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Abstract

Information Communication Technologies (ICTs) have become a popular leisure platform. Psychological recovery during leisure time is vital to replenish resources spent at work. The present diary study comprised a sample of employees with high exposure to emotional demands and integrates the Job Demands-Resources (JD-R) and addiction literature to examine whether engaging intensively on the internet may be conducive or inhibitor to psychological recovery. A total of 84 employees completed four consecutive daily diary survey three times a day comprising 880 data points. Multilevel analysis was used and results confirmed that intensive internet use was higher on days of high demands and low resources for those with higher baseline levels of compulsive use, and intensive use was weaker on days of high resources. Additionally, intensive use increased recovery experience before bed and the morning after only low compulsive users. The opposite was true for more compulsive users. These findings contribute to both JD-R and addiction theory by showing how the unfavourable effects of daily intensive use on recovery can be ameliorated by daily work resources. It also contributes to the recovery literature demonstrating how intensive internet use can trigger recovery and the circumstances under which this happens.

Keywords: diary study, psychological recovery, intensive internet use, job demands-resources, internet addiction

1. Introduction

Within a service-based economy, excellence in customer service has become a key element for companies to demonstrate competitive advantage. Furthermore, customer satisfaction is highly dependent on the way in which employees handle the interaction with the client (Chu, Baker & Murrmann, 2012; Hyung, O'Rourke, & O'Brien, 2014). Such interactions are more or less explicitly regulated by a company's display rules, such as remaining calm when dealing with upset or angry customers (Hochschild, 1981; Grandey, 2000). Abiding by these rules when felt emotions are not aligned with them, requires employees to regulate their own emotions and those of the customers. For example, when dealing with an angry customer about a below par service, employees may have to hide their own frustration with customer's anger whilst simultaneously showing understanding so that the customer calms down. Evidence suggests that these work events require sustained effort and trigger stress-related physiological activation, and as a result they have been conceptualized as a type of emotional demand of the job (e.g., Kenworthy, Fay, Frame, & Petree, 2014; Quinones-Garcia et al., 2013; Quinones et al., 2016; Xanthopolou et al., 2013).

Importantly, employees are not powerless when it comes to avoiding the negative impact of sustained emotional demands. The activities and mechanisms that help restore the energy spent at work to avoid depletion building up and becoming problematic have been extensively studied in the psychological recovery literature (e.g., Sanz-Vergel, Demerouti, Moreno-Jiménez, & Mayo, 2010; Schraub, Turgut, Clavairoly, & Sonnentag, 2013; Sonnentag, 2001; Sonnentag & Natter, 2004; Sonnentag & Fritz, 2007; Sonnentag, Binnewies, & Mojza, 2008). Psychological recovery refers to 'the psycho-physiological unwinding after effort expenditure' (Geurts & Sonnentag, 2006:482). Not all leisure activities are conducive to psychological recovery. Furthermore, rather than the activities *per sé*, what

seems to be universal is the recovery experience. A key recovery experience in relation to work effort is psychological detachment (i.e., ability to detach mentally from work) (Deerks & Bakker, 2012; Derks, Mierlo, Schmitz, 2014; Sonnentag, Binnewies, & Mojza, 2010). Relaxation – like detachment – is also key to recovery experience because it comprises low activation and the experience of positive affect (Derks et al., 2014).

In contemporary society, individuals spend large amounts of leisure time engaged in virtual activities (Quinones-Garcia & Kakabadse, 2014; Vilhelmson, Thulin, & Eildér, 2017). Therefore, it is important to understand the recovery value of engaging with online activities after work (Derk & Bakker, 2012; Derks et al., 2014). Previous studies have demonstrated an association between intensive internet use via smartphone and difficulty with managing work-home conflict using both survey designs (Boswell & Osion-Buchanan, 2007; Jarvenpaa & Lang, 2005) and diary studies (e.g., Derks & Bakker, 2014; Derks et al., 2014). These studies indirectly suggest that intensive smartphone use outside of work can be detrimental for psychological recovery. However, there have been no studies to date that have directly tested the potential recovery value of intensive online use and the individual differences that might shape such outcomes.

Additionally, prior studies have assumed that intensive internet use is a stable variable that does not fluctuate across the days. However, this has not been empirically tested. In addition to having a better understanding of when and how intense online use can be a recovery experience, it is important to understand how different work events may influence the extent to which employees engage on intensive internet use and whether specific work events may influence the preference to use the internet more intensively on a particular day, as this can be key in explaining its recovery value.

Building on the Job Demands-Resources (JD-R) theory and psychological recovery

literature, the present diary study examines how daily emotional demands and resources predict individuals' intensive internet use within work and outside work in their leisure time, and how this in turn impacts on recovery. Also, building on the behavioral addiction literature, the present study examined the potential role that compulsive traits – in particular to internet use – have on the extent to which emotional demands lead to intensive internet use, and whether this intense use leads to recovery. In short, the present study aims to clarify the conditions under which technology use works as a recovery mechanism and how compulsive traits can influence the experience of recovery from the same activity.

The expected contributions of the study are both conceptual and methodological. Conceptually, this study integrates behavioral addictions with psychological recovery theory in order to enhance current understanding of the benefits – but also potential risks of – intensive internet use because this has become a key way in which many, consciously or unconsciously, decide to spend their leisure time. Methodologically, the present study responds to the call for designs in the field of human-behavior technology which allow us to look at the process beyond simple correlation evidence (Sonnentag, 2012; Spector & Meier, 2014). Within this field of study more specifically, the present study responds to the call to understand potential daily fluctuations of intensive technology use on response to changes on daily demands (Derks et al., 2014).

2. Theoretical background and hypotheses development

The literature has documented strong association between regulating emotions to align with those required by the role and emotional exhaustion (Grandey, Fisk & Steiner, 2005; Holman, Martinez-Iñigo, & Totterdell, 2008; Mann, 2006; Grandey & Gabriel, 2015). According to JD-R theory, the high level of emotional demands that employees are subject to (an that are often related to the conflict between felt and expressed emotions) requires the

investment of effort (physical and/or psychological). When prolonged over time, this causes energy depletion and an inability to cope with further demands (e.g., Demerouti, Bakker, Nachreiner, & Schaufeli, 2001; Hülshager & Schewe, 2011). Complementing this framework, the effort-recovery theory (Meijman & Mulder, 1998) explains how external demands impact physiological systems on a daily basis, and inform the development of strategies that help individuals prevent the accumulation of stress (Sonnentag, 2012). According to this theory, the effort individuals invest in dealing with emotional demands is mobilized through the activation of the sympathetic system (e.g., heart rate increase, raise in blood pressure [de Jonge, Spoor, Sonnentag, Dormann, & van den Tooren, 2011]). The activation on its own is not conducive to ill-health provided that individuals are able to return their cardiovascular systems to pre-stressor levels after the strain.

Recovery activities allow individuals to 'restore a status of physiological and psychological performance readiness' (Demerouti, Bakker, Geurts & Taris, 2009:91). However, they have been broadly classified in order to examine its impact on recovery depending on whether they require low vs. high physical effort and low vs. high psychological involvement. Consequently, activities such as watching television or taking a bath are low in both effort and psychological involvement. Others, such as meditation are low in physical effort but high in psychological involvement. Physical exercise and sports are often considered high on both dimensions. With regards to spending time on the internet as a leisure activity, this could be broadly considered as a low effort physical activity. Similar to social activities, internet use might have varying degrees of personal involvement (e.g., watching online videos usually has a much lower psychological involvement than online gaming). The present study examined the type of intense internet use where it becomes a leisure activity in its own right. Considering that there is no official tool to differentiate between intense and non-intense use, and that the concept is relative, the study build on the extensive work of behavioral addictions

by Griffiths and other addiction researchers (Grant, Potenza, Weinstein, & Gorelick, 2010; Griffiths, 2000; 2005; 2010; Kuss, Griffiths, Karila, & Billieux, 2014; Young, 1998, 1999; Kuss, Griffiths, & Binder, 2013). Griffiths (1995, 2005) identified the key characteristics of intensive use that in extreme cases, suggest a potential internet addiction. Studies have demonstrated that internet addiction affects only a minority of individuals (Grohol, 2012). Building upon this literature, intensive internet use is conceptualized by high engagement with the internet, which is often associated with a need to cope and/or escape from negative emotions. This may lead to conflict with both their personal and work life (Griffiths, 2005, 2010). The term 'intense use' as opposed to 'addiction' or 'compulsion' (often used in this literature) was preferred to align with previous study on recovery and smartphones use within the occupational health field (Derks & Bakker, 2014; Derks et al., 2014). Based on this conceptualization, intense internet use is classified as a low physical effort but relatively high involvement activity.

In terms of their impact on recovery, low effort-high involvement activities such as meditation appear to be strongly related to wellbeing and recovery (Sonnentag & Fritz, 2007; Sonnentag, 2001). If intense internet use is conceptualized as a low effort high involvement activity, it could potentially have a positive relationship with recovery. However, meditation has been demonstrated to effectively lower high arousal following stressful situations (Shonin, Van Gordon, Dunn, Singh, & Griffiths, 2014). This is not always the case in intensive internet use because activities such as gaming or participating in online debates could in fact have the opposite effect and increase stress levels (Davis, 2001; Charlton 2002; Derks et al., 2014; Quinones & Kakabadse, 2015). Consequently, although many people report going online to feel relaxed, this is not always achieved. Intensive internet use is conceptualized in the present study following Griffiths (2005) components model and characterized by conflicts with work performance, family commitments or the inability to go online again when they desire, raising

levels of psychological arousal (Geurts & Sonnentag, 2006), regardless of whether these were temporarily lowered through intense online activity (Barber & Jenkins, 2014). In order to examine the potential recovery value of internet in relation to work effort, the daily fluctuations of intense use in relation to work demands will be explored.

2.1 Impact of work demands and resources on the engagement with internet use

The literature suggests that one's ability to effectively recover depends upon what happens at work that day. Therefore, high demands on a specific day increases the risk of not being able to relax and detach from work that day (Sonnentag & Bayer, 2005; Hahn, Binnewies, Sonnentag, & Mojza, 2011). Studies have extensively shown how experiencing fatigue after a work day prevents people from engaging in physical exercise, which has largely demonstrated its positive impact on psychological recovery (Sonnentag, 2001; Sonnentag & Natter, 2004). The Conservation of Resources Theory explains this phenomenon via the concept of resource loss spirals (Hobfoll, 1989). Here, those who have less resources to face in a work day are less likely to engage in effective resource recovery because these require initial investment of effort (Hobfoll, 1989). On days of high emotional demands, individuals feel more exhausted (Xanthopolou Bakker, & Fischbach, 2013), and are likely to choose low physical effort activities to relax outside work. Importantly, since the present study is assessing the impact of emotional demands experienced during the morning, and considering the use of internet for private purposes whilst at work (Quinones & Kakabadse, 2015), it is expected that high demands will also trigger intense use to cope with these demands during the work day. Thus, on days where emotional demands are high it is expected that individuals will report both high exertion of emotional effort and higher than usual engagement internet use both in the afternoon at work and outside work.

Unlike previous studies, the present study tests the extent to which emotional demands during the morning lead to high level of emotional effort (directly enquiring about the resources individuals invest in trying to meet display rules of the role) using a validated tool specifically for this purpose (Quinones-Garcia, Rodríguez-Carvajal, & Clarke, 2013). Also, to the authors' knowledge, this is the first study to assess intensive internet through different daily measures and to examine daily fluctuations in respond to changes in demands both within and outside work (Derks & Bakker, 2014; Derks et al., 2014).

Hypothesis 1: On days of high emotional demands during the morning and high level of emotional effort in the afternoon, individuals will be more likely to engage in (a) intensive internet use during the afternoon at work (b) and to engage in intensive internet use before going to bed (c).

According to the Job Demands-Resources (JD-R) theory, the impact of demands on exhaustion can be minimized through the availability of relevant job resources (Bakker, Demerouti, & Euwema, 2005; Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2007; Martínez-Corts, Demerouti, Bakker, & Boz, 2015; Schaufeli, Bakker, & Van Rhenen, 2009). One of the job resources most widely studied is social support. The buffering effect of social support on the impact of job demands on exhaustion has been widely demonstrated (e.g., Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2007; Liu et al., 2008). Importantly, it has been found that the strongest buffering effects are found when demands and resources match up. Consequently, the present study examines how daily interactions between emotional demands and available support from peers and supervisors buffer the impact of emotional demands on the effort they have to exert to deal with demands, and on the intensive internet use within and outside work.

Hypothesis 2: Emotional resources buffer the impact of high emotional demands on

emotional effort (a), and on intensive internet use during work (b), and before going to bed (c). Therefore, on days where emotional demands are high, the higher the resources at work, the lower the emotional effort and the less people will engage in intensive internet use.

Considering that there are documented individual differences in the Compulsive Internet Use (CIU) across the population (Quinones & Kakabadse, 2015; Meerkerk, van den Eijnden, Franken & Garretsen, 2010; Landers & Lounsbury, 2006), the extent to which higher emotional demands lead to intensive internet use is likely to be more pronounced for those who have a more intense relationship with the internet generally in their lives. To date, there have only been two studies examining how individual differences in intensive online use (via smartphone) can influence the associations between work demands, stress, and recovery (Derks & Bakker, 2014; Derks et al., 2014). Here the authors found that more intensive users seem to experience higher levels of work stress on a daily basis than non-intensive users. However, in these studies the authors assumed no fluctuations on the level of smartphone use for high users regardless of the work demands, and therefore treated intensive internet use as a stable variable. Building on the coping mechanisms of classic stress theory and its relationship with the addiction literature, the assumption of stable intense internet use unaffected by external factors will be challenged and the need to test fluctuations on intensive internet use justified below.

Classic stress literature distinguishes between two main ways of dealing with the experience that external and/or internal demands exceed available resources: problem-focused coping and emotional coping (Lazarus & Folkman, 1984). Whereas the former represents an active stance in so far as it attempts to modify the situation that is causing the experience of stress, the latter aims at reducing the negative emotions an individual may experience from the situation. One of the key features of addiction in the early stages is that it allows people to cope

and distract oneself from unwanted emotions and could therefore be conceptualized as a maladaptive emotion-focused coping mechanism (Griffiths, 2005). Unsurprisingly, stress and addiction exhibit overlapping neural circuits (Valentino, Lucky & Van Bockstaele, 2011). Although internet addiction use has not been recognized as a formal diagnostic in the DSM-5, there is evidence of a minority of cases whose behaviors mirror the clinical manifestations of an addiction (Sussman, Lisha & Griffiths, 2011; Quinones & Kakabadse, 2015). If intensive internet use is conceptualized as an (emotional) coping mechanism, it is reasonable to expect that those who have higher scores on intense internet use dimensions, will have a higher tendency to engage intensively on the internet during days of high demands. Furthermore, since one of the other key manifestations of addiction is the conflict with key areas in an individual's life including work performance, it is likely that on days where high demands are experienced in the morning, those with high levels of intensive internet use at baseline, engage excessively both during working hours and as the preferred leisure activity before going to bed.

Hypothesis 3: Baseline intensive internet use moderates the relationship between daily emotional demands and daily excessive internet use. Those who report higher levels of intensive internet use more generally, are more likely to engage excessively on the internet during work (a) and before going to bed (b) to cope with those high demands.

Feelings of available social support are considered a natural resource that increases levels of the hormone oxytocin, which has soothing and calming effects on the experience of distress (Heinrichs, Baumgartner, Kirschbaum, & Ehlert, 2003). Because of these properties, social support plays a key role in buffering the impact of stress on a wide range of maladaptive responses to stress such as addiction. In relation to excessive internet use, Charlton (2002) found that perceiving non-existent or problematic social interactions offline was a decisive factor in accelerating the move from excessive engagement with the internet to actual

addiction. On the other hand, and building on the buffering effect of social support, the opposite could be true. Consequently, the provision of social support during work may moderate the need for intensive engagement during work and after for those who have a tendency to engage intensively on the internet for private purposes.

Hypothesis 4: For those with high levels of CIU at baseline, experiencing resources during the work day will lessen the need to in engage on the internet during work and before going to bed.

2.2 Excessive internet use and experience of recovery

Whether or not a leisure activity enables recovery can vary across and within individuals, yet the underlying mechanisms appear to be universal. These are psychological detachment and relaxation (Sonnetang, 2001; Derks & Bakker, 2014). Psychologically, detachment involves both physically and cognitively detaching from work or ‘switching off’ (Sonnetag & Fritz, 2007; Sonnetag, 2011). This is a key mechanism for recovery and its linked not only to increased wellbeing (e.g., Sonnetag & Fritz, 2007) but also to life satisfaction and performance (Binnewies, Sonnetag, & Mojza, 2009; Demerouti, Bakker, Geurts, & Taris, 2009). In contrast, an individual’s inability to detach from work leads to high levels of fatigue and sleep problems (Van Hooff, Geurts, Kompier, & Taris, 2006). Similarly, relaxation during evening hours has shown evident benefits on employee wellbeing (Sonnetag et al., 2008). Considering the contrasting evidence concerning the impact of intensive internet use on different indicators of wellbeing, arguments supporting and arguing against the potential recovery value of intensive internet use can be found. For instance, Steinkuehler and Williams (2006) found that individuals who were highly engaged with online gaming derive significant social gains from this activity and therefore enjoy the positive affect associated with the experience of relaxation in recovery. Likewise, Shotton (1991) found that high computer users

(as compared to normal or low users) reported improved reasoning and analytical skills, technological knowledge, and a range of positive emotional outcomes, including self-esteem and lower depression. On the other hand, some studies suggest that intense internet use to make up for limited offline social links has been associated with increase peer-rated loneliness (Tepper, Luyck, Klimstra, & Goossens, 2014) and decreased feelings of social bonding (Sherman, Michikyan, & Greenfeld, 2013).

The discrepancies in the impact of intense internet use can be attributed to two (not mutually exclusive) explanations: (i) the difference between high engagement and addiction, and (ii) individual differences in the use. With regards to the first point, Charlton (2002) found two clearly differentiated factors that were often amalgamated in studies – one termed high engagement (characterized by cognitive salience and euphoria) and the other termed addiction (characterized by withdrawal, behavioral salience, relapse, control loss, and conflict). Evidence supporting this distinction has been found in later studies (e.g., Charlton & Danforth, 2007; Charlton & Danforth, 2009) where also different antecedents (e.g., neuroticism is related to addiction but not to high engagement) and consequences have been identified (e.g., average two days more spent a week online for those addicted than those engaged).

The other key aspect that can influence the extent to which an individual experiences psychological detachment and relaxation from high engagement with the internet is individual differences in the use. Evidence of other individual differences moderating the impact of intensive use has already been found. For instance, Teppers et al. (2014) found that those who were motivated to engage in social interactions online only to increase the size of their offline network experience, receive lower peer-rated loneliness scores. In another study, Quinones and Kakabadse (2015) found that those with low self-concept clarity, and which is often associated with social phobia, were more likely to experience the negative consequences of high engagement. Taking these findings and the previous discussion on engagement vs. addiction,

it would be reasonable to expect that whether intense engagement leads to recovery depends upon the type of relationship individuals have with the internet. Derks and Bakker (2014; Derks et al., 2014) found that intensive smartphone users outside work were more exhausted than less intensive users because they reported lower levels of detachment and relaxation. The authors argued that that intensive use outside work exposes individuals to continue drawing on the same psychological systems they use at work and thereby impairing recovery (Meijman & Mulder, 1998). Although these findings suggest that those intensive internet users are less likely to experience recovery from the use, there are some limitations which compromise the validity of the findings. First, as argued earlier, intense smartphone users were assessed with an ad-hoc instrument for the purpose of the study that lacks validity and reliability information. In the present study, widely validated compulsive internet use scales are used to qualify the type of use (Meerkerk et al., 2010). Second, the relationships between variables in the study were inferred from synchronous data assessed at the end of the work day. Therefore, it is limited in the extent to which it informs the potential recovery effect of intensive internet use outside work. In the present study, work demand and resource variables and the recovery experiences and activities they may trigger are assessed at the relevant points in time allowing capture of the process more rigorously.

In short, building on the discussion on the negative impact of avoidance coping and addiction, it is expected that those who exhibit high intense internet use more generally, do not experience recovery from their use. In contrast, in line with the studies suggesting potential benefits of engaging in online activities, and the positive impact of low effort and high engagement activities discussed above, it is expected that those with low internet intensity scores at baseline assessment, will in fact derive psychological recovery. Building on the studies that have examined the impact of recovery at night the morning after (Sonnentag et al.,

2008), it is expected that similar findings in relation to recovery are experienced the morning after.

Hypothesis 5: Those who score higher in CIU at baseline, will experience lower level of recovery before bed (a) and the morning after (b) on days in which they use the internet excessively during work. This is the opposite for those who score low levels of CIU (c).

Hypothesis 6. Those who score higher in CIU at baseline, will experience lower level of recovery before bed (a) and the morning after (b) on days in which they use the internet excessively before going to bed. This is the opposite for those who score low levels of CIU(c).

Figure 1

3. Method

3.1 Participants and procedure

The design involved a three-times-a-day survey for four consecutive working days. Participants were asked to complete an online diary survey before lunch, immediately after finishing work, and before going to bed. The consecutive days were needed because part of the hypothesis consisted on evaluating the impact of specific behaviors during work and leisure on how the individuals felt and behaved the day after. Because of the nature of the study, participants had to fulfill two criteria to take part: (i) they were exposed to emotional demands as part of their job when dealing with customers, and (ii) reported a high level of engagement with technology in their spare time. In order to carry out the screening process, participants were asked to confirm that dealing with customers was a regular part of their daily role (being screened out at this point otherwise) and completing the widely validated Compulsive Internet

use Scale (CIU)¹ which builds on the widespread model of internet addiction (Meerkerk et al., 2010). Scoring an average of sometimes or more in the full CIU scale, has been used previously used to identify intensive users (i.e. those who may have experienced a specific level of conflict in their lives as a result of their high engagement with the tool) (Meerkerk et al., 2010). These were also the criteria used in the present study. Importantly, as discussed earlier, these may be individuals who use the internet intensively for leisure purposes and therefore do not necessarily exhibit negative signs of addiction (Charlton, 2002). Prior to responding the screening questions, participants were informed of the nature of the study and the process to follow. Consequently, following the screening out questions above, they were told that they would have to complete a set of questions and after that asked to participate in a subsequent four-day consecutive diary study which would start a week later.

A total of 319 participants were selected and completed the baseline questionnaire, and 84 completed the four-day diary ($M_{age}=49.07$ years; $SD=14.45$; 34 females and 50 males; 51 lived with partner whereas 33 were single/divorced; 31 had managerial roles whereas the remaining participants held non-managerial roles). The diary entries of 84 participants days led to 880 data points (out of 1008 possible) over the four-day period. During the diary phase, participants received a daily reminder to complete the questionnaire at the three different times.

At lunchtime, participants answered questions about their intensive internet use for private purposes during the morning, their energy levels during the morning, emotional demands, and emotional resources of the job. Immediately after work, they were asked questions about effort exerted in dealing with customer demands that day, and intensive internet use for private purposes during work. Before going to bed, participants were asked

¹ To keep consistency with the literature in each field and the original instrument, Compulsive Internet Use (CIU) will be referred to when referring to the baseline trait and Intensive Internet Use when discussing daily intensive use

about their intense internet use for private purposes and their experience of feeling recovered. Each time point allowed them a 2-hour slot to be filled, after which time the link became inactive.

3.2 Measures

General questionnaire data. With the general questionnaire, trait versions of the daily measures included in the diary were evaluated. All items can be found in Table 1.

Compulsive Internet Use. Meerkerk et al.'s Compulsive Internet Scale (2010) was used. The scale comprises 14 items, and respondents answer each of the items on a 5-point Likert scale from 1 = never to 5 = very often. The Cronbach's alpha for this scale was .91.

Emotional demands. Emotional demands were assessed in terms of both emotional rule dissonance and customer demands. The items were adopted from Xantopolou et al.'s (2013) study. The Cronbach's alpha coefficient was .79.

Emotional resources. Emotional resources were assessed in terms of colleagues' and supervisor's support. Colleagues' support was assessed with two items adopted from Bakker et al. (2004). Supervisor support was assessed with two items one from Karaseck (1985): "My supervisor pays attention to what I say if the situation arises" and from the general supervisory coaching of Graen and Uhl-Bien's (1991) Leader–Member Exchange Scale "My supervisor uses his/her influence to help me solve my problems at work". The Cronbach's alpha coefficient was .89.

Emotional effort. To assess emotional effort, the Explicit Emotional Effort sub-scale was used (Quinones-Garcia et al., 2013). This three-item instrument assesses the perceived effort that occurs with meeting the job's emotional requirements. The scale employs a 5-point Likert scale with 1= never and 5= always. The instructions encouraged participants to think

about the process whereby they meet their job's emotional display rules and asked them how often they had felt the things in the item statements during the last month. 'Meeting emotional display rules' refers to the process whereby an individual show the emotions required by their job when dealing with clients (e.g., remaining calm when dealing with unpleasant clients, showing interest in issues that an individual does not really care about, etc.). The Cronbach's alpha was .70.

Psychological recovery. Sonnentag and Fritz's (2007) questionnaire was used and participants were asked to respond with respect to their free evenings on a 5-point scale from 1 (*I do not agree at all*) to 5 (*I fully agree*). The questionnaire has four subscales representing each recovery experience. For the purpose of this study the psychological detachment dimension and the relaxation dimensions were focused upon, each with a Cronbach's alpha of .93.

Insert Table 1

Diary survey. In line with other diary studies, and responding to the inherent space limitations in this type of design, a limited number of items from the original scales were selected (Ohly, Sonnentag, Niessen, & Zapf, 2010). The diary items were selected from existing scales for which there was enough validity and reliability data to justify its inclusion. Face validity and factor analysis criteria were used to select the items for the diary from validated and reliable scales. All except for emotional effort (which was assessed with one item) were assessed with two or more items. Sacket and Larson (1990, cited in Martínez-Corts et al., 2015) argued that provided the construct is unidimensional, efficiency may justify the need to use single-item measures. Responses for demands, resources, emotional effort scales were given on a 5-point scale ranging from (1) "*Not at all True*", to (5) "*Absolutely True*". Cronbach's alpha coefficients were calculated for each day. Following this, an overall reliability alpha coefficient was estimated as the average across the four days.

Daily emotional demands. Emotional demands were assessed with the same items as in the general scale but the wording was modified to indicate events that happened in the morning, e.g., “*This morning, I dealt with demanding clients*” “*This morning, I dealt with clients complaining even though I did everything to help them*” “*This morning, I had to hide my frustration or anger when dealing with unreasonable clients*”. Cronbach’s alpha for the four consecutive days were .91, .87, .85, and .86, respectively ($M = .87$).

Daily emotional resources. Supervisor support and colleague support were assessed with the same items as in the daily scale but amended the wording to indicate the timing, e.g., “*This morning, I could have asked my colleagues for help if I needed it*”, “*This morning, I felt that my supervisor would have paid attention to what I said if the situation had arisen*”. Cronbach’s alpha for the four consecutive days were .91, .90, .91, and .94, respectively ($M = .91$).

Emotional effort after work. The item that had stronger face validity of the construct and that had shown the greatest loading in emotional effort scale in previous studies were selected: “*Today, I felt that displaying the emotions required by my role (e.g. showing understanding when dealing with unpleasant customers) involved a great amount of effort*”.

Daily intensive internet use (morning, after work and before bed). At each time of the day seven items were selected that represented the key dimensions of compulsive internet use: salience, loss of control, withdrawal, mood change and conflict. The first section of the instructions was the same in the different time points: “*The following statements describe your use of the Internet for private purposes...*”. Then at each time point, the timing wanted to report on in relation to individuals’ intensive internet use was specified. Thus, at lunch individuals were asked to report on their use during the morning “*This morning, I experienced an irresistible desire to be online*”. After work, respondents were asked to reflect on their use

during work hours “*At work today I tried to stay offline but was not able to*”. Before going to bed, the instructions reminded participants to think about their use of the “*Internet for private purposes, since leaving work that day*”. Cronbach’s alpha for the four consecutive days in the morning scale were .79, .89, .93, and .84 respectively ($M = .86$); for the scale administered after work .95, .92, .95, and .93 respectively ($M = .94$); and for the scale administered before bed .94, .92, .92, and .91 respectively ($M = .93$).

Recovery experience before bed. The experience of psychological recovery before bed was assessed by asking respondents to rate the extent to which they agreed with statements that are related to the key dimensions of the recovery process which are detachment and relaxation (Derks & Bakker, 2014). These were adopted from the instrument used for the general questionnaire “*Right now, I feel relaxed*” and “*Overall, I feel that I switched off from work tonight*” as well as the outcome of recovery: feeling renovated. These were written based on the construct “*Right now I am again full of energy*” and “*Right now I feel recuperated from the work day*”. Cronbach’s alpha for the four consecutive days in the morning scale were .84, .82, .69, and .78, respectively ($M = .80$).

Recovery experience in the morning. The experience of recovery was assessed by writing items that represent the outcome of recovery physically and mentally. The instructions were: “*Before you started work this morning, how did you feel*” and the three items to rate were: Filled with energy, physically refreshed, mentally and rested”. Cronbach’s alpha for the four consecutive days in the morning scale were .92, .92, .96, and .95, respectively ($M = .94$).

3.3 Data analysis

The baseline questionnaire produced person-level data (i.e. for each participant there were data on these different variables): compulsive internet use, emotional resources and demands, emotional effort at work). In addition to these data, there were daily data concerning

intensive internet use, recovery in the morning, demands and resources at lunchtime; emotional effort and intense internet for private purposes use during work; recovery and intense internet use before going to bed. This is called day-level data. Since each individual has multiple day-level data points, daily data is nested within individuals resulting in a two-level data where daily data represents Level 1 and baseline data represents Level 2. Multilevel analysis via SPSS Mixed Model was used to test hypotheses.

Prior to hypotheses testing, Level 1 variables were centered at the grand mean and Level 2 variables around the mean of each individual across the four days. Thus, for instance, intensive internet use in the morning was centered around the mean of each individual across the four days in that particular variable, and compulsive internet use baseline was centered around the grand mean of all individuals in that variable. By centering the within-level variables at the person mean, all between-individual in these variables is removed so that the findings at this level could only be attributed to within-individual effects (Sonnentag et al., 2008). The models were tested using Maximum Likelihood estimation method (ML). Lagged main effects and interaction hypotheses were tested through nested models. Each model was tested for improvement in relation to the previous one by estimating the differences of their associated log likelihood statistic $-2 \cdot \log$ and this difference was checked for significance with a chi-square test (Martínez-Corts et al., 2015).

The null model was the first step with no predictors other than the intercept. In Model 1, Level 1 variables were entered including relevant demographic variables and general levels of daily predictors. Since centering Level 1 variables at individual mean results in losing between-individual variance, the between-individual difference on average level of daily predictors would be neglected if baseline versions of the predictors were not controlled for in the analysis. Model 2 included the daily resources and demands at lunch time. Model 3a and 3b were used to test the significance of the hypothesized interaction terms. Model 4 added daily

variables assessed after work and model 5 contained variables assessed before going to bed.

4. Results

The between-individual and within-individual variance components were examined to ensure the multilevel structure of the data was supported. The IntraClass Correlation (ICC) for demands was $\rho = .51$. This means that 51% of the answers in questions about daily demands were explained by between-individual variations in the four-day measurement occasions, whereas 49% of the variance was explained by within-individual variation. The ICC values for the remaining variables were as follows: resources after lunch $\rho = .55$, effort after work $\rho = .36$, CIU after work $\rho = .72$, CIU before bed $\rho = .72$, CIU in the morning $\rho = .76$, recovery before bed $\rho = .48$ and recovery in the morning $\rho = .53$. The ICC value and the significance of the intercept variance term for each variable collectively suggested that sufficient variance can be explained by the between-and the within-individual levels and therefore the multilevel structure of the data is supported. Prior to hypothesis testing, estimated means, standard deviations and correlations among all study variables were calculated (see Table 2). Correlations with daily variables were estimated using the aggregated scores per individual over the four days of study.

Insert Table 2

Hypotheses 1a, 1b, 1c stated that high emotional demands will be positively related to emotional effort after work, and intensive internet use after work and before going to bed. As shown in Tables 3 to 5 (Model 2), emotional demands predicted emotional effort ($B = .221$, $p < .05$) excessive internet for private purposes during working hours ($B = .140$, $p < .05$) and excessive internet use before going to bed ($B = .378$, $p < .01$). Therefore, hypotheses 1a, 1b and 1c were all supported.

The second set of hypotheses predicted a within-level interaction (2a, 2b, 2c). As is

shown in Model 3 (Table 3), and Model 3a (Table 4), the interaction terms were not significant. Although there is no previous evidence in relation to intensive internet use, the buffering effect of social support on the impact of emotional demands on effort has been largely demonstrated. Thus, it was decided to break down emotional resources into its different components of supervisor support, and colleague support. Unlike with colleagues support, it was found that supervisor support was a significant moderator of the impact of emotional demands on emotional effort. In order to examine the interaction effect in more depth, a simple slope test was performed with the interactive tool developed by Preacher, Curran and Bauer (2006). Results demonstrated that the relationship between emotional demands and effort was stronger at low levels of supervisor support ($b=1.71$, $SE=.56$, $z=3.01$, $p<.001$) than at high levels ($b=.25$, $SE=.10$, $x=2.36$, $p<.05$). Therefore, hypothesis 2a was partially supported and hypothesis 2b was not.

The interaction term in relation to hypothesis 2c (Table 5) was significant ($B=-.294$, $p<.05$). Further analysis of the interaction supported that on days where employees experienced low level of resources, the relationship between demands and intensive internet use was positive but weak ($\gamma=1.1$, $SE=.54$, $z=2.00$, $p=.05$). In contrast, on days where individuals experienced high levels of resources, the relationship between demands and intensive internet before going to bed use was negative ($\gamma=-.120$, $SE=.53$, $z=-2.24$, $p<.05$).

Insert Tables 3 and 4 and Figures 2a and 2b

Regarding the between-level moderation of compulsive internet use baseline on the relationship between daily demands and daily intensive internet use (hypotheses 3a, 3b), both interaction terms were significant as demonstrated in Tables 3 and 4 (Model 3b) ($B=.133$, $p<.05$; $B=.723$, $p<.01$). A simple slope test supports the notion that at high levels of CIU, the relationship between high demands and intense use was strong and positive ($\gamma=.38$ $SE=.13$,

$z=2.1, p<.001$) whereas at low levels of CIU, the relationship was not significant ($\gamma=-0.131, SE=.14, z=-.93, p=.35$). With regards to the interaction in relation to intensive internet before bed it was found that high levels of CIU baseline, the relationship between daily demands and intense use was positive ($\gamma=.2.04 SE=.46, z=4.4, p<.001$) whereas at low levels was negative ($\gamma= -2.04 SE=.45, z=-4.5, p<.001$). These results indicate support for hypotheses 3a and 3b.

With regards to hypothesis 4, the interaction with daily resources (Model 3c in Tables 4 and 5), the interaction was not significant in relation to intensive use during work but was significant in relation to the intensive use before going to bed as can be seen in Table 5 ($B=.327, p<.01$). A simple slope test suggested that those with high levels of baseline of compulsive use, use the internet less intensively on days of high emotional resources ($\gamma=-1.14 SE=.283, z=-3.94, p<.001$) whereas at low levels of CIU, the relationship was not significant ($\gamma=0.106, SE=.34, z=.32, p=.75$). Therefore, hypothesis 4a was not supported whereas hypothesis 4b was.

Insert Table 5 and Figures 3a, 3b and 3c

The interaction term of intensive internet use during work and baseline compulsive internet (Model 5a in Table 6) ($B=-.390, p<.05$), and the interaction of intensive internet use before bed and baseline compulsive internet use (Model 5b in Table 6) ($B=-.350, p<.05$) in relation to recovery before going to bed were significant. Simple slope tests revealed that at high levels of CIU baseline, the relationship between excessive internet use during work and recovery was negative ($b=-1.033, SE=.36, p<.001$) whereas at low levels the relationship was of the opposite sign ($b=1.35, SE=.47, p<.001$). At high levels of CIU baseline, the relationship between intensive internet use and recovery before bed was negative ($b=-1.18, SE=.37, p<.001$) whereas at low levels the relationship was of the opposite sign though only marginally significant ($b=.90, SE=.54, p=.09$). Therefore, hypotheses 5a and 6a were supported.

Insert Tables 6 and 7 and Figures 4a, 4b, 4c

The interaction term of intensive internet use during work and CIU (Model 5b in Table 7) ($B=-.520, p<.001$) in relation to recovery in the morning was significant. At high levels of CIU baseline, the relationship between intensive internet use during work and recovery before bed was negative ($b=-1.20, SE=.39, p<.001$) whereas at low levels the relationship was in the opposite direction ($b=1.18, SE=.50, p<.05$). Therefore, hypothesis 5b was supported. This was not the case in the relationship between intensive internet use before bed and recovery in the morning because the interaction term was not significant ($B=.199, p=.326$), therefore hypothesis 6b was not supported.

5. Discussion

The objectives of the present study were twofold. The first aim was to examine potential fluctuations of daily intensive internet use in relation to changes in work demands and resources. The second aim to explore the recovery value of engaging intensively on the internet both during work and before going to bed thereby addressing earlier calls about studying a variety of different type of leisure activities on recovery (Sonnetag, 2001). In line with what was hypothesized, on days with higher than average emotional demands, people engaged more intensively with the internet for private purposes during work and before going to bed. These associations were moderated by the availability of key emotional resources and individual differences. Thus, on days when demands were high and resources were high, the association between emotional demands and intensive internet use before bed was not only non-significant, but was of a negative sign. On the contrary, emotional resources did not moderate the relationship between high demands and intense use of the internet for private purposes during working hours. Equally, unlike what was hypothesized, results did not find emotional resources to moderate the relationship between emotional demands and emotional

effort. Further analysis confirmed that the moderation existed only for supervisor and not for colleagues' support, and here the lower the support the stronger the relationship between high demands and intensive internet use. Regarding the role of individual differences, it was found that the relationship between high emotional demands and daily intensive use during work was significant for those with generally high levels of intensive internet use but not significant for those with low levels of baseline CIU. Similar results were found for intensive internet use after work. It was also found that high level of emotional resources can be particularly beneficial for those who have a tendency to engage compulsively with the internet as the relationship between high CIU and daily use was weaker on days of high resources. Finally, in line with the hypotheses, intensive internet use before going to bed was negatively related to recovery experience both before bed and the morning after only for those who had a more problematic relationship with the internet more generally. In contrast, those who reported low baseline levels of CIU, were more likely to experience high recovery both before bed and the morning after on days when they engage significantly on the internet before going to bed. In terms of intensive use during work, the negative impact on recovery before bed and the morning after was only significant for those reporting high CIU at baseline.

The significant impact that changes on emotional demands have on intensive internet use confirms that it is subject to fluctuations across days and influenced by work-related events. This means that treating this variable as a trait as it has been in previous studies (Derks & Bakker, 2014; Derks et al., 2014) ignores key information about potential triggers (in this case high emotional demands), and moderators (in this case emotional resources). In the present study, it was found that resources alter the extent to which intensive use can deliver recovery experiences. Identifying the role of these antecedents and moderators is crucial in the design of evidence-based strategies to help people cope with work-related stress in more adaptive ways. In this way, the present study adds to our current understanding of how work demands

and resources influence individuals' choice of leisure activity (Sonnentag & Natter, 2004; Sonnentag, 2001) and more uniquely to the choice of intense internet use.

Addictions (whether substance or behavior-based) exhibit a pattern of behaviors characterized by excessively engaging with the object to cope with, or escape from negative moods (in this case likely triggered by high emotional demands) and experience loss of control and conflict from the use (Griffiths, 2005; Kuss et al., 2014). In this case, it was found that those individuals with a tendency to use the internet more compulsively, also experience daily interference of daily use with their work performance (because they were using the internet for private purposes during working hours). Furthermore, intensive use during a particular day led to lower experience of recovery not only on the same day but the day after for high CIU users. In relation to the contribution to the addiction literature, these findings suggest an overall picture of intensive use which can be consistent with that of a behavioral addiction (Griffiths, 2005). Additionally, the impact of intensive internet use at night upon morning energy levels also contributes and expands upon previous psychological recovery studies showing the role of psychological detachment from work during the evening as a predictor of fatigue the morning after (e.g., Sonnentag et al., 2008; Binnewies et al. 2009, 2010). In this case, it could be argued that intensive internet use inhibits psychological detachment. In short, these findings allow integration between the knowledge from the behavioral addiction literature and in the occupational health literature. This is at a time where the boundaries between work and leisure are virtually disappearing and it is important that cross-disciplinary knowledge is used to enhance our understanding of how work and health are interrelated and can be best promoted.

On the other hand, the findings are in line with the view that intensive internet use is not harmful *per se*. In fact, for those who do not have a problem with the use in general life as defined by conflict with their work and interpersonal life and difficulty to stay away from it,

daily intensive use not only avoids harm, but is positively related with the experience of recovery. These findings support Charlton and others (2002, Charlton and Danforth, 2009) distinction between healthy engagement vs. addiction. Beard and Wolf (2001) also argued that having something always on one's mind (cognitive salience) and wanting to use something for longer every time were still signs of a likely healthy high engagement. Relatedly, one internet addiction prevalence study with samples from different countries found an average of 20% less intense/compulsive internet users when strict addiction criteria were employed (Quinones & Kakabadse, 2015). According to Grohol (2012), this characteristic of high engagement is in fact a phase through which anyone trying a new technology may go, and this eventually wears off for the majority. They also help shed some light concerning the varied evidence found in the literature in relation to positive and negative impact of intense internet use (e.g., Charlton & Danforth, 2009; Derks & Bakker, 2014). In this case, and in line with Meerkerk et al's (2009) study, the role of individual differences, particularly in their compulsion levels, appear to be key. This has important implications in terms of understanding how best to support employees in their recovery efforts outside work which are discussed below.

In line with previous JD-R studies on one hand, and other addiction and stress literature findings on the other (e.g. Jongue et al., 2011), the role of social support at work appear to have a key beneficial impacts for those that may exhibit a problematic relationship with the internet. With regards to the contribution to JDR, the present study confirms that the provision of social support at work diminished the need to engage on mechanisms to cope, therefore indirectly supporting the buffering role of resources in the relationship between high demands and exhaustion (Liu et al., 2008). More specifically, findings confirmed the buffering role of emotional resources on the impact of demands on emotional effort, though here only the supervisor (but not colleague) support was the real moderator. This is in line with contemporary evidence stressing the importance of line managers in alleviating (or increasing if relationships

are negative) the impact of work-related demands (e.g., Yang et al., 2015). The lack of significant effect of peer support could tentatively be attributed to a more individualized nature of job design and limited space for peer collaboration and support. Also, colleagues in this environment are often as limited as each other, and the extent to which an individual can access relevant resources may be more strongly related to the access to gatekeepers such as line managers can be. With regards to the role of social support in relation to moderating or preventing the engagement with the object of addiction, it was confirmed that high compulsive users could nonetheless benefit from the experiences at work in the form of support from peers and colleagues thereby reducing the need to overcompensate with harmful mechanisms. The literature often recounts evidence that work can spill over into personal lives in negative ways (Martínez-Corts et al., 2015). It is comforting to also see the opposite is true in this case and will be considered as an important implication of this study.

5.1 Key contributions, limitations and future research

The key contributions of this paper are both methodological and conceptual. First, the different time points at which each of the relevant variables were assessed reduces the frequent limitation highlighted in cross-sectional studies as well as diary studies that rely on retrospective accounts. With this type of design, the recall bias is minimized. Statistically, it also enables a more rigorous test of antecedents and consequences because data are collected at different points in time and therefore hypotheses about process can be more strongly justified, as opposed to most studies of this kind, where the direction of relationships is only theoretically sustained (Sonnetnag, 2001; Spector & Meier, 2014). With regards to the conceptual contributions, the present study provides a better understanding of the conditions of how intensive internet use works as a recovery mechanism (i.e., when high demands at work are compensated by high resources, and when employees do not exhibit a tendency towards compulsive internet use more generally). It also offers a way to integrate findings from

addiction literature to the work stress and recovery. Stress and addiction are closely related, and neuroscientific studies have demonstrated that neurological correlates of stress and addiction largely overlap (Valentino et al., 2010). In addition, stress is often amongst the causes of addiction development and can be a trigger in relapse (Griffiths 2005). By integrating the addiction literature with work stress and demands, we are in a better position to inform the design of prevention strategies and more fulfilling work lives.

The study is not without its limitations. First, reactivity of the diary method cannot be ruled out (Burt, 1994). Nonetheless, the studies which have documented changes in behavior as a result of keeping a diary are often longer and therefore a four-consecutive-day design is less likely to have caused that reaction. The measures used were still subjective, therefore further studies would benefit from using more objective measures. For instance, measuring arousal associated with intensive internet use before going to bed. The generalizability of the results can also be called into question. It could be argued that the participants in the study were already highly engaged with the internet and therefore misrepresented the general population. Secondly, it could also be argued that those who really had stronger problems with their internet use could have been those who decided not to proceed with the diary study after the baseline questionnaire. This argument can be ruled out to some extent because the analysis of those who did not participate did not show significant differences in relation to compulsive internet use. It is safe to conclude that the differences observed here are applicable to those that do engage with the internet significantly for leisure. Ironically, leisure online is becoming so prevalent that is likely to increasingly apply to greater numbers of people (ONS, 2013a, b). Also, since the study focused on those that have high levels of emotional demands, the findings are also relevant to this population, but considering the strong focus of service economy, the generalizability of these findings may not be so strongly compromised. Nonetheless, it is important that the generalizability of the present study's findings on other occupational groups

is tested. Also, although it is argued that social support needs to be put in place, it would be interesting to assess the actual impact of a coaching support program on the extent to which individuals actually benefit in a number of outcomes, including the need to cope through intensive internet use. Finally, the present study ignores the importance of macro factors that in themselves shape the recovery opportunities available to individuals, organizational and societal norms. However, the present authors are conscious of the limited ability of a particular study to test a number of variables and therefore cooperation and multidisciplinary work is needed to address this gap.

5.2 Practical implications

At an individual level, the findings presented here stress the importance of paying attention to any potential disparity between what is said to be relaxing for individuals and what actually triggers relaxation and psychological detachment. Not being aware of these activities or not doing anything about it, together with a constant exposure to high level of emotional demands over time can lead to emotional exhaustion which is a key symptom of the chronic stress syndrome of burnout, as well as more direct forms of serious physical problems such as hypertension and heart disease (Hulsheger & Schewe, 2011, Quinones et al. 2013, 2016). In view of this, it is recommended that individuals engage in self-checks in the way in which internet use is affecting their life. Studies suggest that high engagement is not problematic *per se* but can be healthy. However, it is important that we keep monitoring internet use and at least examine whether it (a) interferes negatively with other areas of our life, work or persona or (b) whether individuals perceive they have no control over their use, how and when to stop it. These individual self-checks must be supported through organization's wellbeing initiatives that understand the benefits of recovery for their employees and their productivity. This does not mean singling out employees who may have problems with intensive internet use but proactively offering the tools and information to prevent the problem from happening, making

good use of studies such as the present study which show how benefits and risks can be balanced. This is particularly relevant at a time where employees are increasingly encouraged to work remotely.

Building on the key role of emotional resources, and in line with previous studies about the specificity of resources, the present authors encourage organizations whose employees are subject to high levels of emotional demands to incorporate a frequent catch-up of support. This can be in the form of more structured forms of support such as coaching, or in the shape of a less structured chat. However, it is important that the importance of these conversations are not underestimated as they have strong powerful effects to prevent ill-health derived from high demands and can even support people who already have maladaptive habits in relation to the use of the internet to ameliorate their problematic behaviors.

6. Conclusion

In spite of what is known about the benefits of physical activities and relaxation, statistics suggest that individuals appear to spend more and more time 'hooked' to technological devices, and not primarily as the aid to monitor their physical activities. The ability to connect online anywhere and anytime can aid detachment from work. On the other hand, the very characteristics that bring individuals the ability to work flexibly may also become an obstacle to engage in effective recovery processes whereby psychological systems can go back to pre-stressor levels. The present study shed some light about how work and personal variables can shape the extent to which intensively engaging on the internet may work to enhance recovery from work. For those with higher compulsive use tendencies, there appears to be price to pay for easily accessible intensive internet use activity whereas for those who are not, intensive internet use may in fact enhance recovery experiences

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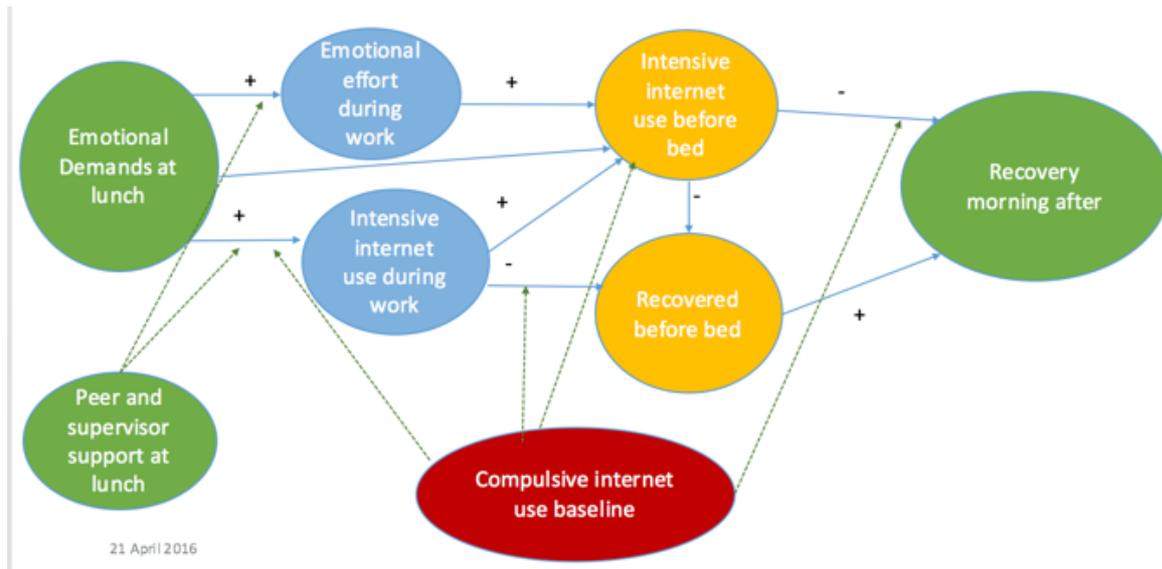


Figure 1 Theoretical model

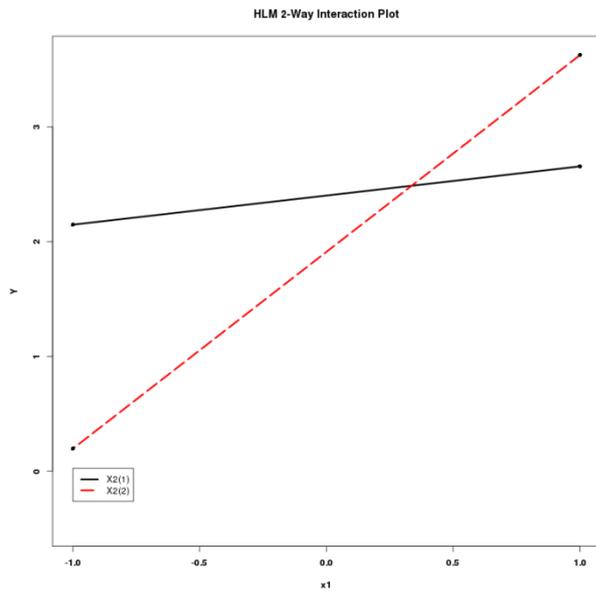


Figure 2a. Interaction effect of daily supervisor support on the impact of emotional demands on emotional effort.

Note: X1= Demands; X2(1)= High supervisor support , X2(2) Low resources.

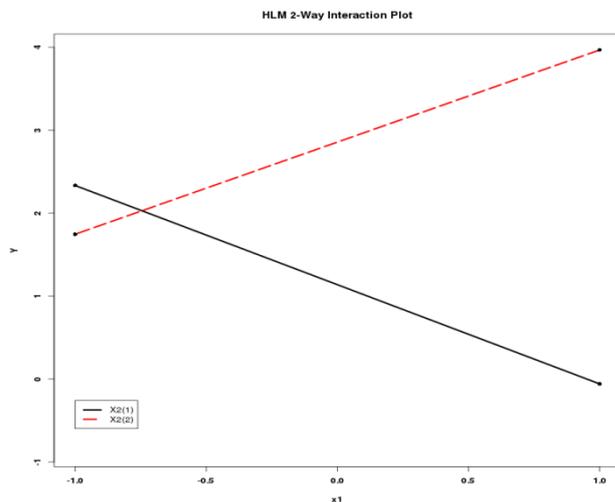


Figure 2b. Interaction effect of daily resources on the impact of emotional demands on intensive internet use before bed

Note: X1= Demands; X2(1)= High resources, X2(2) Low resources.

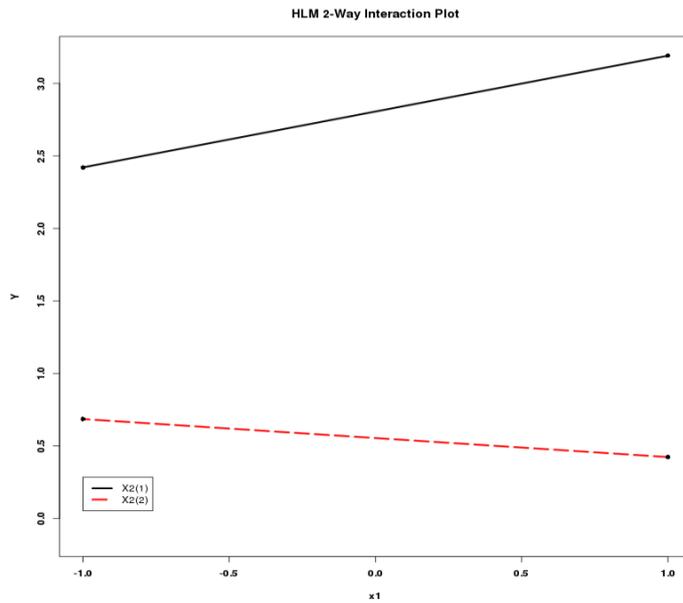


Figure 3a. Interaction effect of baseline CIU on the relationship between emotional demands and intensive internet use during work.

Note X1= Demands; X2(1)=High CIU baseline, X2(2) CIU baseline; Y=Intensive internet use after work

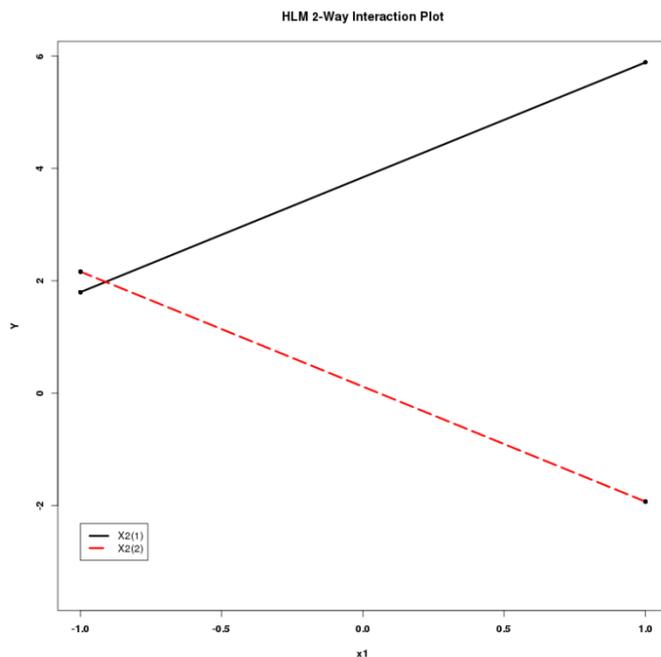


Figure 3b. Interaction effect of baseline CIU on the relationship between emotional demands and intensive internet use before bed.

Note X1= Demands; X2(1)=High CIU baseline, X2(2) CIU baseline; Y=intensive internet use before bed

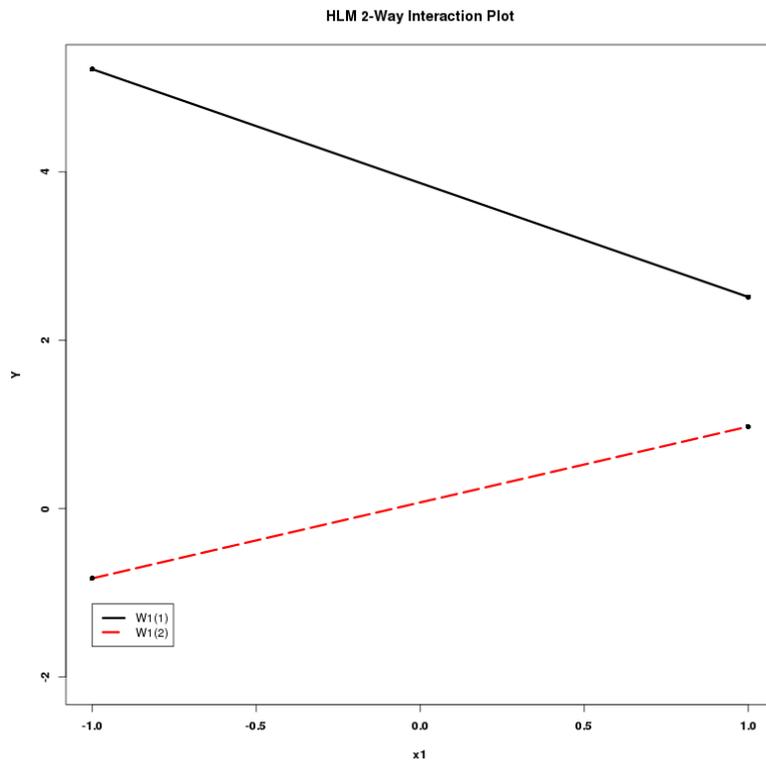


Figure 3c Interaction effect of baseline CIU on the relationship between emotional resources and internet use before bed.

Note X1= Resources; X2(1)=High CIU baseline, X2(2) CIU baseline; Y=Intensive internet use before bed

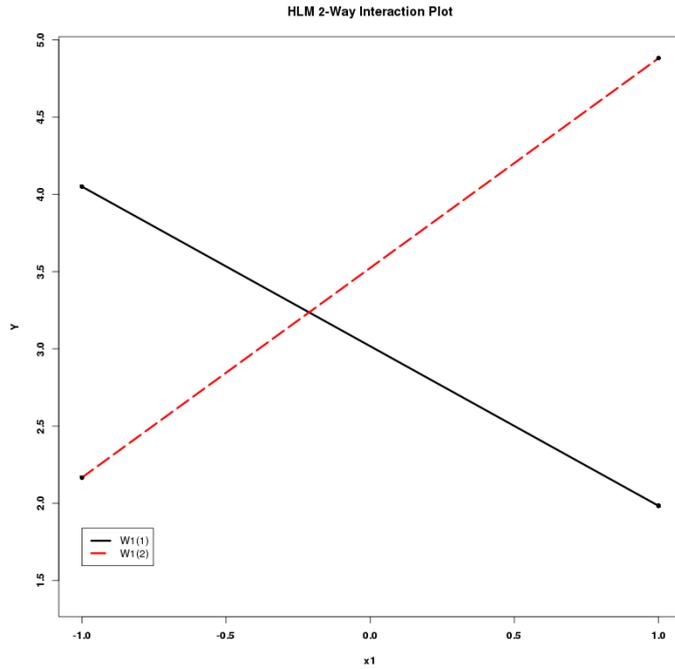


Figure 4a. Interaction effect of baseline compulsive internet use on the impact of daily intensive internet use at work (afternoon) and recovery before bed.

Note X1= Intensive internet use before bed; X2(1)=High CIU baseline, X2(2) Low CIU baseline Y=Recovery before bed

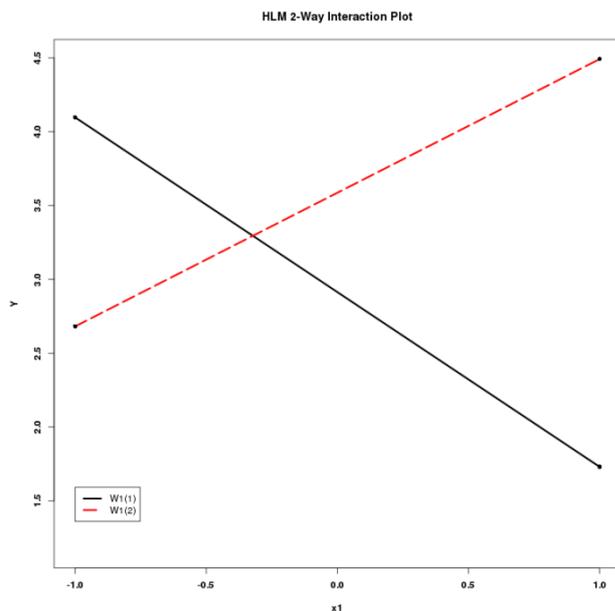


Figure 4b. Interaction effect of baseline compulsive internet use on the impact of internet use before bed on recovery before bed.

Note X1= Intensive internet use before bed ; X2(1)=High CIU baseline, X2(2) Low CIU baseline Y=Recovery before bed

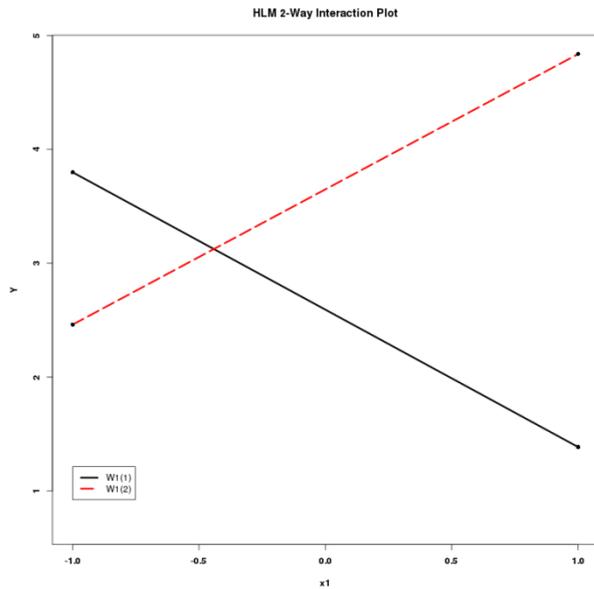


Figure 4c. Interaction effect of baseline compulsive internet use on the impact of daily intensive internet use during work and recovery the morning after
 Note X1= Intensive internet use during work (afternoon) ; X2(1)=High CIU baseline, X2(2) Low CIU baseline Y=Recovery in the morning

The impact of daily emotional demands, job resources and emotional effort on intensive internet use during and after work

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ACCEPTED MANUSCRIPT

Highlights

- 84 employees were surveyed 3 times a day for 4 days on their internet use, work demands, and recovery
- High demands and low resources led to intense internet use, high resources had the opposite effect
- Intense internet use negatively affected recovery at night and in the morning for compulsive users
- Intense internet use positively affected recovery for low compulsive internet users

Table 1. *General questionnaire items***Compulsive internet use**

- 1-How often do you find it difficult to stop using the internet when you are online?
 2- How often do you continue to use the internet despite your intention to stop?
 3-How often do others (e.g. partner, children, parents, friends) say you should use the internet less?
 5-How often are you short of sleep because of the internet?
 8-How often do you think you should use the internet less often?
 9-How often have you unsuccessfully tried to spend less time on the internet?
 10-How often do you rush through your (home) work in order to go on the internet?
 11-How often do you neglect your daily obligations (work, school or family life) because you prefer to go on the internet?
 14-How often do you feel depressed or irritated when you cannot use the internet?

Emotional demand: Emotional rule dissonance

I have to react with understanding to clients with unreasonable behaviour

I have to hide my frustration or anger, when I am dealing with unreasonable clients

Emotional demand: Customer demands

I deal with clients who incessantly complain, although I always do everything to help them

I have to deal with demanding clients

Emotional resources: Colleagues' support

I can ask my colleagues for help if I need it

My colleagues help me if I experience difficulties with the work I am doing

Emotional resources

My supervisor pays attention to what I say if the situation arises

My supervisor uses his/her influence to help me solve my problems at work".

Emotional effort

... involves a great amount of effort?

... this activity is the main reason why you feel tired after work?

... you make more mistakes in other areas due to this activity?

Psychological recovery: Detachment

I forget about work

I don't think about work at all

I get a break from the demands of work

Psychological recovery: Relaxation

I kick back and relax

I use the time to relax

I take time for leisure

Note: The selection of items and instructions adapted for the diary are presented in the relevant section in the paper

Table 2. Mean, standard deviations, and intercorrelations between the model variables

Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11
<i>Level 2 variables</i>													
1. Compulsive internet use	2.98	.73											
2. Demands	3.36	.79	.151**										
3. Resources	3.86	.70	.021	.022									
4. Emotional effort	2.89	.85	.412**	.366**	-.045								
<i>Level 1 variables</i>													
5. Daily demands after lunch	2.34	0.90	.188**	.335**	.014	.354**							
6. Daily resources after lunch	3.45	0.86	-.053	.102	.476**	.044	.221**						
7. Daily emotional effort after work	2.40	1.31	.091	.226**	.151**	.178**	.435**	.152**					
8. Daily compulsive internet use during work	1.65	0.92	.446**	.092	-.116*	.221**	.325**	-.135*	.259**				
9. Daily compulsive internet use before bed	2.01	0.94	.494**	.161*	-0.039	.213**	.340**	-.12	.312**	.672**			
10. Daily recovery before bed	3.25	0.89	-.069	-.056	.301**	-.158**	-.047	.351**	-.012	-.066	-.133*		
11. Daily recovery in the morning	3.10	1.15	-.111	-.153**	.227**	-.087	.008	.385**	-.021	-.057	-.012	.478**	
12. Daily compulsive internet use in the morning	1.66	0.86	.442**	.134*	-.116*	.213**	.324**	-.171**	.308**	.662**	.713**	-.081	-.214**

Table 3. Multi-level estimates predicting emotional effort reported after work

	Null Model	Model 1	Model 2	Model 3
Intercept	2.39***(.11)			
<i>Level 2-variables</i>				
Resources baseline		.258†(.151)	.259† (.152)	.252 (.152)
Demands baseline		.343*(.185)	.341*(.187)	.374*(.182)
Compulsive internet use				
<i>Level 1-variables</i>				
Resources			-.162(.134)	-.163(.134)
Demands			.221* (.110)	.221* (.109)
Resources x demands				-.375 (.265)
Diff-2*log (df)		6* (4)	4*(2)	1(1)

† $p < .10$ * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 4. Multi-level estimates predicting intensive internet use within work in the afternoon

	Null Model	Model 1	Model 2	Model3a	Model 3b	Model 3c	Model 4
Intercept	1.69***(.08)	1.69***(.08)	1.69***(.08)	1.69***(.08)	1.69***(.08)	1.69***(.08)	1.69***(.08)
<i>Level 2-variables</i>							
Compulsive Internet use		.584***(.11)	.573***(.11)	.574***(.11)	.580***(.11)	.581***(.11)	.581***(.11)
<i>Level 1-variables</i>							
Resources			-.102 (.08)	-.105 (.08)	-.077 (.06)	-.078 (.06)	-.085 (.07)
Demands			.140**(.05)	.141**(.05)	.127* (.05)	.146**(.05)	.136*(.05)
resources x Demands				-.045(.15)			
Demands x baseline					.133*(.06)		
Resources x compulsive internet use baseline						-.108 (.08)	
Diff-2*log (df)		17***(2)	1.2(2)	2(1)	1(1)	NS	NS

† $p < .10$ * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 5. Multi-level estimates predicting intensive internet use before going to bed

	Null Model	Model 1	Model 2*	Model 3a	Model 3b	Model 3c	Model 4
Intercept	1.98***(.09)	1.98***(.08)	1.98***(.08)	1.99***(.08)	1.99***(.08)	1.98**(.08)	1.99***(.08)
<i>Level 2-variables</i>							
Compulsive internet use		.630***(.11)	.613***(.10)	.615***(.10)	.618***(.11)	.646***(.11)	.606***(.10)
<i>Level 1-variables</i>							
Resources			-.186*(.07)	-.219**(.10)	-.187*(.07)	-.189**(.07)	-.143*(.07)
Demands			.378**(.12)	.374**(.12)	.349**(.12)	-.051(.09)	.349**(.12)
Demands x Resources				-.294*(.13)			
Demands x compulsive internet use baseline					.723**(.25)		
Resources x compulsive internet use baseline						-.327**(.09)	
Intensive internet at work (afternoon)							.224**(.08)
Effort during work (afternoon)							.069*(.03)
Diff-2*log (df)		23.7***(1)	27***(2)	14***(1)	3*(1)	27***(1)	6*(2)

Note: † $p < .10$ * $p < .05$ ** $p < .01$ *** $p < .001$. Please note Model 2 values are those which correspond to demands entered as random in the model

Table 6. Multi-Level Estimates predicting recovery before bed

	Model 1	Model 2	Model 3	Model 4	Model 5a	Model 5b
Intercept	3.25***(.08)	3.27***(.07)	3.28***(.07)	3.26***(.07)	3.26***(.07)	3.26***(.07)
<i>Level 2-variables</i>						
Psychological detach	.128†	.131†(.07)	.133†(.07)	.130†(.07)	.174†(.09)	.174†(.09)
Resources baseline	.329**(.11)	.325**(.11)	.375**(.11)	.373**(.11)	.306*(.12)	.303*(.12)
Compulsive internet use baseline					.118(.09)	
<i>Level 1-variables</i>						
Resources at lunch		-.012(.10)	-.061(.10)	-.118(.11)	-.040(.09)	-.158(.11)
Demands at lunch		-.118(.08)	-.089(.08)	-.117(.08)	-.098(.07)	-.111(.11)
Intensive internet use during work (afternoon)			-.079†(.04)	-.054(.05)	.120(.12)	-.048(.12)
Intensive internet use before bed				-.297**(.11)	-.310**(.10)	-.114(.14)
Intensive internet use during work (afternoon)* compulsive internet use baseline					-.390**(.14)	
Intensive internet use before bed * compulsive internet use baseline						-.350**(.15)
Diff-2*log (df)	10**(1)	-4 (2) NS	2(2) NS	75***(1)	9**(1)	7**(1)

† $p < .1$
 0
 $*p < .05$
 $**p < .01$
 01
 $***p < .001$

Table 7. Multi-level Estimates predicting recovery in the morning

		Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	3.09***(.10)	3.12***(.10)	3.12***(.10)	3.07***(.11)	3.07***(.11)	3.12**(.10)
<i>Level 2-variables</i>						
Resources Baseline		.393**(.14)	.392**(.14)	.383**(.15)	.383**(.15)	.400**(.15)
Compulsive internet use baseline						-.182(.14)
<i>Level 1-variables</i>						
Resources			.224*(.11)	.224**(.13)	.224**(.13)	.263**(.13)
Demands			.130(.09)	.157(.09)	.170(.09)	.174(.09)
Intensive internet use during work (afternoon)				-.344*(.14)	-.339*(.14)	-.122(.15)
Effort during work (afternoon)				-.072(.06)	-.072(.06)	-.072(.06)
Intensive internet use before bed				-.210†(.12)	-.210†(.12)	-.201(.12)
Recovery before bed					.393**(.15)	.137(.15)
Intensive internet use during work (afternoon)* CIU baseline						-.520***(.16)
Diff-2*log (df)		6*(2)	-1(2)	173***(1)	18***(1)	7**(1)

† $p < .10$ * $p < .05$. ** $p < .01$. *** $p < .001$.