK

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control condition, showed a significant decline of evening fatigue over the intervention days.

The results from the multilevel growth support hypothesis 1.

**Translating immediate gains into more stable energy resources**

We expected that the respite intervention would increase energy levels after the work break, which would indirectly strengthen more stable energy levels after the intervention period (H2). This hypothesis was tested in two multiple mediation models separately for post-intervention vigor and post-intervention exhaustion (see Figures 1 and 2). As can be seen in Table 4, the effect of condition on the intercept and the slope coefficients of afternoon vigor were positive. Using one-tailed t-tests and a liberal critical  $p$ -value to avoid type II errors, the effect on the intercept was significant and the effect on the slope was marginally significant ( $p = .105$ ). Both intercept and slope coefficient positively predicted post-intervention vigor, which indicates that both initial and cumulative gains in afternoon vigor contribute to the increase in vigor after the intervention period. Moreover, using a liberal critical  $p$ -value to avoid type II errors, the indirect effects for the intercept coefficient (mediator 1;  $B = .16$ ,  $SE = .10$ , 95%  $BCCI$  [-.016, .370]); 90%  $BCCI$  [.007, .330]) and for the slope coefficient (mediator 2;  $B = .08$ ,  $SE = .06$ , 95%  $BCCI$  [-.014, .210]); 90%  $BCCI$  [.002, .184]) and the significant total indirect effect for both mediators ( $B = .24$ ,  $SE = .12$ , 95%  $BCCI$  [.014, .487]); 90%  $BCCI$  [.053, .442]) indicate that both initial and cumulative gains in afternoon vigor contribute to the increases in vigor after the intervention period. This provides support for hypothesis 2a.

A slightly different pattern appeared for exhaustion. As can be seen in Table 5, condition negatively affected the intercept and slope coefficient of evening fatigue indicating that condition lead to both an initial drop in evening fatigue and an additional decline in evening fatigue. Only the intercept coefficient of evening fatigue was positively related with emotional exhaustion after the intervention period. Moreover, a significant indirect effect for

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3 the intercept coefficient (mediator 1;  $B = -.09$ ,  $SE = .06$ , 95% *BCCI* [-.225, -.003]); 90%  
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5 *BCCI* [-.192, -.011]) and a non-significant indirect effect of the slope coefficient (mediator 2;  
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7  $B = -.04$ ,  $SE = .03$ , 95% *BCCI* [-.109, .019]); 90% *BCCI* [-.095, .010]) indicate that the initial  
8  
9 decline in evening fatigue mainly drives the decrease in emotional exhaustion after the  
10  
11 intervention period. Moreover, the total indirect effect was significant ( $B = -.12$ ,  $SE = .07$ ,  
12  
13 95% *BCCI* [-.273, -.020]); 90% *BCCI* [-.240, -.032]) indicating that daily fatigue levels  
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15 indeed mediate the influence of the intervention on post-intervention exhaustion. This  
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17 provides support for hypothesis 2b.  
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### 20 Discussion

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22 The aim of this study was to explore the potential of brief daily respite interventions  
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24 for employees' energy resources. We expected that engaging in a daily savoring nature or  
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26 relaxation intervention would strengthen daily energy resources (i.e. vigor) and mitigate  
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28 against the depletion of daily resources (i.e. fatigue) compared to a control condition. We  
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30 further expected that these daily effects would indirectly lead to more stable benefits for  
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32 energy resources. Growth modeling showed that afternoon vigor levels increased during the  
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34 intervention period in the intervention groups, while afternoon vigor levels remained stable in  
35  
36 the control group. We saw a similar pattern of decline in evening fatigue for the intervention  
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38 group but not for the control group. This indicates that the intervention had cumulative  
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40 effects over time. Our mediation analyses indicated that the effects of the intervention first  
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42 occurred immediately and then translated into more stable post-intervention changes.  
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48 Quinn et al. (2012) suggested that future research needs to investigate how the context  
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50 of work can restore human energy. Our results reveal the positive potential of savoring nature  
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52 and progressive muscle relaxation as respite interventions to restore human energy. These  
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54 results are in line with previous research showing the energizing impact of contact with  
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56 nature (Hartig et al., 2014; Pilotti et al., 2015) and relaxation strategies (Krajewski et al.,  
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2010). However, moving beyond these previous studies, the present study transformed these respite activities into brief interventions, which could be completed at the workplace, and demonstrated how they may serve as a type of micro-break (Trougakos & Hideg, 2009). As in previous field studies testing workplace recovery interventions (e.g., Bono et al., 2013), the reported effects are rather small which could be expected due to the multitude of potential stressors and resources in participants' work and private lives. Actually, it has been argued that small effect sizes can tell a big story especially when a phenomenon can be detected even in inauspicious circumstances (Cortina & Landis, 2009). Overall, we conclude that engaging in these respite interventions helped the employees in our study to restore and maintain their energy levels on a daily basis.

### **Theoretical implications**

These results provide several implications for organizational theory and research. Our findings help to determine that the effects of daily micro respite interventions have cumulative effects over time. These results are in line with the sustainable model of human energy in organizations (Quinn et al., 2012) with regard to the view that energy is dynamic and sustainable over time. These results are also consistent with Conservation of Resources theory (Halbesleben et al., 2014; Hobfoll, 2002), which proposes that resource trajectories are an important consideration in understanding the fluctuating of resources over time. However, to date, few studies have examined specifically how energetic resources at work can be aided by interventions, and fewer studies have examined whether such effects are cumulative, with notable exceptions (e.g. Pogrebtsova et al., in press). Our results suggest that these respite interventions can be used to facilitate the accumulation of resources and promote a positive trajectory of resources, in line with past research highlighting the role of respites in replenishing resources (see Halbesleben et al., 2014, p. 1350 for a review). Thus, the study illuminates the energy flow triggered by a daily respite exercise rather than focusing on an

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3 optimal design of a respite exercise and the associated recovery experiences.  
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### 5 **Limitations**

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7 The study has several limitations. First, our sample consisted only of German office  
8 workers. Hence, the present results cannot be generalized to employees in other professions  
9 (e.g., assembly-line workers), other employment forms (e.g., self-employed), or individuals  
10 from different cultural backgrounds. However, since employees from different sectors and  
11 with different levels of education participated, the cautious conclusion may be drawn that  
12 respite interventions may posit an energizing effect independent of industry sector and an  
13 employee's educational level.  
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17 Second, it can be assumed that mainly employees participated who felt strained or  
18 cared for their health, wanted to change their work respites, and believed in the positive  
19 effects of the intervention (self-selection). However, due to the experimental design with the  
20 successful randomization between the intervention groups and control group, the reported  
21 effects cannot be attributed to mere self-fulfilling prophecies.  
22

23  
24 Third, emphasizing this point, control participants were not merely waiting for weeks  
25 before starting the intervention period, but instead were actively reporting on their daily  
26 energy levels and affect. Such self-observation forms part of effective self-regulation (Carver  
27 & Scheier, 1981) and stress-management programs (e.g. Meichenbaum, 1985), which may  
28 lead to positive effects on the management of energy resources. Hence, the present control  
29 group could be viewed as a self-monitoring intervention (see Sitzmann & Wang, 2015).  
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32  
33 Despite the strengths of using a randomized controlled trial, our design cannot rule  
34 out all alternative explanations. As in many other studies, we were not able to introduce  
35 placebo groups in a field experiment conducted in the work context and with the support of  
36 employers. This is a common practical issue when conducting interventions in organizational  
37 settings (O'Shea et al., 2016). Nevertheless, future research should also test the short respite  
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3 interventions completed during work breaks against placebo control groups in field settings.

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5 Finally, due the rather low sample size and small effects, the study particularly calls for  
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7 replication and extension by future research, which will be outlined below.

### 9 10 **Future research**

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12 Although we did not focus on it in this paper, past research examining other types of  
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14 daily interventions has shown moderating effects of individual or environmental variables  
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16 (e.g. Clauss et al., 2016). However, we did control for baseline levels of vigor and  
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18 exhaustion, as the baseline well-being of participants may affect the extent to which  
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20 participants have the capacity to benefit from an intervention (Briner & Walshe, 2015). Like  
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22 high work demands (Sonnentag & Krueger, 2006), low resources may reduce the degree of  
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24 recovery experienced as a result of micro-break interventions. Hence, for employees low in  
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26 resources, an extended break (e.g., vacation) or reducing job demands may be needed to refill  
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28 the energy reservoir. Alternatively, skill training may be helpful to support the successful  
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30 participation in intervention programs. Additionally, if respite interventions are undertaken  
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32 during times of changes in job tasks or conditions, they may show differential effectiveness  
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34 as change can be perceived as a threat or resource loss (Niessen & Jimmieson, 2016).

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38 In the context of these considerations, it is also interesting to speculate about  
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40 similarities and differences of the tested respite interventions with other established daily  
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42 interventions applicable during work breaks. In contrast to other positive psychology  
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44 interventions (PPIs), which specifically aim at eliciting positive emotions (e.g., three positive  
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46 things intervention; Bono et al., 2013; Clauss et al., 2016) or dissolving negative emotions  
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48 (e.g., reappraisal strategies; Hülsheger, 2015), the present respite interventions did not  
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50 specifically focus on emotion regulation. Instead, somewhat like mindfulness exercises (e.g.,  
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52 Hülsheger, Alberts, Feinholdt, & Lang, 2013), it aimed on distancing oneself from the work  
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54 context and its hassles by focusing on actual bodily states (PMRI) or on a mental image  
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3 (SNI). Thus, the energizing effects of the tested interventions were driven by energy  
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5 restoration, and are in line with recovery processes (Sonnentag & Fritz, 2007). Although  
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7 these recovery processes have mainly been used to explain leisure time recovery, their  
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9 explanatory power should be further explored in the context of intervention research. Overall,  
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11 gaining more insight into the underlying recovery experiences would allow classification of  
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13 different break interventions and facilitate customized recommendations.  
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### 16 **Practical implications**

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18 The present research has practical implications for the introduction of respite  
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20 interventions to combat the energy drain among knowledge and office workers. First, respite  
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22 interventions promote energy resources among employees by accumulating energy and  
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24 fighting exhaustion on a daily basis through repeated practice. Hence, HR officers should  
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26 facilitate and monitor regular execution of respite interventions and offer this information to  
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28 strained employees. Second, it is also important to note that the versions of SNI and PMRI  
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30 used in this study present rather “light” (less intensive) and office-compatible forms of nature  
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32 contact and relaxation. Stronger effects could be expected through direct exposure to real  
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34 nature (e.g., Kjellgren & Buhrkall, 2010) or sessions conducted by a relaxation trainer.  
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### 38 **Conclusion**

39  
40 Building on the knowledge of organizational, social, and environmental psychology  
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42 about energy resources and their management, we created two short respite interventions  
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44 which can easily be integrated into work days. We showed their effectiveness for energy  
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46 recovery during short breaks at the work place. The presented growth analyses and mediation  
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48 analyses enhance our understanding of the processes contributing to energy gain and provide  
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50 implications for future research. In sum, the presented respite interventions provide  
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52 promising means to accumulate energy resources in the workplace.  
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**References**

- Andersson, G., Carlbring, P., Berger, T., Almlöv, J., & Cuijpers, P. (2009). What makes internet therapy work? *Cognitive Behavior Therapy*, *38*(S1), 55-60.  
doi:10.1080/16506070902916400
- Alvarsson, J. J., Wiens, S., & Nilsson, M. E. (2010). Stress recovery during exposure to nature sound and environmental noise. *International Journal of Environmental Research and Public Health*, *7*, 1036-1046. doi:10.3390/ijerph7031036
- Bakker, A. B., Demerouti, E., & Sanz-Vergel, A. I. (2014). Burnout and work engagement: The JD–R approach. *Annual Review of Organizational Psychology and Organizational Behavior*, *1*, 389-411. doi:10.1146/annurev-orgpsych-031413-091235
- Bakker, A. B., & Xanthopoulou, D. (2009). The crossover of daily work engagement: Test of an actor–partner interdependence model. *Journal of Applied Psychology*, *94*, 1562-1575. doi:10.1037/a0017525
- Barnes, C. M., & Van Dyne, L. (2009). 'I'm tired': Differential effects of physical and emotional fatigue on workload management strategies. *Human Relations*, *62*, 59-92.  
doi:10.1177/0018726708099518
- Baumeister, R. F., Bratslavsky, E., Muraven, M., & Tice, D. M. (1998). Ego depletion: Is the active self a limited resource? *Journal of Personality and Social Psychology*, *74*, 1252-1265. doi:10.1037/0022-3514.74.5.1252
- Bernerth, J. B. & Aguinis, H. (2016). A critical review and best-practice recommendations for control variable usage. *Personnel Psychology*, *69*, 229-283. doi: 10.1111/peps.12103
- Bernstein, D. A., & Borkovec, T. D. (2002). *Entspannungs-Training: Handbuch der "progressiven Muskelentspannung" nach Jacobson* (10. Aufl). *Leben lernen: Vol. 16*

1  
2  
3 [Relaxation training: Handbook of progressive muscle relaxation by Jacobson].

4  
5 Stuttgart: Pfeiffer bei Klett-Cotta.

6  
7 Beute, F., & de Kort, Y. (2014). Natural resistance: Exposure to nature and self-regulation,  
8 mood, and physiology after ego-depletion. *Journal of Environmental Psychology, 40*,  
9 167–178. doi:10.1016/j.jenvp.2014.06.004

10  
11  
12  
13  
14 Bliese, P. (2013a) Multilevel: Multilevel Functions. R package version 2.5. Retrieved from  
15  
16 <http://CRAN.Rproject.org/package=multilevel>

17  
18 Bliese, P. (2013b). Multilevel modeling in R (2.5). Retrieved from [https://cran.r-](https://cran.r-project.org/doc/contrib/Bliese_Multilevel.pdf)  
19  
20 [project.org/doc/contrib/Bliese\\_Multilevel.pdf](https://cran.r-project.org/doc/contrib/Bliese_Multilevel.pdf)

21  
22  
23 Bliese, P. D., & Ployhart, R. E. (2002). Growth modeling using random coefficient models:  
24 Model building, testing, and illustrations. *Organizational Research Methods, 5*362-  
25 387. doi:10.1177/109442802237116

26  
27  
28  
29 Bono, J. E., Glomb, T. M., Shen, W., Kim, E., & Koch, A. J. (2013). Building positive  
30 resources: Effects of positive events and positive reflection on work-stress and health.  
31  
32 *Academy of Management Journal, 56*, 1601–1626. doi:10.5465/amj.2011.0272

33  
34  
35  
36 Briner, R. B., & Walshe, N. D. (2015). An evidence-based approach to improving the quality  
37 of resource-oriented well-being interventions at work. *Journal of Occupational and*  
38  
39 *Organizational Psychology, 88*, 563-586. doi: 10.1111/joop.12133

40  
41  
42  
43 Carver, C. S., & Scheier, M. F. (1981). *Attention and self-regulation: A control-theory*  
44  
45 *approach to human behavior*. New York, NY: Springer.

46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60  
Clauss, E., Hoppe, A., O'Shea, D., González Morales, M. G., Steidle, A., & Michel, A.  
(2016). Promoting personal resources and reducing exhaustion through positive work  
reflection among caregivers. *Journal of Occupational Health Psychology, early view*.  
doi:10.1037/ocp0000063

## ENERGIZING RESPITE INTERVENTIONS AT WORK

27

- 1  
2  
3 Cohn, M. A., Fredrickson, B. L., Brown, S. L., Mikels, J. A., & Conway, A. M. (2009).  
4  
5 Happiness unpacked: Positive emotions increase life satisfaction by building  
6  
7 resilience. *Emotion*, 9, 361–368. doi: 10.1037/a0015952  
8  
9  
10 Cortina, J. M., & Landis, R. S. (2009). When small effect sizes tell a big story, and when  
11  
12 large effect sizes don't. In C. E. Lance & R. J. Vandenberg (Eds.), *Statistical and*  
13  
14 *methodological myths and urban legends: Doctrine, verity and fable in the*  
15  
16 *organizational and social sciences* (pp. 287-308). New York, NY: Routledge/Taylor &  
17  
18 Francis Group.  
19  
20  
21 de Bloom, J., Kinnunen, U., & Korpela, K. (2014). Exposure to nature versus relaxation  
22  
23 during lunch breaks and recovery from work: Development and design of an  
24  
25 intervention study to improve workers' health, well-being, work performance and  
26  
27 creativity. *BMC Public Health*, 14, 488. doi:10.1186/1471-2458-14-488  
28  
29  
30 Dunford, B. B., Shipp, A. J., Boss, R., Angermeier, I. & Boss, A. D. (2012). Is burnout static  
31  
32 or dynamic? A career transition perspective of employee burnout trajectories. *Journal*  
33  
34 *of Applied Psychology*, 97(3), 637-650. doi: 10.1037/a0027060  
35  
36  
37 Enzmann, D., & Kleiber, D. (1989). Burnout im psychosozialen Bereich. *Bewährungshilfe*,  
38  
39 36, 89-101.  
40  
41  
42 Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G\*Power 3: A flexible statistical  
43  
44 power analysis program for the social, behavioral, and biomedical sciences. *Behavior*  
45  
46 *Research Methods*, 39, 175-191. doi:10.3758/BF03193146  
47  
48  
49 Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using  
50  
51 G\*Power 3.1: Tests for correlation and regression analyses. *Behavior Research*  
52  
53 *Methods*, 41, 1149-1160. doi:10.3758/BRM.41.4.1149  
54  
55  
56  
57  
58  
59  
60

## ENERGIZING RESPITE INTERVENTIONS AT WORK

28

- 1  
2  
3 Fritz, C., Lam, C. F., & Spreitzer, G. M. (2011). It's the little things that matter: An  
4  
5 examination of knowledge workers' energy management. *Academy of Management*  
6  
7 *Perspectives*, 23, 28–39. doi:10.1108/dlo.2012.08126aaa.010  
8  
9  
10 Gierra, K., & Klinkenberg, N. (2005). Entspannungsverfahren.. In K. Bernardy, K. V.  
11  
12 Köllner (Eds.). *Praktische Verhaltensmedizin* (pp. 55-62). Stuttgart: Georg Thieme.  
13  
14 Gorgievski, M. J., & Hobfoll, S. E. (2008). Work can burn us out or fire us up: Conservation  
15  
16 of resources in burnout and engagement. In J. R. B. Halbesleben (Ed.), *Handbook of*  
17  
18 *stress and burnout in health care* (pp. 7-22). New York: Nova Science.  
19  
20  
21 Hartig, T., Mitchell, R., de Vries, S., & Frumkin, H. (2014). Nature and health. *Annual*  
22  
23 *Review of Public Health*, 35,207-228. doi:10.1146/annurev-publhealth-032013-  
24  
25 182443  
26  
27  
28 Halbesleben, J. R. B. & Buckley, M. R. (2004). Burnout in organizational life. *Journal of*  
29  
30 *Management*, 30(6), 859-879. doi: <https://doi.org/10.1016/j.jm.2004.06.004>  
31  
32 Halbesleben, J. R. B., Neveu, J. P., Paustian-Underdahl, S. C., & Westman, M. (2014).  
33  
34 Getting to the "COR": Understanding the role of resources in conservation of  
35  
36 resources theory. *Journal of Management*, 40, 1334-1364.  
37  
38 doi:10.1177/0149206314527130  
39  
40  
41 Hancock, P. A., & Desmond, P. A. (2001). *Stress, workload, and fatigue*. Mahwah, NJ, US:  
42  
43 Lawrence Erlbaum.  
44  
45  
46 Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process*  
47  
48 *analysis: A regression-based approach*. New York: Guilford.  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

## ENERGIZING RESPITE INTERVENTIONS AT WORK

29

- 1  
2  
3 Hülshager, U. R. (2015). When regulating emotions at work pays off: A diary and an  
4  
5 intervention study on emotion regulation and customer tips in service jobs. *Journal of*  
6  
7 *Applied Psychology, 100*, 263-277. doi:10.1037/a0038229  
8  
9  
10 Hülshager, U. R. (2016). From dawn till dusk: Shedding light on the recovery process by  
11  
12 investigating daily change patterns in fatigue. *Journal of Applied Psychology, 101*,  
13  
14 905-914. doi:10.1037/apl0000104  
15  
16 Hülshager, U. R., Alberts, H. J., Feinholdt, A., & Lang, J. W. (2013). Benefits of mindfulness  
17  
18 at work: The role of mindfulness in emotion regulation, emotional exhaustion, and job  
19  
20 satisfaction. *Journal of Applied Psychology, 98*, 310–325. doi:10.1037/a0031313  
21  
22  
23 Hunter, E. M., & Wu, C. (2015). Give me a better break: Choosing workday break activities  
24  
25 to maximize resource recovery. *Journal of Applied Psychology, 101*, 302-311.  
26  
27 doi:10.1037/apl0000045  
28  
29  
30 Jahneke, H., Hygge, S., Halin, N., Green, A. M., & Dimberg, K. (2011). Open-plan office  
31  
32 noise: Cognitive performance and restoration. *Journal of Environmental Psychology,*  
33  
34 *31*, 373–382. doi:10.1016/j.jenvp.2011.07.002  
35  
36  
37 Keniger, L. E., Gaston, K. J., Irvine, K. N., & Fuller, R. A. (2013). What are the benefits of  
38  
39 Interacting with Nature?. *International Journal of Environmental Research and*  
40  
41 *Public Health, 10*, 913-935. doi:10.3390/ijerph10030913  
42  
43  
44 Kinnunen, U., Feldt, T., de Bloom, J., & Korpela, K. (2015). Patterns of daily energy  
45  
46 management at work: relations to employee well-being and job characteristics.  
47  
48 *International Archives of Occupational and Environmental Health, 88*, 1077-1086.  
49  
50 doi:10.1007/s00420-015-1039-9  
51  
52  
53 Kjellgren, A., & Buhrkall, H. (2010). A comparison of the restorative effect of a natural  
54  
55 environment with that of a simulated natural environment. *Journal of Environmental*  
56  
57 *Psychology, 30*, 464-472. doi:10.1016/j.jenvp.2010.01.011  
58  
59  
60

## ENERGIZING RESPITE INTERVENTIONS AT WORK

30

- 1  
2  
3 Korpela, K., de Bloom, J., & Kinnunen, U. (2015). From restorative environments to  
4 restoration in work. *Intelligent Buildings International*, 7, 215-223.  
5  
6 doi:10.1080/17508975.2014.959461  
7  
8  
9  
10 Krajewski, J., Wieland, R., Sauerland, M. (2010). Regulating strain states by using the  
11 recovery potential of lunch breaks. *Journal of Occupational Health Psychology*,  
12  
13 15(2), 131–139. doi:10.1037/a0018830  
14  
15  
16 Kühnel, J., Zacher, H., de Bloom, J., & Bledow, R. (2016). Take a break! Benefits of sleep  
17 and short breaks for daily work engagement. *European Journal of Work and*  
18  
19 *Organizational Psychology*, 1-11. doi:10.1080/1359432X.2016.1269750  
20  
21  
22  
23 Largo-Wight, E., W., Chen, W., Dodd, V., & Weiler, R. (2011). Healthy workplaces: The  
24 effects of nature contact at work on employee stress and health. *Public Health*  
25  
26 *Reports*, 126, 124–130.  
27  
28  
29  
30 Leiter, M. P. (1992). Burnout as a developmental process: Consideration of models. In W.  
31 Schaufeli, C. Maslach & T. Marek (Eds.). *Professional burnout; Recent developments*  
32 *in theory and research* (pp. 237-250). Washington, WA: Taylor & Francis.  
33  
34  
35  
36 Maslach, C., & Jackson, S. (1986). *Maslach Burnout Manual* (2nd ed.). Palo Alto, CA:  
37  
38 Consulting Psychologists.  
39  
40  
41 Meichenbaum, D. A. (1985). *Stress inoculation training*. New York, NY: Pergamon.  
42  
43 Michel, A., Bosch, C., & Rexroth, M. (2014). Mindfulness as a cognitive–emotional  
44 segmentation strategy: An intervention promoting work–life balance. *Journal of*  
45  
46 *Occupational and Organizational Psychology*, 87, 733-754. doi: 10.1111/joop.12072  
47  
48  
49 Michel, A., O'Shea, D., & Hoppe, A. (2015). Designing and evaluating resource-oriented  
50 interventions to enhance employee well-being and health. *Journal of Occupational*  
51  
52 *and Organizational Psychology*, 88, 459-463. doi:10.1111/joop.12131  
53  
54  
55  
56  
57  
58  
59  
60

## ENERGIZING RESPITE INTERVENTIONS AT WORK

31

- 1  
2  
3 Moher, D., Schulz, K. F., & Altman, D. G. (2001). The CONSORT statement: Revised  
4  
5 recommendations for improving the quality of reports of parallel group randomized  
6  
7 trials. *BMC Medical Research Methodology*, 1, 2. doi:10.1186/1471-2288-1-  
8  
9  
10 Murphy, K. R., Myors, B., & Wolach, A. (2009). *Statistical power analysis: A simple and*  
11  
12 *general model for traditional and modern hypothesis tests* (3rd ed.). New York, NY:  
13  
14 Routledge.  
15  
16 Newell, S., Robertson, M., Scarbrough, H., & Swan, J. (2009). *Managing knowledge work*  
17  
18 *and innovation*. Basingstoke, UK: Palgrave Macmillan.  
19  
20 Niessen, C., & Jimmieson, N. L. (2016). Threat of resource loss: The role of self-regulation  
21  
22 in adaptive task performance. *Journal of Applied Psychology*, 101, 450-462.  
23  
24 doi:10.1037/apl0000049  
25  
26  
27 O'Shea, D., O'Connell, B. H., & Gallagher, S. (2016). Randomised controlled trials in WOHP  
28  
29 interventions: A review and guidelines for use. *Applied Psychology-an International*  
30  
31 *Review*, 65, 190-222. doi:10.1111/apps.12053  
32  
33  
34 Pfeffer, J. (2010). Building sustainable organizations: The human factor. *Academy of*  
35  
36 *Management Perspectives*, 24, 34-45. doi:10.5465/AMP.2010.50304415  
37  
38  
39 Pilotti, M., Klein, E., Golem, D., Piepenbrink, E., & Kaplan, K. (2015). Is viewing a nature  
40  
41 video after work restorative? Effects on blood pressure, task performance, and long-  
42  
43 term memory. *Environment and Behavior*, 47, 947-969. doi:  
44  
45 10.1177/0013916514533187  
46  
47  
48 Pogrebtsova, E., Craig, J., Chris, A., O'Shea, D. & Gonzalez-Morales, M. G. (in press).  
49  
50 Exploring daily affective changes in university students with a mindful positive  
51  
52 reappraisal intervention: A daily diary randomized controlled trial. *Stress & Health*.  
53  
54  
55  
56  
57  
58  
59  
60

## ENERGIZING RESPITE INTERVENTIONS AT WORK

32

- 1  
2  
3 Quinn, R. W., Spreitzer, G. M., & Lam, C. F. (2012). Building a sustainable model of human  
4 energy in organizations: Exploring the critical role of resources. *The Academy of*  
5 *Management Annals*, 6, 337-396. doi:10.1080/19416520.2012.676762  
6  
7  
8  
9  
10 R Core Team. (2014). R: A language and environment for statistical computing. R  
11 Foundation for Statistical Computing. Retrieved from <http://www.R-project.org/>.  
12  
13  
14 Ratcliffe, E., Gatersleben, B., & Sowden, P. T. (2013). Bird sounds and their contributions to  
15 perceived attention restoration and stress recovery. *Journal of Environmental*  
16 *Psychology*, 36, 221-228. doi:10.1016/j.jenvp.2013.08.004  
17  
18  
19  
20 Richardson, K. M., & Rothstein, H. R. (2008). Effects of occupational stress management  
21 intervention programs: a meta-analysis. *Journal of Occupational Health Psychology*,  
22 13, 69-93. doi:10.1037/1076-8998.13.1.69  
23  
24  
25  
26  
27 Schaufeli, W. B., Bakker, A. B., & Salanova, M. (2006). The measurement of work  
28 engagement with a short questionnaire a cross-national study. *Educational and*  
29 *psychological measurement*, 66, 701-716. doi:10.1177/0013164405282471  
30  
31  
32  
33 Schaufeli, W.B., Leiter, M.P., Maslach, C., & Jackson, S.E. (1996). The MBI-General  
34 Survey. In C. Maslach, S.E. Jackson, & M.P Leiter (Eds.), *Maslach Burnout*  
35 *Inventory. Manual* (3rd ed., pp. 19-26). Palo Alto, CA: Consulting Psychologists.  
36  
37  
38  
39  
40 Schulz, K. F., Altman, D. G., & Moher, D. (2010). CONSORT 2010 statement: updated  
41 guidelines for reporting parallel group randomised trials. *BMC medicine*, 8, 18.  
42  
43  
44  
45  
46  
47  
48 Sitzmann, T., & Wang, M. (2015). The survey effect: Does administering surveys affect  
49 trainees' behavior? *Learning and Individual Differences*, 37, 1-12.  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

## ENERGIZING RESPITE INTERVENTIONS AT WORK

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45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60
- Sonnentag, S. (2003). Recovery, work engagement, and proactive behavior: A new look at the interface between nonwork and work. *Journal of Applied Psychology*, 88, 518-528. doi:10.1037/0021-9010.88.3.518
- Sonnentag, S. (2005). Burnout research: Adding an off-job and day-level perspective. *Work & Stress*, 19(3), 271-275. doi: 10.1080/02678370500386473
- Sonnentag, S., & Fritz, C. (2007). The Recovery Experience Questionnaire: Development and validation of a measure assessing recuperation and unwinding at work. *Journal of Occupational Health Psychology*, 12, 204–221. doi:10.1037/1076-8998.12.3.204
- Sonnentag, S., & Krueger, U. (2006). Psychological detachment from work during off-job time: The role of job stressors, job involvement, and recovery-related self-efficacy. *European Journal of Work and Organizational Psychology*, 15, 197-217. doi:10.1080/13594320500513939
- Sonnentag, S. & Niessen, C. (2008). Staying vigorous until work is over: The role of trait vigor, day-specific work experiences and recovery. *Journal of Occupational and Organizational Psychology*, 81, 435-458. doi: 10.1348/096317908X310256
- Ten Brummelhuis, L., & Bakker, A. (2012). A resource perspective on the work-home resource model. *American Psychologist*, 67, 545-556. doi:10.1037/a0027974
- Trougakos, J. P., & Hideg, I. (2009). Momentary work recovery: The role of within-day work breaks. In S. Sonnentag, P. L. Perrewe, & D. C. Ganster (Eds.), *Research in occupational stress and well-being* (pp. 37–84). Bingley, UK: Emerald Group.
- Trougakos, J. P., Hideg, I., Cheng, B. H., & Beal, D. J. (2014). Lunch breaks unpacked: The role of autonomy as a moderator of recovery during lunch. *Academy of Management Journal*, 57, 405-421. doi: 10.5465/amj.2011.1072
- Van Hooff, M. L. M., Guerts, S. A. E., Kompier, M. A. J., & Taris, T. W. (2007). "How fatigued do you currently feel?": Convergent and discriminant validity of a single-item

## ENERGIZING RESPITE INTERVENTIONS AT WORK

34

1  
2  
3 fatigue measure. *Journal of Occupational Health*, 49, 224-234.

4  
5 doi:10.1539/joh.49.224  
6  
7

8  
9 Xanthopoulou, D., & Meier, L. L. (2014). Daily burnout experiences: Critical events and  
10  
11 measurement challenges. In M. P. Leiter, A. B. Bakker, & C. Maslach (Eds.), *Burnout*  
12  
13 *at work: A psychological perspective* (pp. 80–97). London: Taylor & Francis.  
14

15  
16 Zacher, H., Brailsford, H. A., & Parker, S. L. (2014). Micro-breaks matter: A diary study on  
17  
18 the effects of energy management strategies on occupational well-being. *Journal of*  
19  
20 *Vocational Behavior*, 85, 287–297. doi:10.16993/sjwop.13  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
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## ENERGIZING RESPITE INTERVENTIONS AT WORK

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Table 1.  
Means, standard deviations, reliabilities and correlations.

	Intervention group ( <i>N</i> = 52) <i>M</i> ( <i>SD</i> )	Control group ( <i>N</i> = 30) <i>M</i> ( <i>SD</i> )	Correlations							
			1	2	3	4	5	6	7	8
1	Pre-int. vigor	4.40 (1.12)	(.82)	.80*	-.43*	-.46*	.61*	.28*	-.29*	-.22
2	Post-int. vigor	4.24 (1.23)		(.86)	-.41*	-.53*	.77*	.46*	-.38*	-.29*
3	Pre-int. exhaustion	2.92 (1.21)			(.91)	.88*	-.41*	-.18	.51*	.12
4	Post-int. exhaustion	2.90 (1.11)				(.91)	-.50*	-.22*	.60*	.20
5	Intercept afternoon vigor <sup>a</sup>	3.17 (0.41)					(.77)	.36*	-.36*	-.29*
6	Slope afternoon vigor <sup>a</sup>	0.04 (0.04)						(.77)	-.23*	.49*
7	Intercept evening fatigue <sup>a</sup>	2.95 (0.44)							-	.19
8	Slope evening fatigue <sup>a</sup>	-0.02 (0.04)								-
9	Age	37.77 (10.00)	.07	.15	-.17	-.16	.19	.13	-.11	.03
10	Sex (1 = man, 0 = woman)	28 men	-.23*	-.19	-.01	.04	-.16	-.16	.01	.18
11	Working hours <sup>b</sup>	41.54 (9.08)	.04	-.01	.05	.02	-.01	-.13	.11	-.11

Notes. Participants *N* = 82, Internal consistency reliabilities appear in parentheses along the diagonal. No reliability could be calculated for the one-item measure fatigue. <sup>a</sup> Intercept and slope coefficients stem from the growth modeling analyses. <sup>b</sup> *N* = 81. *p* < .05.

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Table 2.  
Growth modeling results predicting afternoon vigor.

	Model 1		Model 2		Model 3	
	P.E (SE)	<i>t</i>	P.E (SE)	<i>T</i>	P.E (SE)	<i>t</i>
(Intercept)	3.10(0.07)	45.83*	2.92(0.11)	27.70*	2.95(0.11)	26.67*
Time	0.03(0.01)	2.95*	0.03(0.01)	2.98*	0.02(0.02)	0.90
Condition			0.29(0.13)	2.26*	0.21(0.14)	1.54
TIME X Condition					0.03(0.02)	1.38
Variance Components						
(Intercept)	0.205		0.199		0.243	
TIME	0.002		0.002		0.004	
Residual	0.345		0.346		0.317	
Fit index: AIC	1494.66		1494.09		1509.89	

Note. P.E.= Parameter Estimate. SE= Standard Error. Degrees of freedom: Condition  $df=80$ . Time and Time X Condition  $df=658$ . For Condition the reference group is control condition (value 0). <sup>+</sup>  $p < .10$ , \*  $p < .05$ .

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Table 3.  
*Growth modeling results predicting evening fatigue.*

	Model 1		Model 2		Model 3	
	P.E (SE)	<i>t</i>	P.E (SE)	<i>t</i>	P.E (SE)	<i>t</i>
(Intercept)	3.04(0.08)	36.34*	3.28(0.12)	26.62*	3.17(0.14)	22.93*
Time	-0.01(0.01)	-1.15	-0.01(0.01)	-1.18	0.01(0.02)	0.65
Condition			-0.37(0.14)	-2.64*	-0.20(0.17)	-1.15
TIME X Condition					-0.04(0.03)	-1.76 <sup>+</sup>
Variance Components						
(Intercept)	0.337		0.340		0.336	
TIME	0.003		0.004		0.003	
Residual	0.605		0.605		0.605	
Fit index: AIC	1915.978		1913.52		1918.026	

*Note.* P.E.= Parameter Estimate. SE= Standard Error. Degrees of freedom: Condition  $df=80$ . Time and Time X Condition  $df=654$ . For Condition the reference group is control condition (value 0). <sup>+</sup>  $p < .10$ , \*  $p < .05$ .

## ENERGIZING RESPITE INTERVENTIONS AT WORK

Table 4.  
 Mediation model 3: Intercept and slope afternoon vigor as mediators of the effect of respite intervention on post-intervention vigor.

Variable	Intercept afternoon vigor		Slope afternoon vigor		Post-int. vigor	
	Effect (SE)	<i>t</i>	Effect (SE)	<i>t</i>	Effect (SE)	<i>t</i>
Constant	2.05 (0.17)	12.28*	-0.02 (0.02)	-1.05	-1.61 (0.56)	-2.85*
Pre-int. vigor	0.22 (0.03)	6.55*	0.01 (0.00)	2.27*	0.50 (0.08)	6.55*
Condition	0.15 (0.09)	1.93 <sup>+</sup>	0.02 (0.01)	1.64	0.00 (0.14)	0.02
Intercept afternoon vigor					1.09 (0.20)	5.50*
Slope afternoon vigor			.12		4.58 (1.73)	2.64*
<i>R</i> <sup>2</sup>	.40				.79	
<i>F</i>	23.24*		5.12*		68.66*	

Notes. *N* = 82. Values are unstandardized regression coefficients; standard error estimates are in parentheses. <sup>+</sup> *p* < .10, \**p* < .05.

## ENERGIZING RESPITE INTERVENTIONS AT WORK

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Table 5.  
 Mediation model 4: Intercept and slope evening fatigue as mediators of the effect of respite intervention on post-intervention exhaustion.

Variable	Intercept evening fatigue		Slope evening fatigue		Post-int. exhaustion	
	Effect (SE)	<i>t</i>	Effect (SE)	<i>t</i>	Effect (SE)	<i>t</i>
Constant	2.55 (0.17)	14.95*	-0.01 (0.01)	-1.16	-0.27 (0.40)	-0.71
Pre-int. exhaustion	0.21 (0.04)	5.72*	0.00 (0.00)	0.94	0.72 (0.05)	13.36*
Condition	-0.22 (0.11)	-2.05*	-0.02 (0.01)	-2.64*	-0.04 (0.12)	-0.30
Intercept evening fatigue					0.39 (0.16)	2.53*
Slope evening fatigue					2.21 (1.76)	1.25
$R^2$	.31		.08		.81	
$F$	27.04*		4.33*		68.66*	

Notes.  $N = 82$ . Values are unstandardized regression coefficients; standard error estimates are in parentheses. \*  $p < .10$ , \* $p < .05$ .

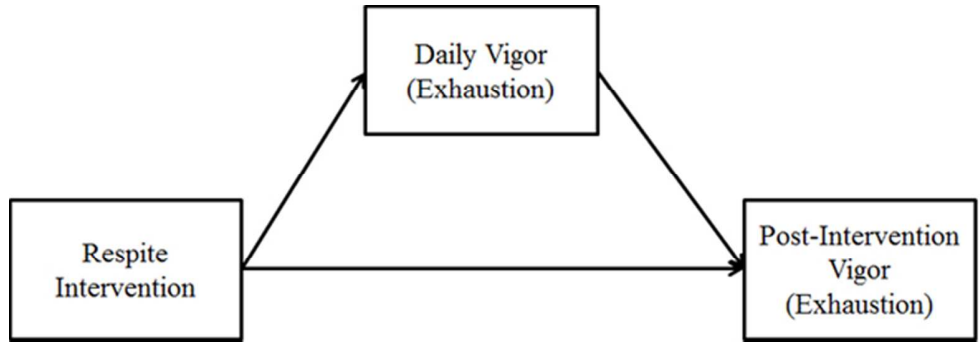


Figure 1. Conceptual model of the main hypothesis.

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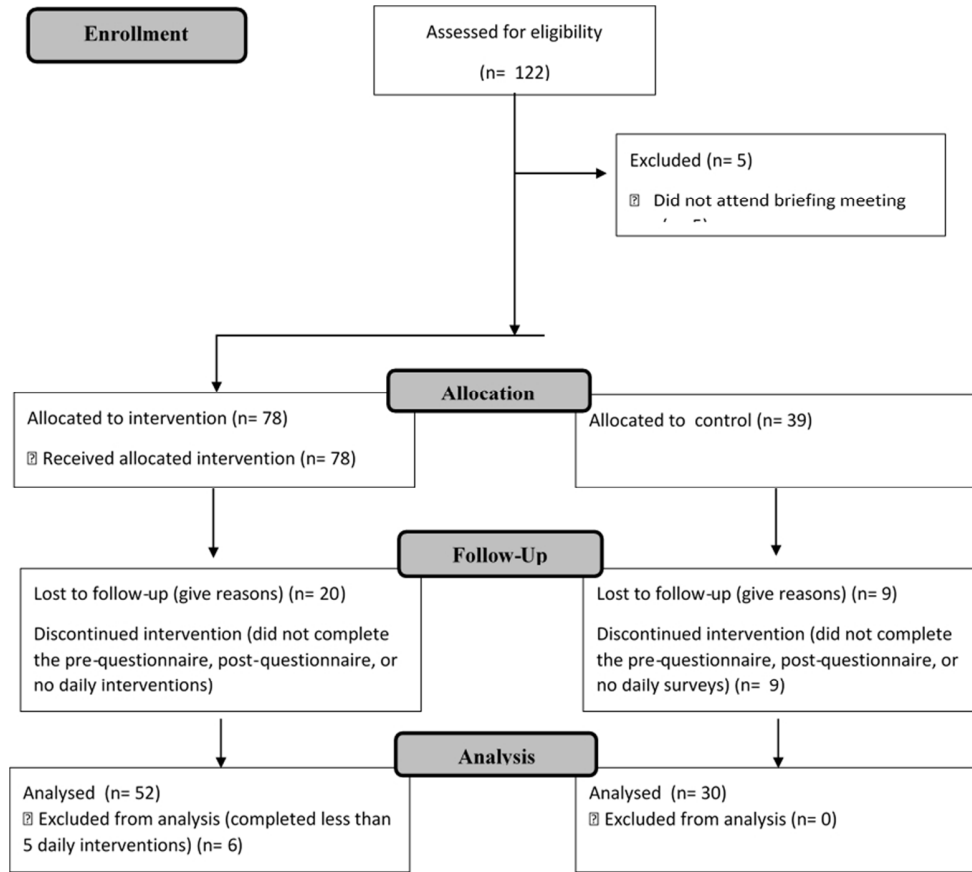


Figure 2. Consort flow diagram

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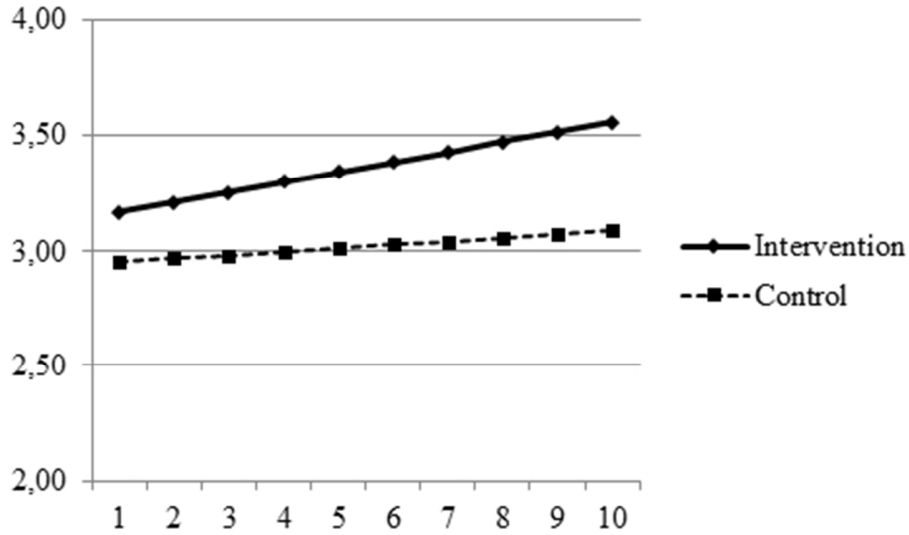


Figure 3. Predicted values of afternoon vigor based on the estimation of the growth model presented in table 2. This figure shows the positive growth trend of the time-afternoon vigor slope over the ten intervention days for the participants in the intervention conditions as compared to the control condition.

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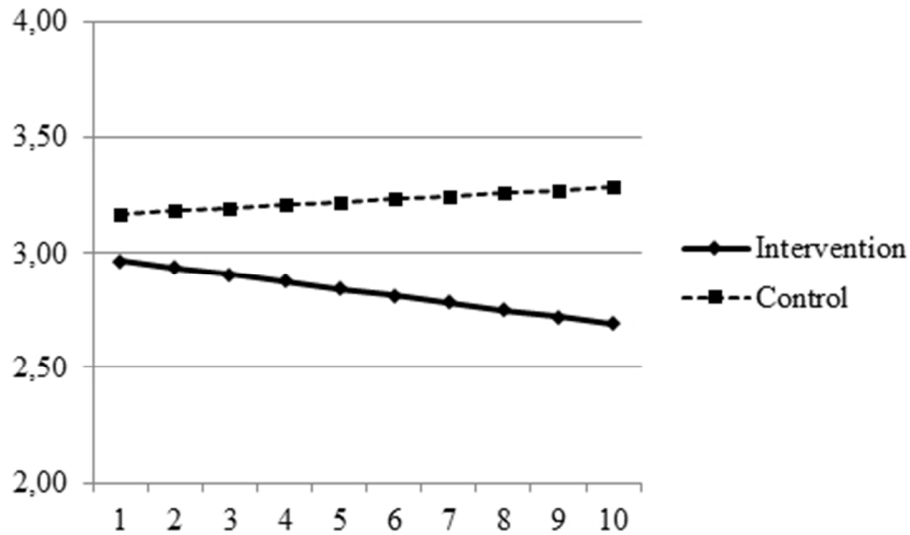


Figure 4. Predicted values of evening fatigue based on the estimation of the growth model presented in table 3. This figure shows the negative growth trend of the time-evening fatigue slope over the ten intervention days for the participants in the intervention conditions as compared to the control condition.

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