

Running head: THE EFFECT OF WORKPLACE TELEPRESSURE ON RECOVERY

**You´ve Got Mail:
The Effect of Workplace Telepressure on Recovery Processes
and the Benefits of Mindfulness**

EMPIRICAL RESEARCH

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Abstract

Due to an intensified use of information and communication technology (ICT) at work, employees often suffer from a continuous urge to respond quickly to ICT messages – a phenomenon known as workplace telepressure (Barber & Santuzzi, 2015). The present study investigates on whether such pressure negatively influences employees' recovery processes (*here*: psychological detachment and sleep quality) and whether mindfulness can reduce these negative effects. The research question was investigated using data from a daily diary study (N= 198; 5 consecutive working days; 3 measurements per day). Multilevel analysis confirmed that workplace telepressure was negatively related to sleep quality, whereby psychological detachment partially mediated the relation. Further, results revealed that people who scored high on trait mindfulness suffered less from workplace telepressure. As expected, daily levels of mindfulness moderated the relation between workplace telepressure and psychological detachment, such that telepressured employees could better switch-off mentally from work when daily levels of mindfulness were high. Suggestions for future research and practical implications to counteract against workplace telepressure are discussed in conclusion.

Keywords: information and communication technology; mindfulness; psychological detachment; recovery; sleep quality; workplace telepressure

Introduction

“Technology is a useful servant but a dangerous master” -- Christian Lous Lange

The adoption of information and communication technology (ICT) has drastically changed our working life. E-mail, mobile and other technological devices are indispensable from our daily work environment and frequently used to get our tasks done. The use of ICT in the workplace is generally associated with substantial advantages in terms of efficiency, flexibility and productivity. Changing communication patterns and a reduction of spatial and temporal constraints were found to improve the integration of work and family life (Ahrentzen, 1990) and to increase people's productivity at work (Gressgård, Amundsen, Aasen, & Hansen, 2014). Despite these advantages, organizational concerns emerged from psychological and physical health costs of ICT use in the long term (cf. Park, Fritz, & Jex, 2011; Thomas, 2015). Due to intensified expectations of workers availability, employees often feel an urge to use work-related ICT in their non-work time (Lal & Dwivedi, 2010). The status of being continuously connected and potentially contactable anywhere at any time leads to an ongoing thinking about ICT messages and an overcoming need to respond to it – a phenomenon known as workplace telepressure (Barber & Santuzzi, 2015). So far, it has been demonstrated that such pressure leads to a lack of boundary setting between work and non-work (Barber & Jenkins, 2014). This in turn, negatively influences two key recovery processes, namely the ability to psychologically detach from work and one's sleep quality (Barber & Jenkins, 2014; Berkowsky, 2013). A wide range of research has shown that impaired recovery leads to mental and physical health problems of the employee (Mejman & Mulder, 1998), often reflected in high absence rates, sick leave or work disability at the organizational level (Hershcovis et al., 2007). Previous studies found that mindfulness – a state of conscious awareness to the present - can facilitate psychological detachment after work and thereby improve people's recovery (Hülshager, Alberts, Feinholdt, & Lang, 2013; Hülshager et al., 2014).

The present study aims to extend existing scientific findings by examining the effects of workplace telepressure on psychological detachment and sleep quality beyond the day level. To date, the relation has only been investigated in a recent study conducted by Barber and Santuzzi (2015) using a cross-sectional design. However, the identification of recovery process patterns throughout a working week in relation to workplace telepressure helps to extend existing

knowledge about the impact of workplace telepressure on employees' recovery. That in turn, could lay the foundation for the effective implementation of work flexibility initiatives in organizations. A second contribution is to integrate the concept of mindfulness into the recovery process by examining its potential role against preservative work-related thoughts. To the best of our knowledge, this research is the first to empirically examine the effects of mindfulness on workplace telepressure. This investigation may help to maintain health in organizations and to foster sustainability. Altogether, current theories and studies in regard to technology use at work, employee recovery and mindfulness raise the following research questions:

- How does workplace telepressure influence employees' recovery processes, in particular psychological detachment and sleep quality?
- Can mindfulness counteract against workplace telepressure and its potential negative effects?

Considering increasing concerns about an intensified use of ICT's in the workplace and the fluctuating dynamics of recovery processes (Sonnentag & Fritz, 2015; Thomas, 2015), the present study investigates the above mentioned research questions using a daily diary design.

Theoretical Background

Recovery from Work

During the course of a working day employees encounter various work demands and need to invest mental and/or physical effort in order to meet them. As a consequence, people experience a certain level of fatigue at the end of a work period (Fritz & Sonnentag, 2005; Zijlstra & Sonnentag, 2006). During non-work time, depleted (psycho-physiological) resources need to be replenished – a process which is generally known as work recovery (Cropley & Zijlstra, 2011). If employees do not recover sufficiently, fatigue accumulates and individuals suffer from negative mental and physical consequences both, in the short- and in the long-run (Meijman & Mulder, 1998). Numerous studies found that enduring stress leads to poor physiological well-being and mental health problems, often reflected in irritability, burnout or cardiovascular diseases (e.g. Leitner & Resch, 2005; Maslach, Schaufeli, & Leiter, 2001). On the organizational level, this eventually results in increased turnover, high absence rates, sick leave or work disability (Herscovis et al., 2007).

In numerous contemporary jobs people face high job demands, often in form of intense time pressure, high workload or social pressure, such as demanding interactions with clients that impede sufficient recovery. Such demands lead to a high arousal level (e.g. increased heart rate or adrenaline excretion) that requires people to take a rest in order to regenerate effort investments and to prepare for new challenges (Zijlstra & Sonnentag, 2006). In correspondence to these findings, people experience a general 'need for recovery' at the end of a work period, which can be defined as a person's desire to take a temporary break from work (Jansen, Kant, & van den Brandt, 2002). From a physiological perspective, a need for recovery can be understood as the need for turning back one's level of arousal to a baseline level (Craig & Cooper, 1992; Geurts & Sonnentag, 2006). From a psychological stand, workers need to feel capable to continue with current tasks and to meet new demands in the future (Zijlstra & Sonnentag, 2006).

In order to cope with job demands, people engage in different activities during non-work time (Sonnentag, 2011). Depending on the effectiveness of such activities, individuals differ in their stress response to encountered work demands and in their need for recovery (Sluiter, de Croon, Meijman, & Frings-Dresen, 2003). Sonnentag (2001) showed that tasks that require different demands than work tasks (e.g. physical activities when one's job requires mental effort investments) positively influence individual's well-being. On the other hand, Zijlstra and Sonnentag (2006) demonstrated that activities that require the same demands as work tasks (e.g. work-related activities) negatively affect people's recovery processes.

Sleep Quality. A wide range of research has shown that sleep is crucial for sufficient recovery from work. In order to effectively restore psycho-physiological resources, sleep needs to be continuous and of high quality (Walsh & Lindblom, 1997). There is broad empirical evidence showing that poor sleep quality is associated with performance decrements, fatigue and health complaints (Harrison & Horne, 1999; Lavidor, Weller, & Babkoff, 2003), as well as with negative affect variables during the next day (Scott & Judge, 2006). Sleep disturbances hinder the recovery process, resulting in a feeling of "unfreshness" in the next morning. This indicates that people are not fully able to meet the demands and challenges of the coming working day and need to invest extra effort in order to do so (Zijlstra & Sonnentag, 2006).

Psychological Detachment. One important precondition of high sleep quality is the ability to mentally switch-off from work. In a survey conducted in the UK working population,

17% of the participants declared that their sleep quality is negatively affected by constant worries about their work (Groeger, Zijlstra, & Dijk, 2004). In the literature this phenomenon is known as *ruminative thinking* or the *inability to psychologically detach* from work (cf. Sonnentag, 2011). In the context of organizational stress and recovery, detachment from work is often defined as an “individual’s sense of being away from the work situation” (Etzion, Eden, & Lapidot, 1998, p. 579). Later, this definition was extended by Sonnentag and Bayer (2005), who differentiated between physical and psychological detachment. Although one might not be physically engaged in work-related activities, there might be a connection to work in terms of feelings or thoughts (Sonnentag, 2011). Evidently, an inability to psychologically detach from one’s job leads to an unintentional mental presence of stressors, which ultimately results in a continuous psychophysiological activation. This, in turn, impedes one’s sleep quality and is negatively related to occupational stress and strain (e.g. Podsakoff, LePine, & Lepine, 2007; Sonnentag & Fritz, 2015; Querstret & Cropley, 2012). Hence, psychological detachment during non-work time is important to rebuild energetic and affective resources (Sonnentag & Bayer, 2005). Research has shown that specifically after working days of high workload and intense time pressure, individuals are less likely to mentally switch-off from work during evening hours (Sonnentag & Bayer, 2005). On the other hand, individuals benefit from short respite periods in the evening as well as longer recovery periods such as vacation, in which employees do not execute job-related activities (Sonnentag & Bayer, 2005; Westman & Etzion, 2001).

Consequently, it is important to set clear boundaries between work and non-work time in order to “forget” about work and to regenerate effort investments (Ashforth, Kreiner, & Fugate, 2000). Boundary creation between work and non-work entails a clear temporal, physical and cognitive segregation between these two domains (Campbell Clark, 2000). A successful boundary management was found to be positively related to employees’ job involvement (Adams, King, & King, 1996) and people’s initiative at work (Bolino & Turnley, 2005). On the other hand, a lack of boundary setting is associated with low psychological detachment and poor sleep quality (Barber & Jenkins, 2014), as well as with reduced job satisfaction (Adams et al., 1996).

Workplace Telepressure and its Effects on Recovery Processes

The Construct Workplace Telepressure. The introduction of information and communication technology in the workplace has caused difficulties in setting physical, temporal

and practical boundaries between work and non-work time. Studies found that ICT use hinders the freedom and the authority to define a clear segregation between time for work and time for non-work-related activities (Olson-Buchanan & Boswell, 2006; Park, Fritz, & Jex, 2011). Employees often feel the pressure of being continuously connected to the workplace during both work and non-work time, in order to meet the demands of coworkers, clients and supervisors (Barber & Jenkins, 2014; Lal & Dwivedi, 2010). Hence, an increasing number of employees fear that unplugging from the anywhere-at-any-time-office might equal a disconnection of their careers (Gordon, 2001). The status of being potentially contactable at any time, leads to an ongoing thinking about ICT messages and an overcoming need to respond to it. Barber and Santuzzi (2015) characterized this phenomenon as workplace telepressure, which they defined as an ongoing “thinking about ICT messages accompanied by an overwhelming urge to respond” (Barber & Santuzzi, 2015, p. 173). Workplace telepressure emerges when the advantage of asynchronous ICT’s, that provide people with the autonomy and control over their response times and working hours, is negated. Instead, telepressured workers view ICT’s (e.g. e-mail) as a synchronous communication form which requires immediate responses. This so called autonomy paradox (Mazmanian, Orlikowski, & Yates, 2013) forces workers to prioritize ICT communication throughout the day, regardless of their regular office-hours. Although the use of ICT’s in the workplace has been studied multiple times within the last decades (e.g. Boswell & Olson-Buchanan, 2007; Cameron & Webster, 2005; Huang, 2010), a cognitive concept related to ICT use (i.e. workplace telepressure) is comparatively new. A first scale for measuring workplace telepressure has been validated recently by Barber and Santuzzi (2015). The key elements comprise (1) a continuous preoccupation about message-based technology in the workplace and (2) an on-going urge to respond quickly to these messages.

There are various factors that cause and facilitate workplace telepressure. Firstly, it is related to personality traits such as conscientiousness, extraversion and self-monitoring (Barber & Santuzzi, 2015). Conscientious individuals often score high on responsibility, reliability and achievement orientation, whereas extroversive employees often seek stimulation from others due to their high sociability (McCrae & John, 1992). Therefore, conscientious and extroversive employees feel a stronger need to respond quickly to work-related messages in order to achieve personal (work) goals and to foster their social connectedness (Barber & Santuzzi, 2015). Additionally, self-consciousness, i.e. the awareness of how one is perceived by others (Scheier &

Carver, 1985), was found to be another valid predictor of workplace telepressure (Barber & Santuzzi, 2015). A theoretical explanation is based on the perception of telepressure as an impression-management construct, where quick response times are used to strengthen and maintain positive impressions among colleagues and supervisors.

Although these personality factors facilitate workers predisposition to suffer from workplace telepressure, research suggests that work environmental factors display stronger relationships with the construct (Barber & Santuzzi, 2015). The introduction of ICT's has brought with it a specific type of additional work demands. These can take the form of availability expectations, response requirements and difficulties to deal with technological dysfunctions (Day, Paquet, Scott, & Hambley, 2012). More specifically, it was found that prescriptive work norms and techno-overload best predicted workplace telepressure (Barber & Santuzzi, 2015). Prescriptive work norms refer to particular job demands, e.g. to respond rapidly (Forsyth, 2009), whereas techno-overload is defined as a perceived work overload caused by ICT requirements such as time pressure (Ragu-Nathan, Tarafdar, Ragu-Nathan, & Tu, 2008). Considering these findings, workplace telepressure can rather be perceived as a response to specific job demands than as a result of one's personality traits. More specifically, the concept represents a maladaptive cognitive coping strategy to deal with encountered technological demands (Barber & Santuzzi, 2015).

The Role of Workplace Telepressure for Employee Recovery Processes. A prolonged exposure to (technological) demands and resulting mental stressors is likely to impede recovery processes. Technological overload has been demonstrated to show high relations with various negative outcomes, such as reduced productivity (Karr-Wisniewski & Lu, 2010), low work engagement (Reinke & Chamorro-Premuzic, 2014), as well as high levels of stress (Mano & Mesch, 2010) and burnout (Reinke & Chamorro-Premuzic, 2014) – well known consequences of insufficient recovery (cf. Mejman & Mulder, 1998). Likewise, Barber and Santuzzi (2015) found that workplace telepressure predicted physical and cognitive burnout, as well as health-related absenteeism. Theoretical explanations of these findings are based on two main mechanisms: First, perseverative stressful thoughts about ICT messages prevent boundary creation between work and non-work (Barber & Jenkins, 2013). Second, low psychological detachment is accompanied by an on-going psycho-physiological activation that in turn, reduces one's sleep quality (Querstret & Croy, 2012).

Workplace Telepressure and Sleep Quality. The negative link between technology use at work and employees' sleep has already been established and successfully demonstrated in previous studies (e.g. Barber & Jenkins, 2014; Lanaj, Johnson & Barnes, 2014). A negative relation between workplace telepressure and workers' sleep quality has also been confirmed by Barber and Santuzzi (2015). To test the impact of workplace telepressure on recovery-related variables, the authors applied a cross-sectional research methodology. However, recent studies found that recovery processes such as psychological detachment and sleep quality are fluctuating phenomena which require diary studies as a research method (e.g., Sonnentag & Fritz, 2015; van Hooff & Geurts, 2013). The one-time shot of these variables might therefore be regarded as a comparatively invalid measurement. To be able to validly confirm previous findings, the following is hypothesized using a daily diary design:

Hypothesis 1: Workplace telepressure explains interindividual differences in people's sleep quality. Employees who score low on workplace telepressure have a better sleep quality than employees who score high on workplace telepressure.

Psychological Detachment as a Mediator between Workplace Telepressure and Sleep Quality. As previously discussed, psychological detachment is central to high quality sleep. Many authors suggest that work demands and characteristics affect people's sleep indirectly through their impact on workers psychological state during non-work time (cf. Park, Fritz & Jex, 2011; Querstret & Cropley, 2012). Blurring boundaries between work and free-time caused by an intensified use of ICT's, lead to a mental presence of stressors, resulting in physiological activation that hinders people to fully recover during sleeping times (Sonnentag & Fritz, 2007; Sonnentag & Fritz, 2015). Correspondingly, studies have found that technology use at work is strongly related to a reduced ability to mentally switch-off from job-related thoughts (Berkowsky, 2013; Sonnentag, Binnewies, & Mojza, 2008; Sonnentag, Binnewies, & Mojza, 2010). In particular, recent studies demonstrated a remarkable effect of prescriptive working norms (e.g. expected availability and quick response times) on psychological detachment (Barber & Jenkins, 2014; Barber & Santuzzi, 2015; Park, Fritz, & Jex, 2011). Availability expectations that are conveyed through these norms are in turn closely related to workplace telepressure. Following this argumentation, Barber and Santuzzi (2015) demonstrated that telepressured employees reported less psychological detachment from work than non-telepressured employees.

However, contrary to their expectations, workplace telepressure did not predict psychological detachment beyond personal and work environmental factors. Presumably, this result can be traced back to the cross-sectional research methodology as applied by the authors. Considering current theoretical findings and using a method to capture the fluctuating dynamics of recovery variables, we hypothesize that a negative relation between workplace telepressure and daily sleep quality is mediated by psychological detachment from work.

Hypothesis 2: The relationship between workplace telepressure and sleep quality is mediated by psychological detachment from work.

The Benefits of Mindfulness

Recently, a link between the concept of mindfulness and recovery processes has been established (Hülshager et al., 2013; Hülshager et al., 2014). Mindfulness is rooted in spiritual Buddhist traditions and can be defined as a process of conscious attention to the present and an acceptance of external stimuli in a non-judgmental way (Kabat-Zinn, 2005). According to Brown, Ryan and Creswell (2007), mindfulness consists of several key facets, namely

- a thorough awareness of external events and inner processes (e.g. emotions),
- an ability to process information without evaluating or analyzing what has been perceived, and
- a conscious directed attention to the present moment.

Similar to other personality traits, mindfulness is an “inherent human capacity that varies in strength, both across situations and persons” (Hülshager et al., 2013, p. 311). Hence, mindfulness can be measured as a stable characteristic over time (here termed *trait mindfulness*) or as a state that changes from one situation to another (here termed *state mindfulness* or *daily level of mindfulness*).

In contemporary psychology, the concept has been researched as an approach to reduce cognitive vulnerability to stress (Bishop et al., 2004). The majority of empirical studies were conducted in clinical contexts, showing that mindfulness positively influences treatment programs that in turn, have salutary effects (e.g., Christopher et al., 2015; Dimidjian et al., 2014; Külz et al., 2014). Theoretical explanations of these findings are based on the regulating role of mindfulness in employees’ thoughts and emotional experiences. Rather than identifying with

perceived emotional distress and thoughts, mindfulness enables people to observe external events in a non-judgmental, accepting way.

Recently, researchers have transferred these findings to the working context. Empirical studies have shown that mindfulness helps to prevent emotional exhaustion, one of the key facets of burn-out (Hülshager et al., 2013). Further, it positively affects a number of work-related constructs, such as the balance between work and family life (Allen & Kiburz, 2012), job satisfaction (Hülshager et al., 2013), job performance (Dane & Brummel, 2013), work recovery (Marzuq & Drach-Zahavy, 2012) and sleep quality (Wolever et al., 2012). In a recent diary study conducted by Hülshager et al. (2014) it was found that the positive relation between mindfulness and sleep quality was specifically strong at the between-personal level and mediated by the ability to psychologically detach from work demands during non-work periods. Workers high on mindfulness displayed a continuous high level of psychological detachment over a working week.

Mindfulness Hinders the Occurrence of Workplace Telepressure and Facilitates Recovery Processes. According to the Job Demands Resource model (Bakker & Demerouti, 2007; Demerouti, Bakker, Nachreiner, & Schaufeli, 2001) work demands and work resources can predict an employee's occupational stress and well-being. Whereas job demands require psycho-physiological resource investments and lead to exhaustion, job resources foster people's work engagement and performance. These resources can take the form of job characteristics (e.g. autonomy) or personality factors (e.g. emotional stability) and help to translate encountered job demands into positive work challenges rather than stressful events (Schaufeli & Bakker, 2004). As discussed previously, workplace telepressure can be seen as an ineffective response to perceived technological job demands. A continuous urge and preoccupation to respond quickly to message-based ICT's, leads to extra effort investments among telepressured employees. Consequently, resources are needed that help to reduce job demands and associated psychological and physical costs (Schaufeli & Bakker, 2004).

Mindfulness as a state of conscientiousness helps to acquire, protect and retain resources through various mechanisms. First, it was shown that mindfulness promotes self-regulating behavior (Glomb, Duffy, Bono, & Yang, T., 2011; Shapiro, Carlson, Astin, & Freedman, 2006). Self-regulation refers to a "process of managing and changing the self" (Baumeister & Vonasch, 2015, p.4). It is argued that by recognizing, not judging, the present moment mindfulness can

interrupt the automaticity of cognitive reactions (Glomb et al., 2011). Mindful employees therefore have a wider repertoire of cognitive responses and can replace dysfunctional cognitive and behavioral patterns by effective reactions (Evans & Segerstrom, 2011). Second, the mindful focus to the present allows employees to act in line with their current needs, values and interests (Brown & Ryan, 2003). By focusing on the present and acting according to the needs of the here and now, people objectively perceive their feelings and thoughts without being overwhelmed by them (Bishop et al., 2004).

Transferring these beneficial effects of mindfulness to the recovery context, it might (a) prevent workplace telepressure at its onset and (b) reduce its potential negative consequences on employees' recovery processes. Weinstein, Brown and Ryan (2009) have already demonstrated that mindful individuals experience less work-related distress and are better able to cope with perceived external stressors. The promotion of self-regulating behavior is key to counteract against maladaptive cognitive responses to technological demands. Mindful employees are more likely to actively change their cognitive and behavior patterns to more effective responses, e.g. thinking about and responding to work-related ICT messages only in regular working hours. This might not only prevent to engage in workplace telepressure in the first place, but also facilitates to set clear physical, temporal and practical boundaries between work and non-work. Effective boundary management in turn, stimulates psychological detachment from work and thereby improves employee recovery. A meta-analysis conducted by Giluk (2009) supports this argumentation by showing that mindfulness provokes positive emotions and leads to health and well-being in the long term.

Psychological detachment is not only supported by mindfulness through its promotion of self-regulation but also through the conscious directed attention to the present moment. Paying attention to the present and acting according to the needs of the here and now have been shown to prevent preservative work-related thoughts (Hülshager et al., 2014). This facet of mindfulness possibly hinders telepressured employees to get fully engrossed in their feelings and thoughts about work-related ICT messages. Mindfulness might therefore buffer negative consequences on workers' recovery caused by workplace telepressure. In line with this argumentation, the following is hypothesized:

Hypothesis 3: Trait mindfulness explains interindividual differences in workplace telepressure. Individuals who score high on trait mindfulness suffer less from workplace telepressure than individuals who score low on trait mindfulness.

Hypothesis 4: Daily levels of mindfulness moderate the negative relation between workplace telepressure and psychological detachment, such that the relation is weaker when state mindfulness is high.

To summarize, the current research aims to extend existing scientific findings by testing the proposed research model as presented in Figure 1. Firstly, it is hypothesized that continuous stressful thoughts about work-related ICT messages impair employees' recovery processes, in particular employees' sleep quality (hypothesis 1), whereby the relation is mediated by psychological detachment from work (hypothesis 2). Further it is proposed that mindfulness can counteract against workplace telepressure and its potential negative effects on recovery processes. By promoting self-regulation and directing one's attention to the present, mindfulness might (a) prevent workplace telepressure at its onset (hypothesis 3) and (b) buffer the negative effect of workplace telepressure on psychological detachment (hypothesis 4).

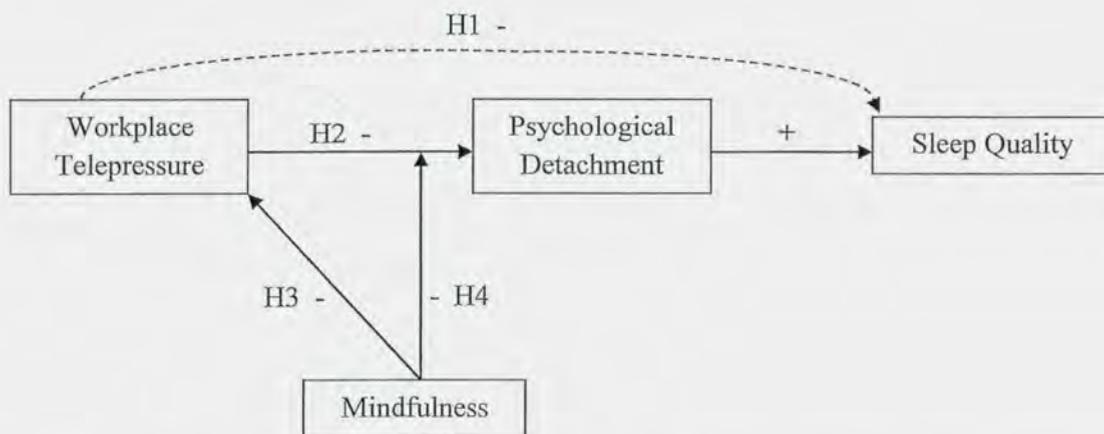


Figure 1. Graphical representation of the research model. ----> represents an indirect effect.

Method

Study Design

The data collection for the current research was based on a paper-pencil diary survey. This design has several advantages: First, in quantitative diary research participants can report thoughts, feelings and behaviors in a natural work environment (Ohly, Sonnentag, Niessen, & Zapf, 2010). Second, recovery processes can be assessed on a daily basis and thereby fluctuating dynamics of these concepts can be captured. Third, in comparison to cross-sectional surveys, diary studies reduce a retrospective bias and social desirability (Bakker & Demerouti, 2007). In addition, diary studies have the advantage to examine within- and between- person relations in a longitudinal setting. The distributed survey package consisted of one general questionnaire and five daily questionnaires with three measurement occasions per day over a consecutive working week from Monday to Friday.

Sample and Procedure

Participants were acquired from various occupations and companies in Germany and the Netherlands using two different recruitment techniques: First, snowball sampling was applied, a method that is often used in work and organizational research settings (e.g., Grandey, Fisk, & Steiner, 2005). The recruitment team started contacting people from their personal network who in turn, recruited other suitable candidates. It was required that participants work at least 32 hours and 4 days per week in order to validly assess recovery change patterns. Second, people were informed about the study directly at their workplaces through internal meetings and flyer. The topic of the research was only introduced broadly as “well-being at work” without mentioning specific variables to prevent data falsification due to participants’ expectancies. Participants received the instruction to fill in the general questionnaire before completing the daily surveys. Daily data was gathered during the first break at work, after work and before bedtime. A possibility to be informed about the study results after finishing the data collection served as an incentive for participation – no additional incentives were offered.

A total of 310 diary booklets were distributed to interested employees, primarily from the private and professional network of the recruitment team. Valid data could be collected from 198 people in total, resulting in an acceptable response rate from 63.9%, which is comparable to other diary studies in organizational research settings (cf. Sonnentag, 2001; van Hooff & Geurts,

2015). Participants' age ranged from 20 to 65 ($M = 35.74$, $SD = 11.39$), whereby 62.1% were female and 37.9% were male. All participants worked full-time, i.e. 32-40 hours and 4-5 days per week, with an average job tenure of 7.45 years ($SD = 8.63$) and 41.47 working hours per week ($SD = 6.87$). 16.2% of the sample hold a leading position. The majority of participants obtained a university degree (Bachelor or Master) (47.4%) and 19.7% of the sample indicated a doctoral degree as their highest profession. Every participant used ICT's in work related contexts, whereby the majority reported that they would always use technology to communicate with people from their work (60.6%) and only 5.6% in rare occasions. A total number of 23 employees (11.6%) engaged in home-office and out of the teleworking participants, 4 (17.3%) worked more than three days from home. The sample generally consisted of a broad range of professions: The majority of participants worked in business contexts (e.g. finance, human resources, sales) (55.6%), in the caring industry (e.g. psychotherapy) (9.1%) or in the educational sector (e.g. as teachers) (8.1%). 2.5% of the sample was self-employed and the remaining participants worked in diverse job positions such as engineers, interns, real estate managers, policemen or doctors.

Measures

The general survey included demographic variables (e.g. age, gender, occupation), workplace telepressure, trait mindfulness and general job demands as a control measure. In the daily surveys, participants had to fill in questionnaires at three different points in time: during work, after work and before bedtime. An overview on the applied scales, as well as on time and frequency of study variable measurements is displayed in Table 1.

Workplace Telepressure. For measuring workplace telepressure we used a German version from the six-item scale validated by Barber and Santuzzi (2015). In a first step, all six items and the measurement instruction were translated from English into German and English into Dutch by a bilingual native speaker, respectively. In order to ensure that content and meaning of the items remained the same, the items were subsequently re-translated from German into English and Dutch into English by an independent second translator and compared to the initial scale. A sample items is "*It's hard for me to focus on other things when I receive a message from someone*" and "*It's difficult for me to resist responding to a message right away*". Responses were provided on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Trait Mindfulness. For measuring trait mindfulness, we used the German version (Michalak, Heidenreich, Ströhle, & Nachtigall, 2008) and the Dutch version (Schroevers, Nykliček & Topman, 2008) of the 15-item Mindful Attention and Awareness Scale (MAAS, Brown & Ryan, 2003). A sample item is *“I find it difficult to stay focused on what’s happening in the present”*. All items were reversed coded and answers were recorded on a 5-point Likert scale ranging from 1 (almost never) to 5 (almost always).

State Mindfulness. Daily levels of mindfulness were assessed two times a day (during the first break at work and after work) using the respective 5-item version of the MAAS.

Job demands. Literature has shown that work characteristics such as workload and time pressure influence recovery-related variables (cf. Sonnentag, 2001) and are closely related to stress-related variables such as workplace telepressure (cf. Barber & Santuzzi, 2015). Therefore, general and daily job demands were assessed as control measures. Job demands were measured with a German and a Dutch translation of the Questionnaire on the Experience and Evaluation of Work (VBBA; Bakker, Veldhoven, & Xanthooulou, 2010). An example item is *“Do you have to perform too much work?”*. Altogether, the scale includes 11 items that were answered on a 4-point Likert scale, ranging from 1 (never) to 4 (always).

Psychological detachment. Psychological detachment was assessed before going to bed using the German and the Dutch version from the four-item subscale of the Recovery Experience Questionnaire (Sonnentag & Fritz, 2007): *“I forgot about work”*, *“I did not think about work at all”*, *“I distanced myself from my work”*, *“I got a break from the demands of work.”* Answers were recorded on a 5-point varying from 1 (I do not agree at all) to 5 (I fully agree).

Sleep quality. Participants’ sleep quality was measured with one single item from the Pittsburgh Sleep Quality Index (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989) *“How do you evaluate this night’s sleep?”* using the German version *“Wie haben Sie letzte Nacht geschlafen?”* (Sonnentag, Binnewies, & Mojza, 2008) and the Dutch translation *“Hoe zou u uw slaap van de afgelopen nacht beoordelen?”* during the first break at work. Answers to the item were assessed on a 5-point rating scale from 1 (very bad) to 5 (very good).

Use of technology at work. In order to measure ICT use and exposure at work, it was further assessed how frequently participants use message-based ICT’s in work-related contexts, using the single item: *“How often do you use message-based technology (e.g. e-mail) to communicate with people from your work?”*. The item was translated into German *“Wie häufig*

benutzen Sie nachrichten-basierte Technologien (z.B. E-Mail), um mit Menschen von Ihrer Arbeit zu kommunizieren?" and into Dutch "*Hoe vaak gebruikt u bericht gebaseerde technologieën (bijv. E-mail) om met mensen van uw werk te communiceren?"*, respectively. Answers were rated on a 4-point Likert scale from 0 (never) to 4 (always).

Date and time. Date and time of the daily survey entries were additionally recorded. This served the purpose of coding for a particular day of the week that the survey has been completed.

Table 1.
Overview on Applied Scales

Construct	Number of items	Type of Survey	Time of measurement	Frequency of measurement
Workplace telepressure	6	General Survey	-	Once
Trait mindfulness	15	General Survey	-	Once
General job demands	11	General Survey	-	Once
Psychological detachment	4	Daily Survey	Before bedtime	Five
Sleep quality	1	Daily Survey	During work	Five
State mindfulness	5	Daily Survey	During and after work	Ten
Daily job demands	11	Daily Survey	During and after work	Ten

Statistical Analyses

The dataset contained data at the day-level (Level 1; *here*: psychological detachment, sleep quality, state mindfulness and daily job demands) and at the person-level (Level 2; *here*: workplace telepressure, trait mindfulness and general job demands) for every participant, with level 1 data being included in level 2 data. To test the hypotheses, a hierarchical linear modeling approach was used (Bryk & Raudenbush, 1992). This multi-level approach is the most suitable one, considering the hierarchically structured dataset and the interdependence of the person-level and daily-level measurements (cf., Hayes, 2006; Sonnentag, 2001). Starting with a unconditional, random coefficient model (null-model), multilevel analysis allows to compare and to test different models against each other. Using a maximum likelihood ratio statistic, the improvement of one model over another can be estimated (Kreft & de Leeuw, 1998). To test for a significant difference between likelihood values, a chi-square (χ^2) test was conducted, whereby

degrees of freedom equaled the number of parameters added to the model (cf. Hayes, 2006). Variables from the general survey and the daily questionnaires were treated as continuous and their distribution did not show any violations against multi-level assumptions.

To test for hypotheses 1-2, random intercept, fixed slope models were calculated. Predictor variables at the person level (workplace telepressure and trait mindfulness) were centered around the grand mean since the interest of this investigation lied on between person differences (cf., Binnewies, Sonnentag, & Mojza, 2010). Variables at the day level (*here*: psychological detachment and sleep quality) were not centered since they were outcome measures. The second hypothesis included a mediation model, which was tested following Baron and Kenny's (1986) analytical approach. The approach assumes that four criteria must be established in order to test for a mediation: The first step aims to confirm that the independent variable (*here*: workplace telepressure) is significantly related to the outcome variable (*here*: sleep quality). The second step is to show that the independent variable is also significantly related to the mediating variable (*here*: psychological detachment). The third step is to demonstrate a significant relation between mediating and outcome variable, while controlling for the independent variable. The final fourth step should confirm that the effect of the independent on the outcome variable is significantly reduced in presence of the mediating variable. In addition, a Sobel z test (Sobel, 1982) was conducted in order to test for an indirect effect of the independent on the dependent variable.

The third hypothesis included Level 2 variables only (*here*: trait mindfulness and workplace telepressure). Hence, a hierarchical structure between these two variables did not exist and a single linear regression analysis was conducted in order to test for a direct effect of trait mindfulness on workplace telepressure. This statistical method is the most appropriate one to test for a simple prediction model as assumed in hypothesis 3, including one continuous independent variable (*here*: trait mindfulness) that should explain variance for one continuous outcome variable (*here*: workplace telepressure) (cf. Hayes, 2006; Field, 2009).

Hypothesis 4 was tested with the predictor variable state mindfulness and the interaction between workplace telepressure and state mindfulness centred around respective person-means to examine intraindividual differences. A random slope was specified to test for the interaction effect. The data analyses were conducted with IBM SPSS Statistics, Version 21.0.

Results

Descriptives

For an initial examination of the present data, a descriptive analysis was conducted. Table 2 displays means, standard deviations, Cronbach's α , intra-class correlations coefficients (*here*: ICC1) and intercorrelations among study variables. Variables that were measured at the day-level were aggregated and averaged to the person-level in order to correlate at the between-person level. The correlation at the within- person level was estimated using random intercept, fixed slope models. As expected, workplace telepressure was significantly negatively correlated to sleep quality ($r = -.38, p < .001$)¹ and psychological detachment ($r = -.33, p < .001$), whereby the latter two were significantly correlated at the between- ($r = .44, p < .001$) and within-person level ($r = .48, p < .001$)². In addition, workplace telepressure was negatively related to trait mindfulness ($r = -.46, p < .001$)³ and state mindfulness ($r = -.41, p < .001$), whereby state mindfulness was significantly correlated to psychological detachment at the between-person ($r = .49, p < .001$) and within-person level ($r = .40, p < .001$)⁴. However, it has to be noted that any tentative conclusions based on the correlation table only are prone to errors due to the interdependence of measures among study variables in a repeated measure (diary) design (Chen et al., 2002).

Preliminary Analysis

In a second step, data validity was estimated considering two important statistics. First, Cronbach's α values were calculated (see Table 2). Reliability analyses demonstrated a high internal consistency of all applied scales ($\alpha = .85 - .92$). As mentioned by Streiner (2003), this is an important indication for data validity. Second, ICC1 statistics were calculated using respective unconditional random coefficient models (see Table 2). ICC1 values generally reflect the proportion of variances within and between units (Klein & Kozlowski, 2000). In the current sample ICC1 values suggest that large proportions of daily measure variances can be explained by differences within participants. For instance, 55% of the variance of daily sleep quality can be explained by within-person variations, whereby 45% can be traced back to between-person differences.

¹ cf. hypothesis 1; ² cf. hypothesis 2; ³ cf. hypothesis 3; ⁴ cf. hypothesis 4

Table 2.

Means, Standard Deviations, Cronbach's α , Intra-class correlations and Intercorrelations among Study Variables

Variable	<i>M</i>	<i>SD</i>	Cronb. α	ICC1	1	2	3	4	5	6	7
Person-level											
1. Workplace telepressure	2.75	.83	.89	-	-						
2. Trait mindfulness	3.43	.71	.92	-	-.46***	-					
3. General job demands	2.49	.50	.87	-	.26***	-.27***	-				
Day-level											
4. Psychological detachment	3.25	.99	.92	.43	-.33***	.38***	-.36***	-	.48***	.40***	-.18***
5. Sleep Quality	3.47	.97	-	.55	-.38***	.46***	-.36***	.44***	-	.48***	-.19***
6. State mindfulness	3.94	2.99	.91	.70	-.41***	.70***	-.36***	.49***	.59***	-	-.17***
7. Daily job demands	2.25	.54	.85	.78	.26***	-.30***	.80***	-.46***	-.41***	-.46***	-

Note. Data below the diagonal show correlations at the between-person level ($n = 182-198$), with day-level measurements being aggregated to the person level. Data above the diagonal show correlations at the within-person level ($n = 182-198$), with estimated random intercept, fixed slope models. Cronbach's α was calculated separately for each day and respective reliabilities were averaged across the 5 working days.

* $p < .05$; ** $p < .01$; *** $p < .001$ (two-tailed)

Hypotheses Testing

Workplace Telepressure and Sleep Quality. The first hypothesis stated that workplace telepressure is negatively related to sleep quality. To test this hypothesis, a direct relationship between workplace telepressure and sleep quality was examined. Results are shown in Table 3. First, an unconditional random intercept model (null model) was calculated. In a second step, it was compared to a random intercept, fixed slope model, which included workplace telepressure as a predictor of sleep quality. A comparison of the likelihood ratio between the models revealed that model fit improved significantly, since it lead to a significantly smaller likelihood ratio (difference of $-2 \cdot \log = 82.49$, $df=1$, $p < .001$). As hypothesized, workplace telepressure significantly predicted sleep quality (estimate = -0.32 , $t = -5.64$, $p < .001$). A negative estimate confirms that the relation between the two variables is negative. Consequently, Hypothesis 1 is fully supported.

Table 3

Multilevel Models Predicting Sleep Quality from Workplace Telepressure.

	Null Model			Model 1		
	Estimate	SE	t	Estimate	SE	t
Fixed Effects						
Intercept	3.46	0.50	69.37***	3.47	0.05	74.48***
Workplace Telepressure				-0.32	0.06	-5.64***
Random Effects						
Residual	0.51	0.03		0.51	0.03	
Intercept	0.38	0.05		0.32	0.05	
-2*LL	2340.94			2258.45		
Δ -2*LL				82.49***		

Note. Models are random intercept, fixed slope models. $N = 198$ at the person level.

* $p < .05$; ** $p < .01$; *** $p < .001$ (two-tailed)

Δ = difference; SE = standard error; LL = log likelihood

The Mediating Role of Psychological Detachment. The second hypothesis included a mediation model that assumes an indirect effect of workplace telepressure on sleep quality through psychological detachment. In order to test for a mediation with multilevel analysis, different nested models have been created and compared to each other, following the analytical approach as proposed by Baron and Kenny's (1986)⁵. Respective results are shown in Table 4. Step 1 is equivalent to the testing of Hypothesis 1 and has been confirmed previously. Criterion 2 of the mediation analysis has also been successfully reached by demonstrating that workplace telepressure significantly predicted psychological detachment. That was done by initially calculating a null model with psychological detachment as the dependent variable. Next, workplace telepressure was added to the model as a predictor. Model fit increased significantly, considering the likelihood ratio between the models (difference of $-2 \cdot \log = 34.69$, $df=1$, $p < .001$). Workplace telepressure significantly predicted psychological detachment ($\beta = -0.31$ $SE = 0.06$, $t = -4.81$, $p < .001$), demonstrating that the requirements of the second step of the mediation analysis have been met.

To confirm a full mediation effect, a random intercept, fixed slope model was calculated, including both, psychological detachment and workplace telepressure as predictors of sleep quality. This model was subsequently compared to the prior calculated null model of sleep quality. Again, model fit improved significantly considering the difference of likelihood ratio statistics (difference of $-2 \cdot \log = 69.59$, $df=2$, $p < .001$). As expected, psychological detachment significantly predicted sleep quality in the presences of workplace telepressure (estimate = 0.27, $t = 4.76$, $p < .001$). However, contrary to expectations, workplace telepressure also remained a significant predictor of sleep quality in the presence of psychological detachment (estimate = -0.15, $t = -4.48$, $p < .001$). However, a comparison of the estimates demonstrates that the significant effect from workplace telepressure on sleep quality has been reduced when psychological detachment was added to the model (see Table 4). This indicates that psychological detachment only partially mediated the relation between workplace telepressure and sleep quality. The Sobel z test provided further support for a partial mediation effect ($z = -2.85$, $p < .001$). Hypothesis 2 is thus partially supported.

⁵ cf. section *Statistical Analyses*

Table 4.

Multilevel Estimates of the Mediation Effect of Psychological Detachment on the Relation between Workplace Telepressure and Sleep Quality.

Variable	Step 1			Step 2			Step 3/4		
	Estimate	SE	<i>t</i>	Estimate	SE	<i>t</i>	Estimate	SE	<i>t</i>
Workplace Telepressure	-0.32	0.06	-5.64 ^{a***}	-0.31	0.06	-4.81 ^{***}	-0.15	0.03	4.48 ^{***}
Psychological Detachment							0.27	0.05	4.76 ^{b***}
-2*LL	2258.45			2213.48			2235.35		
Δ -2*LL	82.49 ^{***}			34.69 ^{***}			69.59 ^{***}		

Note. Models are random intercept, fixed slope models. $N = 198$. Step 1: Workplace telepressure predicts sleep quality. Step 2: Workplace telepressure predicts psychological detachment. Step 3/4: Mediation model; workplace telepressure predicts sleep quality in the presence of psychological detachment.

* $p < .05$; ** $p < .01$; *** $p < .01$ (two-tailed)

Δ = difference; SE = standard error; LL = log likelihood

^a equivalent to testing of hypothesis 1

^b partial mediation effect

The Role of Mindfulness for Workplace Telepressure and Recovery Processes. The third hypothesis assumed that trait mindfulness significantly predicts workplace telepressure. The proposed relation was examined conducting a univariate analysis of variance (ANOVA) for simple linear regressions, since no hierarchical interdependence between both variables existed (cf. Hayes, 2006). The regression model included workplace telepressure as the dependent variable and trait mindfulness as the independent variable. Results are displayed in Table 5. As hypothesized, analysis demonstrates that trait mindfulness significantly predicted workplace telepressure (estimate = -0.51; $t = -15.07$, $p < .001$) and thus, Hypothesis 3 can be fully supported.

Table 5

Univariate ANOVA Predicting Sleep Quality from Workplace Telepressure.

	Estimate	SE	<i>t</i>
Intercept	2.73	0.24	111.83***
Workplace Telepressure	-0.51	0.34	-15.07***

Note. $N = 198$. * $p < .05$; ** $p < .01$; *** $p < .001$ (two-tailed)

The fourth hypothesis suggested that state mindfulness moderates the relation between workplace telepressure and psychological detachment. This was tested comparing various nested multilevel models. Results are displayed in Table 6. Model 1 was a random intercept, fixed slope model and contained the predictor variables workplace telepressure and state mindfulness. In comparison to the null model including the intercept only, model fit was significantly improved in Model 1 (difference of $-2 \cdot \log = 88.19$, $df = 2$, $p < .01$). In a second step, the interaction term between workplace telepressure and state mindfulness was added to the statistical analysis (Model 2). To test for the interaction effect, a random slope was specified to allow for the variation of workplace telepressure and psychological detachment as a function of state mindfulness. Again, model fit improved significantly (difference of $-2 \cdot \log = 4.98$, $df = 1$, $p < .05$). In addition, the interaction term significantly predicted psychological detachment from work (estimate = 0.13; $t = 2.24$, $p < .05$). The interaction pattern is shown in Figure 1. For workers who suffered from high workplace telepressure and who experienced low levels of daily mindfulness, the negative relation between workplace telepressure and psychological detachment was stronger than when they experienced high levels of daily mindfulness. Hypothesis 4 was therefore fully supported.

Table 6

Multilevel Models Predicting Psychological Detachment by Workplace Telepressure and Daily Levels of Mindfulness.

Variable	Null Model			Model 1			Model 2		
	Estimate	SE	<i>t</i>	Estimate	SE	<i>t</i>	Estimate	SE	<i>t</i>
Intercept	3.24	0.06	57.18***	3.27	0.05	62.51***	3.25	0.05	60.65***
Workplace Telepressure				-0.31	0.07	-4.41***	-0.32	0.07	-4.41***
State mindfulness				0.39	0.06	7.05***	0.39	0.06	7.18***
Workplace Telepressure x State mindfulness							0.13	0.06	2.24*
-2*LL	2248.17			2159.98			2155.00		
Δ -2*LL				88.19***			4.98*		

Note. A random slope was specified in Model 2. $N = 198$ at the person level. Model 1 was compared to the null model; Model 2 was compared to Model 1 to estimate respective model fit increase.

Δ = difference; SE = standard error; LL = log likelihood

* $p < .05$ (two-tailed); ** $p < .01$ (two-tailed), *** $p < .01$ (two-tailed),

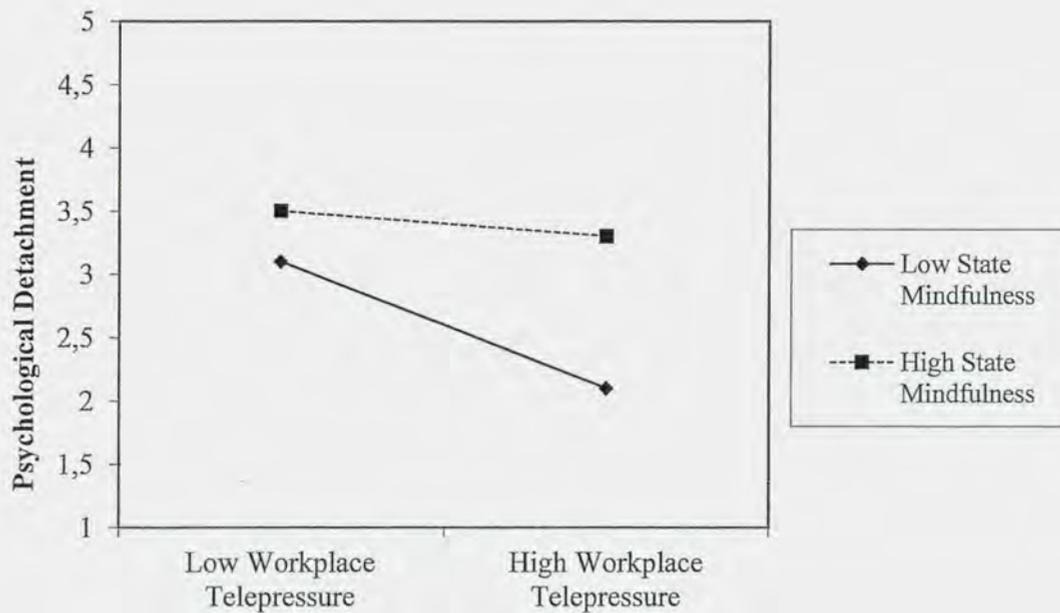


Figure 1. Moderation effect of daily levels of mindfulness on the relation between workplace telepressure and psychological detachment from work.

Discussion

Past research has shown that the introduction of technology at work has brought with it additional job demands that often cause pressure among employees to respond quickly to message-based ICT's. Recently, Barber and Santuzzi (2015) have conceptualized this phenomenon as *workplace telepressure* and demonstrated that it not only negatively affects people's recovery processes but also leads to serious ill-being in the long run. Meanwhile, a growing body of empirical evidence suggests that mindfulness can counteract against work-related distress and thereby prevent its potential detrimental consequences. Based on existing findings, the present study a) examined the relation between workplace telepressure and recovery processes over the course of a working week and b) investigated on the beneficial role of mindfulness for employee health and well-being. Findings of the study supported all of the proposed hypotheses, with the exception of the second hypothesis that could only be partially confirmed. Thereby, the present study contributes to existing knowledge in various ways:

Workplace Telepressure and Recovery Processes

First, current findings validate the negative impact of workplace telepressure on employees' recovery processes, namely workers sleep quality and their ability to psychologically detach from work. In correspondence to the proposition of the first hypothesis, telepressured workers reported significantly lower levels of sleep quality in comparison to non-telepressured employees. These results support prior research that found that exposure to technology use at work or workplace telepressure itself reduces one's ability to experience a high quality sleep during night (cf. Barber & Santuzzi, 2015; Park, Fritz, & Jex, 2011). Most of these studies explain their findings through the negative impact of work-related technology on employees' ability to psychologically detach from their job. Constant ruminative thinking in turn, causes a physical activation that hinders continuous and high-quality sleep (cf. Lal & Dwivedi, 2010; Podsakoff, LePine, & Lepine, 2007; Sonnentag & Fritz, 2015).

Likewise, in the present study it was hypothesized that the mental presence of stressors is fully responsible for employees' sleep disturbances. However, contrary to expectations, current findings indicate that psychological detachment only partially mediated the relation between workplace telepressure and participant's sleep quality, indicating a direct effect of workplace telepressure on employees' restorative sleep, next to an indirect effect via psychological detachment. Recent studies have already shown that digital technology negatively affects peoples sleep through the exposure to artificial sources of light late at night (Starker, Pollock, Zubrick, & Kurinczuk, 2006). For instance, Higuchi, Motohashi, Liu and Maeda (2005) showed that using technology with a bright display before bedtime reduced people's self-reported sleep quality. Correspondingly, Lanaj, Johnson & Barnes (2014) demonstrated a direct negative effect of late-night smartphone on employee's sleep. This might be one of the main reasons why data of the present study suggest a direct negative impact of workplace telepressure on workers sleep quality. Yet, in correspondence to Barber and Santuzzi's (2015) findings, current data also suggests that employees' sleep is negatively affected by workplace telepressure through an inability to psychologically detach from work. This supports the idea that an on-going urge and preoccupation to respond quickly to message-based ICT's does cause difficulties in boundary-setting between work and non-work. The fact that telepressured participants report difficulties in detaching from work right before going to bed indicates, that non-work time is not used to recovery sufficiently from work among those employees.

The Role of Mindfulness

Another way in that the present study contributes to existing theory, is through the detection of mindfulness as an important means to counteract against workplace telepressure and its negative effects. In correspondence to other recent studies (e.g. Evans & Segerstrom, 2011; Weinstein, Brown & Ryan, 2009), current results revealed that people who scored high on trait mindfulness experienced less work-related distress, presumably by possessing more adaptive stress responses and effective coping strategies than non-mindful employees. Mindful individuals tend to be aware and in control of their inner processes, which helps them to interrupt the automaticity of their cognitive reactions (Glomb et al., 2011). In other words, mindful people can better control their cognitive responses, which makes it possible to replace dysfunctional cognitive and behavioral patterns by more effective reactions (Evans & Segerstrom, 2011). The high negative relation between trait mindfulness and workplace telepressure further supports the idea that mindfulness as a personal trait prevents feelings and thoughts about work-related ICT messages at their onset by directing one's attention to the here and now instead of future events (Brown, Ryan, & Creswell, 2007). According to existing theory, this future-oriented facet of telepressure is predominantly responsible for experienced distress (Barber & Santuzzi, 2015). Telepressured workers constantly worry about prospective events such as making a negative impression at work, when they are not able to respond to ICT message from their supervisor or colleagues straight away. Hence, findings of the current study on mindfulness in relation to workplace telepressure contribute to positive occupational health psychology literature (Bakker & Derks, 2010) by demonstrating that mindful individuals do suffer less from job-based telepressure.

In addition, present study results demonstrate that telepressured employees with high levels of daily mindfulness were able to detach more easily from work than with low levels of daily mindfulness. As discussed earlier, there exist a number of theoretical explanations for the observed effect. One possible explanation refers to the fact that mindful individuals direct their attention to inner experiences (e.g. emotions and thoughts), while at the same perceiving external stimuli in a non-judgmental way (Brown & Ryan, 2003; Glomb et al., 2011). Assumingly, telepressured employees who experience high levels of mindfulness on particular days are better prepared to prevent negative work-related, future-oriented feelings and thoughts on these days. Such inner processes in turn, are key to rumination and hinder one's ability to mentally switch-

off from work (Sonnentag, 2011). Due to its self-regulating and present-moment-orientating aspects, daily levels of mindfulness are able to increase workers ability to psychologically detach from work, particularly when they experience telepressure. Taken together, the current research identifies mindfulness as an important recovery facilitating resource at both, the between- and within-person level.

Limitations

Although drawing such conclusions is legitimate considering the present results, the interpretation of any data should always be seen in light of study limitations. The most apparent limitation of the current research lies in the paper-and-pencil survey design to obtain data. Although participants had to report date and time of their survey entries, these reports are prone to falsification and do not objectively indicate the day and time when participants filled in the questionnaires. In that respect, other methodological approaches that all have specific advantages and disadvantages should be considered to conduct diary surveys (e.g. online questionnaires; c.f. Wright, 2005). On the other hand, the present study aimed to not restrict the sample to employees that have continuous access to computers, smart-phones and internet throughout their whole working day. Such a preselected sample is highly likely to experience workplace telepressure and thus, an online research design might have led to biased data. Therefore, in the present sample self-reported date and time prior to a questionnaire served as an indication for when participants filled in the respective survey. Yet, it cannot be guaranteed that some participants did fill out multiple questionnaires in batches, which is a remarkable limitation of the present research. Likewise, the use of paper-pencil diaries in comparison to online diary surveys is a controversial issue in the current literature. Whereas some authors praise the user-friendliness and sample enlargement that is increased by the use of paper-pencil diaries (cf. Hülshager et al., 2014), others prefer the conduction of online diary questionnaires to increase participants' compliance and honest forgetfulness (cf. Bolger, Davis & Rafaeli, 2003). An empirical examination by Green, Rafaeli, Bolger, Shrout and Reis (2006) revealed that a clear superiority of one over the other method in terms of data quality cannot be clearly derived.

A second limitation of the study refers to the time of data collection. Diaries were distributed in May and June in the Netherlands and in Germany, when many national and regional holidays took place. Consequently, a notable number of participants filled in the surveys only three to four out of five days or continued filling in the surveys after a couple of free

working days in between, although otherwise instructed. Considering, that we examined the influence of recovery process variables over consecutive working days (e.g. influence of psychological detachment on the third day on sleep quality on the fourth day), these interruptions might have led to some degree of data falsification, since weekends or holiday breaks positively affect work recovery (Sonnentag & Bayer, 2005; Westman & Etzion, 2001).

The third limitation lies in the fact that all variables were exclusively measured with self-reports, raising the likelihood of common-method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Some authors argue that the relation between self-reported variables is upwardly biased and that other measures should be preferred (cf. Conway & Lanze, 2010). However, due to the fact that this research aimed to examine cognitive and affective variables that reflect subjective experiences (e.g. recovery processes), it would not have been reasonable to measure such variables with objective methods. For instance, one might not suffer from workplace telepressure objectively (e.g. little exposure to ICT messages) but still experiences an internal distress. Hence, although it is worth considering the use of multi-source methods in future studies, it should not replace nor seen as superior to self reports (Conway & Lanze, 2010).

Finally, the conceptualization and respective measurement of mindfulness is discussed controversially in current research and theory. On the one hand, some researchers assume that mindfulness reflects a one-dimensional construct (e.g. Brown & Ryan, 2003; Hüsheger et al., 2014). On the other hand, some authors argue that mindfulness has different dimensions that should each be assessed in order to examine its effects (e.g. Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006; Grossmann, 2011). In the present study mindfulness was measured using the Mindful Attention and Awareness Scale (MAAS; Brown & Ryan, 2003), which regards mindfulness as a single-dimensional construct. To investigate the current research question, this scale was the most appropriate one since it is specifically suitable for participants without mindfulness or meditation experience (cf. Brown & Ryan, 2003). However, one could possibly consider additional questionnaires to measure mindfulness as a multi-dimensional construct. Such an approach is specifically useful when one tries to examine the impact of particular aspects of mindfulness on other variables.

Suggestions for Future Research

Although the present study included a variety of variables to examine the relation between workplace telepressure, recovery process variables and mindfulness, several additional

variables should be considered as relevant to similar investigations. Since workplace telepressure has been conceptualized only recently, future research might head to several directions. First, prospective studies could concentrate on the preconditions that are responsible for workplace telepressure. Barber and Santuzzi (2015) already found first evidence for the fact that descriptive workplace norms (e.g. coworkers respond quickly to one's own messages) or a specific type of reward systems (e.g. reward for fast response times in client-oriented settings) foster workplace telepressure. Hence, future research could add these specific job characteristics to the research design in order to understand the onset of work-related distress caused by message based technology.

Second, future studies should examine the relation between workplace telepressure and specific personality traits. Contrary to the current findings, Barber and Santuzzi (2015) demonstrated that environmental factors displayed a stronger relation with workplace telepressure than personal characteristics. However, the present study provided first evidence that personality variables (*here*: trait mindfulness) can serve as important predictors of workplace telepressure that might prevent or, in other cases, facilitate it at its onset. For instance, it has been frequently demonstrated that a strong positive relation exists between neuroticism and interpersonal stress (e.g. Gunthert, Cohen, & Armeli, 1999; Mohiyeddini, Bauer, & Semple, 2015). Thus, future studies should examine dispositional characteristics that possibly relate to workplace telepressure directly or moderate the relation between workplace telepressure and health outcomes.

Third, current data suggests that workplace telepressure does not only negatively influence employee's sleep quality through an inability to psychologically detach from work, but also affects one's sleep directly. As previously discussed, recent studies have shown that a direct relation between digital technology and one's sleep quality can be traced back to the exposure to artificial sources of light late at night (Starker, Pollock, Zubrick, & Kurinczuk, 2006). However, there might also exist other reasons for a direct negative influence from workplace telepressure on employee's sleep quality, such as sleep disturbances through phone calls or ring tones. Telepressured employees' might feel expected to not turning one's work-related technology to mute during night, which might prevent continuous sleep. This or similar examinations might be worth investigating in future research.

Besides demonstrating the negative consequences of workplace telepressure on recovery process variables, the present study has also revealed that mindfulness as a trait and as a state facilitates recovery processes. However, the exact effect mechanisms remain unclear. Based on existing theory it is reasonable to assume that the focus on the present moment as well as the promotion of self-regulating behavior are primarily responsible for preventing maladaptive cognitive responses as provoked by workplace telepressure (e.g. Bishop et al., 2004; Brown & Ryan, 2003; Glomb et al., 2011; Shapiro et al., 2006). An empirical examination of these mechanisms would provide a basis for effective work interventions that promote sufficient recovery and well-being at work. Such an investigation could include a measure of participants' self-regulation (e.g. squeezing hand grip technique; cf. Muraven & Baumeister, 2000) and/or emotional awareness (e.g. Levels of Emotional Awareness Scale; cf. Lane, Quinlan, Schwartz, Walker & Zeitlin, 1990).

Finally, when designing future studies like the ones suggested above, limitations of the present research need to be considered and research methods should potentially be adjusted. First, in order to possibly increase truthful participation and compliance, it should be considered to use online surveys for data collection. Second, a diary study design over several consecutive working days requires that people do not take a work break in between due to national or regional holidays. Therefore, the time of data collection should be well chosen and months that do not include several holidays should be preferred to those that do include them. Third, next to self-report measures, it might be beneficial to include objective measurements in the study design to reduce a common-method bias, such as an objective sleep assessment through polysomnographic recording (PSG; cf. Bastien et al., 2003). Lastly, if a future study aims to examine the impact of particular aspects of mindfulness on other variables, one should prefer a multidimensional measurement of mindfulness that includes several subscales (e.g. Positive State Mindfulness Scale; Ritchie & Bryant, 2012).

Practical Implications

The present results do not only support theorists with new ideas on how to further align stress literature, recovery theory and mindfulness studies, it also provides practitioners with important implications for current and future practice. The present data revealed that workplace telepressure is a high job stressor that has the potential to lead to serious ill-being in the short and in the long term (cf. Barber & Santuzzi, 2014). This in turn, can result in high absence rates, sick

leaves or work disability (Hershcovis et al., 2007). Thus, the elimination or reduction of workplace telepressure is essential for both, the individual as well as the organization. So far, there exist a variety of job training interventions that facilitate job resources and recovery from work-related distress and thereby promote employee well-being (Hahn, Binnewies, Sonnentag & Mojza, 2011). The present study supports the idea to integrate mindfulness into such training programs. Mindfulness-based interventions at the workplace have already proven to successfully reduce workers emotional exhaustion (Hülshager et al., 2013), to improve employee's sleep quality (Wolever et al., 2012) and to facilitate the creation of personal resources (Fredrickson, Cohn, Coffey, Pek & Finkel, 2008). In particular, the conduction of mindfulness-based stress reduction initiatives (cf. Kabat-Zinn, 2005; Smith et al., 2008) have been shown to effectively lower distress and to increase people's mental health and well-being in the long term. Such interventions can be either conducted at the team level through group training sessions or individually, for instance through the use of mindfulness-based mobile applications (MBMA; cf. Plaza, Demarzo, Herrera-Mercadal & García-Campayo, 2013), the conduction of online trainings (e.g. PsyCap; c.f. Luthans et al., 2008) or brief mental meditation trainings (Zeidan, Johnson, Diamond, David, Goolkasian, 2010).

Another possibility to reduce workplace telepressure is the creation of technological boundaries. At the individual level, Barber and Jenkins (2014) provide preliminary evidence that technology use at home does reduce people's sleep quality through psychological detachment only among workers who do not create technological boundaries during non-work time. Therefore, workers should consider setting a fixed time frame of ICT use at home. Making conscious decisions about times for work and free time and staying committed to these choices (e.g. not responding to work-related ICT messages during personal time) reduces the spillover between work and non-work domains (Hamilton, 2002). At the organizational level, such boundary-creating behavior can be supported through several strategies. For instance, companies should consider giving workers more autonomy about ICT use at home. Another possibility is to define and live after formal rules of ICT during non-work time. These could include that no e-mails are forwarded and should not be responded to after a specific time, e.g. 6 pm.

Identical or similar initiatives have already been implemented by a number of big international companies, such as Volkswagen, the biggest carmaker in Europe. In 2011, Volkswagen's executive committee has decided to stop its mobile e-mail servers forwarding

messages to employees 30 minutes after their shift ends to create strict boundaries between work and free-time (Potter, 2011). A more radical solution to fight technological distress has been recently undertaken by the German automobile manufacturer Daimler (Daimler AG, 2014). The organization has introduced an auto-delete program for e-mails that are received while workers are out-of-office. Likewise, the management board of other international companies (e.g. Telekom, Bayer, Henkel) has explicitly stated that e-mails should and must not be read or edited after regular working hours (Kaufmann, 2014). However, it has to be noted that such initiatives can only be successful if direct managers discuss the relevance of creating technological boundaries with their subordinates and support such behavior, e.g. by not expecting responses of their employees during agreed non-work times (Gordon, 2001).

Conclusion

The present research revealed two important insights: First, workplace telepressure, a recently conceptualized phenomenon, negatively impacts workers sleep quality and their ability to psychologically detach from work – two important recovery process variables that determine employee's well-being in the long term. Second, mindfulness can counteract against workplace telepressure and its negative effects in two ways. At the trait level, mindfulness negatively relates to workplace telepressure directly, most probably by counteracting against the onset of respective stressful thoughts. At the state level, mindfulness reduces the negative consequences of workplace telepressure on psychological detachment from work. Findings suggest that theorists, as well as practitioners must be prepared to deal with workplace telepressure in order to ensure that intended advantages of ICT use in the workplace do not backfire to the negative. This includes preparing workers with a repertoire of effective coping strategies through mindfulness training or technological boundary creation. In today's work environment, which is increasingly dependent on message-based technology, such organizational practices seem to be inevitable in order to ensure employee health and sustainability or in other words, to encourage happy and productive workers.

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