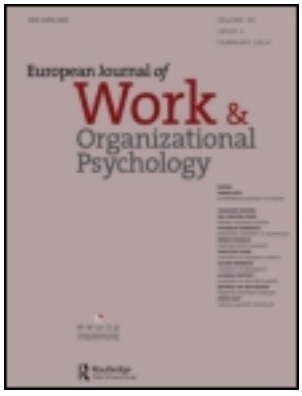

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Switching on and off … : Does smartphone use obstruct the possibility to engage in recovery activities?

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Switching on and off . . . : Does smartphone use obstruct the possibility to engage in recovery activities?

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This study examines the impact of work-related smartphone use on daily recovery from work-related efforts. The literature shows that work–home interference (WHI) is an important inhibitor of the recovery process. We propose that the extensive use of smartphones with its implicit request of 24/7 availability inhibits the process of engaging in activities that are required for daily recovery. A total of 80 employees (40 smartphone users, 40 controls) completed a 6-day diary questionnaire over a time period of 2 weeks. Contrary to our hypothesis, smartphone users did not experience more overall WHI than nonusers. Furthermore, four activities aimed at recovery were examined. We predicted that daily WHI would increase employees' engagement in recovery activities, but only if they did not use a smartphone. Results showed that, for the control group, WHI was positively related to psychological detachment, relaxation, mastery, and control activities, whereas smartphone users facing high WHI did not succeed in engaging in these recovery activities. This implies that being connected to work in the evening hours through smartphones has consequences for the extent to which employees succeed in undertaking recovery activities.

Keywords: Psychological detachment; Recovery; Smartphone; Work–home interference.

The smartphone is one of the newest communication tools in the workplace today (Rennecker & Godwin, 2005). The wireless email systems facilitated by a smartphone enable users to engage in email in new ways. For an increasing number of employees smartphones have become part of everyday work life (e.g., Hassan, 2003; Hörning, Ahrens, & Gerhard, 1999). However, the impact of this new technology on organizational life is still under researched in the scientific field. This article aims to fill this gap by examining the impact of smartphone use on employee recovery from work. Advantages often associated with smartphone use are the facilitation of new forms of interaction and better collaboration between co-workers (Lyytinen & Yoo, 2002; Pica & Kakihara, 2003), increased flexibility in work schedules (Rood, 2005), and increased productivity (Locke, 2005).

Next to these advantages and innovative elements of this new technology, it is conceivable that smartphone use has disadvantages as well. For example, Derks and Bakker (2010) argued that the smartphone might lead to information overload, especially when received information is not requested and beyond the control of the receiver. Consequently, information overload and loss in control over information flow can become a stressor in work (Edmunds & Morris, 2000). Since smartphone use often continues during evenings, weekends, and even holidays, it is conceivable that stress as the result of continuous information flows is also present in private life. Another often heard critique on smartphone use is that it blurs the boundary between the work and home domains. Employees stay connected to work during after work hours, which implies that work never stops, and intrudes in the home life (Green, 2002; Jarvenpaa & Lang, 2005). This can result in work–home interference (van Hooff, Geurts, Kompier, & Taris, 2006).

We propose that smartphone use and the implicit request to stay connected to work after office hours may inhibit the process of daily recovery. We aim to examine how smartphone use during after work hours influences the daily recovery strategies that employees may adopt to gain recovery in detail. To examine the daily fluctuations, we conducted a diary

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study comparing a group of smartphone users with a control group of nonusers.

CONSEQUENCES OF SMARTPHONE USE

A smartphone is a mobile device with the functionality of a pocket PC. It facilitates calendar management, unlimited access to the Internet, making phone calls, and receiving emails anytime, anywhere. The main reason for having a smartphone is to send and receive emails (Middleton, 2007). Companies provide smartphones to their employees in the hope of a return on investment. Research has indeed indicated that mobile tools can lead to increased productivity (Locke, 2005), and enhanced collaboration (Baron, 2005). Other advantages associated with smartphone use are improved responsiveness, the availability of real time information, faster decision making, and more flexibility in work schedules. The general thought is that this flexibility can give individual workers the opportunity to better balance their work and home domains, as they can allocate their time over work and family activities in a way that suits their situation best (Parasuraman & Greenhaus, 2002; Rood, 2005; Taylor, 2003).

Besides these advantageous consequences, several downsides of smartphone use have been suggested as well (Derks & Bakker, 2012). The intensive use of smartphones in organizational life creates a norm that is characterized by nomadic working and continual communication (e.g., Castells, 1996; Hassan, 2003; Hörning et al., 1999). The possibility of staying connected expands into new settings and introduces new options regarding availability, responsiveness, and coordination (Mazmanian, Orlikowski, & Yates, 2006). New options in availability issues are in themselves not disadvantageous. However, this opportunity of accessibility anytime, anywhere, seems to change in availability everywhere, all the time (Brown, 2001; Cooper, 2001; Katz & Aarhus, 2002).

The company's increasing expectations regarding availability suggest that employees feel compelled to immediately respond to work-related messages even during leisure time (Davis, 2002). Many smartphone users engage in continuous monitoring, which generates compulsive routines of chronic checking, escalation of commitment, and, in the long run, increased stress (Gergen, 2002; Mazmanian et al., 2006). Furthermore, the instant messaging facilitated by smartphones derail work and attention as users are interrupted by incoming messages (Czerwinski, Cutrell, & Horvitz, 2000; Rennecker & Godwin, 2005). There is evidence that mobile devices blur the distinctions between the public and private domains of life (Grant & Kiesler, 2001; Green, 2002). In line with this, Jarvenpaa and Lang (2005) showed that smartphone users reported increased work pressure and the inability to separate and keep distance from work. Thus, the increased autonomy and flexibility in work schedules due to smartphone use seems to come at the cost of enhanced expectations of availability; this may even result in escalated commitment to stay connected (Green, 2001).

There is evidence that the smartphone is associated with difficulties in managing work–home balance (e.g., Davis, 2002; Higgins & Duxbury, 2005; Jarvenpaa & Lang, 2005). It seems difficult for mobile users to maintain a satisfactory balance between their work and personal life. Smartphone use can be very demanding since the employees experience closer monitoring and supervision, resulting in a lack of autonomy. Duxbury, Higgins, and Lee (1994) argue that work–life stress is explained in terms of perceived control. Smartphone users might be a vulnerable group in developing work–life stress, since they have no control over the amount and timing of incoming messages. Fenner and Renn (2004) argue that it is of all times to extend the workday to the home during evening, weekends and holidays. However, the availability of technological tools facilitating connectedness to work anyplace-anytime is a relative new tendency. This technology-assisted supplemental work (TASW) as they call it, refers to the performance of job tasks by full-time employees by means of advanced information and telecommunications technology in- or outside the home (Fenner & Renn, 2004). The conclusion of Middleton (2007), who argued that the smartphone made it much easier to work longer hours, is in line with these considerations. Whether the impact of TASW on work–family balance is mainly positive or negative is still open for discussion (Fenner & Renn, 2004).

In conclusion, there are some indications that smartphone use can initiate a higher level of integration between work and home domains due to increased flexibility. It is also possible that smartphone use has several harmful side effects such as blurring the work–family boundary and prolonging working days. Extensive research on the backlash of smartphone use is scarce. Moreover, the results of the reported studies on the effects of smartphone use are mainly based on qualitative studies interviewing limited numbers of respondents (e.g., Jarvenpaa & Lang, 2005; Middleton, 2007). The literature lacks empirical, quantitative studies including larger, representative groups of respondents. The current study aims to fill this gap by studying whether smartphone users experience higher levels of work–home interference as a consequence of the blurring of boundaries between the work and private domain. Furthermore, we examine whether smartphone users

are less successful than nonusers in similar professions in initiating recovery activities in response to high work–home interference.

WORK–HOME INTERFERENCE

The smartphone causes the employee to literally take work into the home domain. Recent studies show that communications technology use increases the permeability of work–family boundaries (e.g., Haddon & Silverstone, 2000; Lewis & Cooper, 1999; Valcour & Hunter, 2005). As a consequence, the blurring of boundaries might lead to a deteriorated work–family balance (e.g., Davis, 2002; Derks & Bakker, 2011; Jarvenpaa & Lang, 2005). In short, the higher integration of the work and home domains facilitated by communications technologies results in the experience of work–home interference (WHI). WHI refers to a process of negative interaction between work and home domains (van Hooff et al., 2006). WHI is defined as a form of interrole conflict in which the role pressures from the work and the family domains are mutually incompatible so that participation in the home role conflicts with participation in the work role (Greenhaus & Beutell, 1985).

Greenhaus and Beutell (1985) argued that WHI could occur in three distinct ways. First, time demands can make it physically impossible to be in two places at the same time (e.g., working long hours). Second, spillover of strain from work to home can occur (e.g., stress at work can make it more difficult to relax at home). Finally, specific behaviour that is expected at work is incompatible with the behaviour that is expected at home. With regard to the first type of conflict, we remark that the smartphone makes it possible to ''be'' at home, but work (in the living room). In other words, time demands are challenged in a more subtle way than in the situation that overwork takes place at the office. Galinsky, Kim, and Bond (2001) showed that the use of communication technologies promotes working overtime. Especially this subtle way of working overtime is our concern since answering emails outside office hours may seem trivial and therefore the consequences might stay unnoticed. However, Jarvenpaa, Lang, and Tuunainen (2005) argue that is impossible to engage in two activities at the same time. This implies that engaging in smartphone activities *automatically* implies that the individual disengages from home activities. The bottom line is that, even when employees are at home, there is no quality time to spend with their family because they are still connected to their work hassles. Spillover from work to home is also likely to occur since the work and home domains become more integrated. The presence of a smartphone in a nonwork context might make work salient during times that first were solely dedicated to the private life. Finally, the smartphone introduces behaviours related to work, e.g., answering emails, in the home domain. For example, it is possible to answer a work-related phone call while the children are playing in the living room.

Frequently using a smartphone contributes to a blurring of the boundaries between work and leisure time. The increased interference between the work and family domains often results in higher stress levels and lower employee satisfaction, which may eventually lead to impaired performance (Eby, Casper, Lockwood, Bordeaux, & Brinley, 2005, or Greenhaus & Beutell, 1985). Working in the evening implies work–home interference—with reduced opportunities for recovery. Since many employees feel compelled to respond to work-related emails in the evening (Middleton & Cukier, 2006), the amount of WHI they experience is for a large part beyond their control. Therefore, we expect smartphone users to experience higher levels of WHI in comparison to nonusers.

Hypothesis 1: Smartphone users experience more WHI compared to a control group.

RECOVERY

WHI can be considered as a potential source of stress that can have a negative effect on employee well-being (Geurts, Kompier, Roxburgh, & Houtman, 2003). The Effort–Recovery (E-R) Theory (Meijman & Mulder, 1998) states that effort expenditure at work is unavoidably associated with acute load reactions. Under optimal conditions, these stress-related acute load reactions return to prestressor levels during after-work hours and recovery is completed before the next workday starts. However, when the stressor prolongs or reoccurs during after-work hours—which is likely when employees stay connected with work at home—recovery is incomplete. In particular, daily overtime work is a risk factor since a demand is made on the same psychophysiological systems that were already activated during normal work hours (Geurts & Sonnentag, 2006). In addition, Sonnentag (2001) showed that employees need evening hours to detach from work in order to recover from stress expenditure properly. Research on job-stress recovery suggests that recovery experiences during leisure time provide opportunities to unwind from work (Geurts & Sonnentag, 2006; Westman & Eden, 1997). Many studies on recovery have focused on weekend and holiday effects (Fritz & Sonnentag, 2005, 2006). However, since the beneficial effects of vacations fade out quickly (De Bloom et al., 2009), daily recovery during evening hours is more crucial for protecting

health, well-being, and performance (Sonnentag, 2001, 2003).

A core component of recovery inherent on the leisure activities is psychological detachment, an individual's sense of being away from work (Etzion, Eden, & Lapidot, 1998). It implies more than just being physically away from work. It suggests that the individual stops thinking about work and disengages mentally from work (Sonnentag & Kruel, 2006). Psychological detachment is particularly important after stressful and demanding working days (Sonnentag & Bayer, 2005). Especially on these days, individuals might continue working at home and lack recovery (e.g., Taris, Beckers, Dahlgren, Geurts, & Tucker, 2007). It is plausible that the smartphone with its implicit request for 24/7 availability disturbs the important process of disengaging from work and recovery.

Sonnentag and Fritz (2007) argue that people might differ in what leisure activities they experience as recovering. They developed a scale measuring four types of recovery experiences. Psychological detachment (1) includes activities aimed to disengage oneself mentally from work. Relaxation (2) is characterized by low activation and increased positive affect. Deep physical and mental relaxation can be achieved by deliberately practising relaxation techniques, for example meditation (Grossman, Niemann, Schmidt, & Walach, 2004). Low effort walks in a natural environment (Hartig, Evans, Jamner, Davis, & Gärling, 2003) or listening to music (Pelletier, 2004) are examples of everyday life relaxation activities. Mastery experiences (3) refer to challenging experiences in other domains that provide opportunities for learning and success (Sonnentag, Binnenwies, & Mojza, 2008). Finally, control or autonomy (4) refers to an individual's ability to choose an action from multiple options. In other words, the degree to which an individual can decide which activity to pursue during leisure time, as well as how and when to engage is this activity (Sonnentag & Fritz, 2007).

We expect that when intensive smartphone users experience work–home interference they have more difficulty in actively engaging in recovery activities since the request to work initiated by the smartphone is often external and uncontrollable, and continues the confrontation with work related matters (Duxbury et al., 1994). Furthermore, recovery occurs during time periods when no demands similar to the preceding job demands are put on the person (Meijman & Mulder, 1998), in other words on free evenings (Rook & Zijlstra, 2006). It is questionable to what extent intensive smartphone users really experience free evenings. As deduced from the study by Sonnentag and Fritz (2007), people not only differ in what activities they experience as recovering, but also, recovery is not something that automatically happens when employees are physically separated from their work. It is the responsibility of the employee to deliberately initiate activities during evening hours that help them recover. In addition, the connotation of WHI is negative. Therefore, we argue, WHI is an unpleasant state that withholds employees from recovering. Consequently, in order to cope with high levels of WHI, employees will try to initiate activities that help them to recover from the effort they invested in their work during the day.

To examine whether smartphone users have more difficulty in sufficiently recovering during evening hours, in the current study we operationalized recovery activities as coping styles to deal with high levels of WHI. The underlying assumption on recovery activities as coping styles is that an individual has a decision to actively engage in it. This implies that when work–home interference is high, employees might be motivated to actively seek for activities that help them to recover from work. Since we assume that the WHI initiated by the smartphone is largely beyond the users' control, we hypothesize that smartphone users would succeed to a lesser extent in adopting coping styles when they experience WHI.

Hypothesis 2: Smartphone use moderates the relationship between WHI and recovery strategies in such a way that the positive relationship between WHI and (a) psychological detachment, (b) relaxation, (c) mastery, and (d) autonomy is weaker or even negative for smartphone users in comparison to a control group of nonusers.

METHOD

Procedure and participants

The participants were recruited by invitation emails with a request to participate in a diary study on the evaluation of their work. The researchers contacted companies and business associates in their network to ask for permission to approach their colleagues and/or employees by email. The email explained the survey process and assured confidentiality of the responses. The data were collected via questionnaires that could be filled out online by means of an online survey. Respondents were first invited to fill out a background questionnaire with demographics and a questionnaire assessing their email use and if relevant their smartphone use. Subsequently, participants were contacted through email for 6 workdays equally spread over 2 weeks. These emails included the link to a diary questionnaire that could be filled out online at the end of each of 6 workdays, in the evening before going to sleep. All variables were measured in the evening.

As a reward for participating in the study, and to prevent drop out, we announced a lottery in which employees who participated all 6 days, could win an iPod Touch. In total, 80 participants filled out the background questionnaire and each of the six diaries. This leads to 480 study occasions at the within-subject level. The sample consists of two equally distributed subsamples, a smartphone group ($n = 40$) and a control, PC-group ($n = 40$). Both groups are similar in workload and job type. Participants are employed in 22 different organizations.

Participants were 62 male (78%) and 18 female (22%) employees. Their mean age was 39.5 years ($SD = 9.9$). Within the smartphone group there was differentiation in the brand smartphone participants used. The smartphones used were: BlackBerry ($n = 18$), Nokia ($n = 11$), Sony Ericsson ($n = 8$), Siemens ($n = 1$), Google Android ($n = 1$), and iPhone ($n = 1$). The differences between the smartphones are in the interface they use and not in functionality. All participants had full access to their work email account on their devices.

Measures

Work–home interference was measured using the eight-item subscale of the SWING (Survey Work–home Interaction NijmeGen; Geurts et al., 2005). Van Hooff and colleagues (2006) adjusted the items to day-level measurement. Example items are: "Today I had difficulties to fulfil my domestic obligations because I am constantly thinking about my work" (strain-based) and "Today my work schedule made it difficult for me to fulfil by domestic obligations" (time-based). All items were rated on a 5-point Likert scale, 1 = "totally disagree" to 5 = "totally agree". Cronbach's α of the scale was .97, indicating good reliability.

Recovery strategies was measured using the recovery experiences measures from Sonnentag & Fritz (2007). The scale was reframed to measure recovery activities that aimed to achieve each of the recovery experiences. The scale consists of four subscales each containing four items. This scale was also adjusted for daily measurement by adding "In my free time after work…" to each item. Example items include the following: "I tried to forget about work" (psychological detachment subscale, $\alpha = .84$), "I used the time to relax" (subscale relaxation, $\alpha = .91$), "I did things that challenge me" (mastery subscale, $\alpha = .95$), and "I decided my own schedule" (autonomy subscale, $\alpha = .95$). The overall reliability of the scale was good, $\alpha = .97$. All items were rated on a 5-point Likert scale, 1 = "totally disagree" to 5 = "totally agree".

Confirmative multilevel factor analysis using Mplus (Muthén & Muthén, 1998–2010) offered clear evidence for the proposed four-factor structure of the recovery experiences. The four-factor model representing the four recovery experiences each indicated by four items showed a reasonable fit to the data, CFI = .99, TLI = .96, $\chi^2(2) = 17.43$, $p < .001$, RMSEA = .13. We compared this four-factor model to a one-factor model in which the four strategies were assumed to load on one overall factor. This one-factor model showed a bad fit to the data, CFI = .60, TLI = .54, $\chi^2(104) = 1692.53$, $p < .001$, RMSEA = .18. Moreover, the chi-square difference test indicates that the four-factor model fits significantly better to the data than the one-factor model, Chi-square difference ($df = 102$) = 1675.1, $p < .001$. Therefore, although we adapted the recovery experience questionnaire into activities aimed to achieve the recovery experiences, the four component structure is comparable to the results from Sonnentag and Fritz (2007).

RESULTS

Analysis

Our repeated measures data can be viewed as multilevel data, with repeated measurements nested within individuals. This leads to a two-level model with the repeated measures at the first-level ($N = 480$ study occasions) and the individual persons at the second-level ($N = 80$ participants). Multilevel analysis with the MlwiN program (Rashbash, Browne, Healy, Cameron, & Charlton, 2000) was applied. Predictor variables at the day-level (Level 1, i.e., WHI) were centred to the individual mean and person level (Level 2) predictor variables (i.e., age) were centred to the grand mean. None of the control variables (gender, age, education, and months of smartphone use) were significant predictors of either day level of the coping styles, and were excluded from further analyses.

Descriptive statistics

Table 1 presents the means, standard deviations, and correlations among the study variables. In order to examine the proportion of variance that is attributed to the different levels of analysis, we calculated the intraclass correlation for each day-level variable. Results showed that 55% of the variance in psychological detachment, 62% in relaxation, 60% in mastery, and 62% in autonomy was attributable to between-person variations. Thus, significant amounts of variance are left to be explained by within-person fluctuations justifying our multilevel approach.

Hypotheses testing

According to Hypothesis 1, smartphone users experience more WHI compared to a control group. An

ANOVA with group (smartphone; control) as between subjects factor and overall WHI as dependent variable showed no significant differences, $F(1, 78) < 1$. Therefore, Hypothesis 1 was rejected.

Further, we hypothesized that smartphone users would succeed to a lesser extent in adopting coping styles when they experience WHI. In Table 2, the multilevel analyses are shown for the effects of WHI on the recovery strategies psychological detachment (Hypothesis 2a) and relaxation (Hypothesis 2b). The multilevel interactions between WHI and smartphone use in relation to activities resulting in daily psychological detachment, $\gamma = -.134$, $p < .001$, and relaxation, $\gamma = -.226$, $p < .001$, were significant. In addition, the interaction models containing WHI, intensive smartphone use, and the interaction term as predictor variables of psychological detachment, Δ–2x log = 32.601, $df = 2$, $p < .001$, and relaxation, Δ–2x log = 49.026, $df = 2$, $p < .001$, both showed a significant improvement over the Null model.

Smartphone use significantly moderated the relationship between WHI and psychological detachment, as well as WHI and relaxation. To examine whether the interactions were in the hypothesized direction, interactions were plotted in Figures 1 and 2. Figure 1 shows that WHI is positively related to engaging in activities that result in psychological detachment among the control group, whereas smartphone users were less successful in engaging in activities that result in psychological detachment in response to high WHI. To examine the interaction patterns in more detail, we conducted simple slope analyses as suggested by Preacher, Curran, and Bauer (2006). The unstandardized simple slope for the control group was $B = 0.76$, $SE = 0.39$, $t = 1.96$, $p < .05$, implying that the control group succeeds in undertaking activities aimed at psychological detachment when they are confronted with high levels of WHI. For smartphone users the relation between WHI and psychological detachment was negative, $B = -0.19$, $SE = 0.10$, $t = 1.96$, $p < .05$, suggesting that smartphone users are less successful in initiating activities aimed at psychological detachment when WHI increases. In a similar vein, Figure 2 shows that WHI is negatively related to relaxation among smartphone users, $B = -0.30$, $SE = 0.15$, $t = 2$, $p < .05$, whereas this relationship is positive for the control group, $B = 0.65$, $SE = 0.33$, $t = 1.97$, $p < .05$.

Table 3 presents the analyses with mastery (Hypothesis 2c) and autonomy activities (Hypothesis 2d) as the dependent variables. The multilevel interactions between WHI and smartphone use in relation to engagement in activities aimed at mastery, $\gamma = -.128$, $p < .001$, and autonomy, $\gamma = -.229$,

TABLE 1
Means, standard deviations, and correlations of study variables

	Mean	*Std.*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1. Gender (1 = male, 2 = female)	1.15	0.36								
2. Age	39.46	9.94	.37**							
3. Education	2.98	0.80	.15	−.16						
4. WHI	2.08	0.64	−.04	.07	−.02					
5. Psychological detachment	3.58	0.51	.12*	−.10	.29*	−.38**				
6. Relaxation	3.68	0.55	.18**	−.16	.19	−.49**	.68**			
7. Mastery	3.75	0.46	.19**	.05	.15	−.32**	.62**	.66**		
8. Autonomy	3.48	0.52	.10*	−.03	.10	−.39**	.62**	.70**	.72**	
9.Smartphone[1]	1.50	0.50	−.21**	.19	−.54**	.02	−.17**	.00	−.03	−.10*

**$p < .01$, *$p < .05$. $n = 80$. [1](1 = smartphone users, 2 = control group).

TABLE 2
Multilevel results of the interaction of WHI and smartphone use on activities aimed at psychological detachment and relaxation

	Psychological detachment				*Relaxation*			
	Null model		*Interaction model*		*Null model*		*Interaction model*	
	Estimate	*SE*	*Estimate*	*SE*	*Estimate*	*SE*	*Estimate*	*SE*
Intercept	3.561***	0.045	4.036***	0.179	3.677***	0.050	4.623***	0.184
WHI			0.012	0.067			0.118*	0.067
Smartphone			−0.113	0.118			−0.480***	0.122
WHI*Smartphone			−0.134***	0.041			−0.226***	0.042
Variance level 2 (employee)	0.143 (55%)	0.026	0.111	0.021	0.185 (62%)	0.032	0.124	0.022
Variance level 1 (day)	0.118 (45%)	0.008	0.114	0.008	0.112 (38%)	0.008	0.107	0.008
–2 Log likelihood	505.239		472.638		503.744		454.718	

***$p < .001$, **$p < .01$, *$p < .05$. SE = standard error. Data points = 480 (respondents $n = 80$, days $n = 6$).

$p < .001$, were both significant. Additionally, the interaction models containing WHI, intensive smartphone use, and the interaction term as predictor variables of mastery activity, Δ–2x log = 17.66, $df = 2$, $p < .001$, and autonomy activity, Δ–2x log = 38.251, $df = 2$, $p < .001$, both showed a significant improvement over the Null model.

Again, the interaction effects were plotted to examine the direction of the effects (see Figure 3 and 4). As can been seen from Figure 3, there is a strong positive relationship between WHI and engaging in mastery activities for the control group, $B = 0.83$, $SE = 0.42$, $t = 1.98$, $p < .05$, whereas this relationship is negative for the smartphone group, $B = -0.23$, $SE = 0.12$, $t = 1.92$, $p < .05$. Finally, a comparable pattern is found for activities aimed at the recovery strategy of autonomy (Figure 4). Unlike smartphone users, $B = -0.28$, $SE = 0.14$, $t = 2$, $p < .05$, employees without a smartphone increasingly adopted autonomy as a coping style when they experienced an increase in WHI, $B = 0.58$, $SE = 0.29$, $t = 2$, $p < .05$. These results provide strong support for Hypotheses 2a, 2b, 2c, and 2d, indicating that smartphone users, when faced with high levels of WHI, are less successful in initiating activities aimed at recovery in comparison to a control group of nonusers.

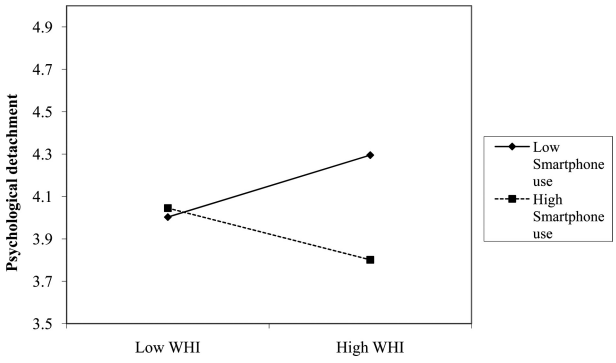

Figure 1. Moderation of smartphone use on the relationship between Work–Home Interference (WHI) and activities aimed at psychological detachment.

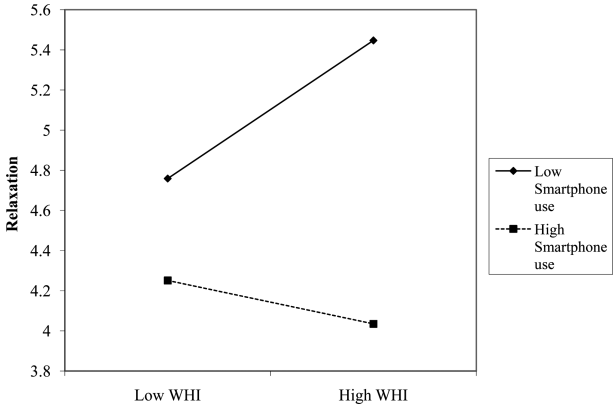

Figure 2. Moderation of smartphone use on the relationship between Work–Home Interference (WHI) and activities aimed at relaxation.

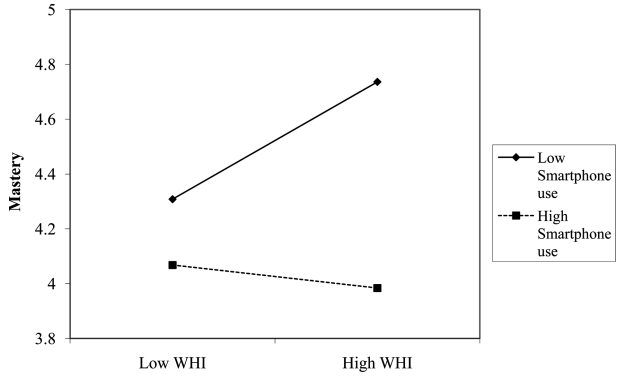

Figure 3. Moderation of smartphone use on the relationship between Work–Home Interference (WHI) and activities aimed at mastery.

TABLE 3
Multilevel results of the interaction of WHI and smartphone use on activities aimed at mastery and control

	Mastery				*Autonomy*			
	Null model		*Interaction model*		*Null model*		*Interaction model*	
	Estimate	*SE*	*Estimate*	*SE*	*Estimate*	*SE*	*Estimate*	*SE*
Intercept	3.749***	0.042	4.274***	0.169	3.483***	0.048	4.389***	0.183
WHI			0.086	0.061			0.200**	0.067
Smartphone			−0.248*	0.112			−0.378**	0.122
WHI*Smartphone			−0.128***	0.038			−0.229***	0.041
Variance level 2 (employee)	0.127 (60%)	0.022	0.108	0.019	0.168 (62%)	0.029	0.126	0.023
Variance level 1 (day)	0.085 (40%)	0.006	0.084	0.006	0.106 (38%)	0.007	0.101	0.007
–2 Log likelihood	364.821		347.161		472.674		434.423	

***$p < .001$, **$p < .01$, *$p < .05$. SE = standard error. Data points = 480 (respondents $n = 80$, days $n = 6$).

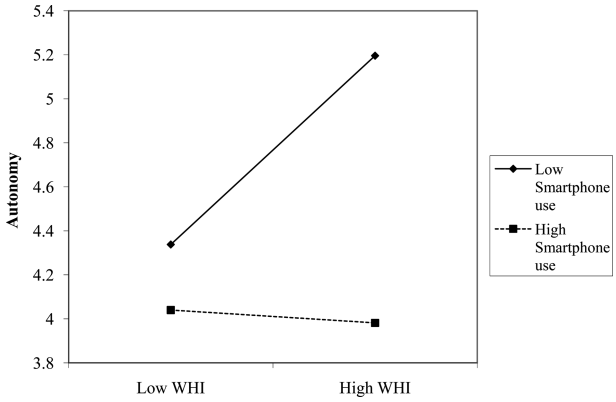

Figure 4. Moderation of smartphone use on the relationship between Work–Home Interference (WHI) and activities aimed at autonomy.

DISCUSSION

The central aim of the current study was to explore the impact of smartphone use on employees' potential to engage in recovery activities in response to an increase in the experience of WHI. This is the first study to our knowledge that handles this issue empirically in a diary design. Former research showed in a cross-sectional study among managers that work–home interference and recovery opportunities are interrelated (Taris et al., 2006).

In contrast to our first hypothesis, there were no differences in WHI between smartphone users and the control group. This is in conflict with previous studies on the blurring of distinctions between the work and home domain (e.g., Grant & Kiesler, 2001; Green, 2001, 2002; Hill, Hawkins, & Miller, 1996). Furthermore, Derks and Bakker (2011), in their study among a group of smartphone users, showed that daily WHI increased when employees used their smartphones more intensively during after-work hours. However, an alternative explanation might be that the smartphone users in the current research group were very capable in their boundary management skills (Ashforth, Kreiner, & Fugate, 2000; Macan, 1994). Ashforth and colleagues (2000) argued that individuals differ with regard to how effective they are in setting clear boundaries and how successful they are in time management. In addition, a recent study by Sanz-Vergel and colleagues showed the importance of role salience in this process. They showed that especially individuals who highly value family life do their best to not let work interfere with their private lives (Sanz-Vergel, Demerouti, Bakker, & Moreno-Jiménez, 2011). It is interesting to take role salience into account in future studies regarding the permeability of boundaries between work and home domains and the consequences of a misfit between the demands of the job and the preferences of the employee on this issue.

In our study we hypothesized that smartphone users would succeed to a lesser extent in adopting healthy recovery strategies when they experience an increase in WHI. Our data confirm that, unlike a control group without smartphones, when WHI increases, smartphone users do not manage to undertake additional activities aimed at psychological detachment, relaxation, mastery experiences, and feelings of autonomy.

The results of the current study are in line with earlier findings that psychological detachment from work during off job time is highly relevant for recovery processes (Etzion et al., 1998); Sonnentag & Bayer, 2005). Sonnentag and Kruel (2006) have already suggested that making job related phone calls probably will make psychological detachment impossible. This study contributes to the literature in showing that smartphone users indeed had more difficulties in mentally switching off from work than nonusers. Furthermore, the simple contrasts are negative suggesting that smartphone users when faced with increasing levels of WHI are becoming less capable in achieving psychological detachment. Sonnentag et al. (2008) showed that relaxation during the evening was related to serenity in the next morning and mastery experiences during the evening were related to positive activation in the morning. Since smartphone users have more difficulties to undertake activities aimed at relaxation or mastery experiences in response to high WHI during evening hours, this automatically implies that they are not able to profit from the benefits of these activities for their well-being. Future research is necessary to examine whether intensive smartphone use has consequences for the well-being of employees.

Our results about a lack of feeling of autonomy are in line with the results of Jarvenpaa and Lang (2005). They showed that employees felt more closely monitored by their employers resulting in feelings of lack of control. Perhaps this effect is even more powerful when employees are compelled to work mobile (Hill et al., 1996). In our sample, smartphones were distributed on the initiative of the employer, but we do not know whether the employees felt pressure from the company in using it. Sonnentag and colleagues (Sonnentag, 2001; Sonnentag & Zijlstra, 2006) showed consistently that when individuals spent more time on job-related activities during evening hours, the more deteriorated their well-being was at bedtime. Additionally, Sonnentag and Kruel (2006) argue that working a great deal at home makes detachment extremely difficult since work-related issues are very salient at home. Our results add to this research that detaching from work is especially difficult when employees have a smartphone. A light that blinks as an indicator for new messages seems to

be an important source of work being present at the home domain impeding adequate recovery.

Limitations and future research

Like most other studies, this study is not without limitations. First, the design of the study was not optimal. We used a quasi-experimental design, which implies that there was no random assignment of respondents to the smartphone group and the control group. The reason for this was purely practical. Since we were interested in experienced smartphone users who internalized smartphone use in their lifestyles, we chose to use existing groups. It is possible that our smartphone users represent a biased group of users who had deliberately chosen to use a smartphone for business purposes. For future research it would be interesting to set up an experimental design with a longitudinal focus using zero-history groups in smartphone use. Then it would be possible to see how the benefits and potential drawbacks of smartphone use and the accompanied issues regarding availability develop over time.

Second, the planning of the spreading of 6 diary days over 10 workdays was with hindsight not ideal. Since there was always at least 1 day in between two measurements, we were not able to make a causal argument about activities in the evening and recovery activities the *next* workday. Furthermore, it should be noted that the reported findings were all synchronous effects. Since all our data were collected at the same time, at the end of the day, the temporal order of the variables could not be established with our design. One issue that could be a useful contribution to the field is to show a causal effect between intensive smartphone use in the evening, and its consequences for recovery activities the next working day. In future research it might be interesting to test these lagged effects using a diary design with measurements on 5 or 10 successive working days.

Third, the smartphone group was more heterogeneous than the control group. This is caused by the fact that the control group consisted for a larger part of employees of the same organization than the control group. It is useful to strive for groups that are comparable in composition in as many ways as possible. Furthermore, it is interesting to explore what the impact is of organizational culture and work climate on smartphone use, especially regarding availability expectations. Additionally, the organization that was overrepresented in the control group had economic problems at the time the study was conducted. This might have influenced the experience of work–home interference in the control group. Demerouti, Bakker, and Bulter (2004) argued that job insecurity is a stressor that may result in chronic stress that cannot be easily turned off once an employee comes home.

Finally, we did not control for workaholism, the inner drive to work excessively hard (Schaufeli, Taris, & Bakker, 2008). Traditionally, workaholism is a strong predictor for working during evening hours. In particular, individuals high on workaholism find it very difficult to detach from work and seem to neglect their need for recovery. As a result they are more likely to experience work–family conflict (Bakker, Demerouti, & Burke, 2009; Taris, Schaufeli, & Verhoeven, 2005). The repetitive and addictive character of workaholics' behaviour seems to drain their energy resources (Schaufeli, Bakker, Van der Heijden, & Prins, 2009). We expect that smartphone use reinforces the urge to work even more for these individuals. It is possible that our effects in the smartphone group regarding work–home interference and psychological detachment is due to more workaholics in this group. Furthermore, it might be plausible that individuals, who are prone to developing addictions, have difficulties with setting boundaries and as are result are also more vulnerable to developing a smartphone addiction and email dependence.

CONCLUSION

In conclusion, this is the first empirical study that explored the impact of smartphone use on how employees engage in recovery activities in reaction to high WHI. There is strong evidence that smartphone use disturbs the important process of recovery, especially when the experienced work–home interference is high. It appeared that smartphone users had a hard time in unwinding and switching off. Additionally, they had more difficulties in experiencing autonomy, mastery, and relaxation during their leisure time. This implies that the seemingly "innocent" way of being connected to work in the evening hours has consequences for how employees recover. Next to the advantages of using a smartphone, including the increased flexibility (Rood, 2005; Taylor, 2003), it is important to show that there might be drawbacks of smartphone use as well, particularly in the long run. As a practical implication, we advise organizations to have a clear policy regarding availability expectations in the evening hours. The simple fact that employees feel compelled to respond to emails everywhere, all the time, does not automatically represent the vision of the organization regarding this issue. If this is the case, organizations could be more explicit in addressing this issue resulting in a clear and transparent policy that states that employees are not expected to work during leisure time. In this way, the benefits of smartphone use (e.g., flexibility) can possibly be

exploited, while preventing its disadvantageous side effects on recovery.

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