



Smartphone use and work–home interference: The moderating role of social norms and employee work engagement

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Work in our modern society that is facilitated by communication technology involves connectivity, immediacy, and a blurring of boundaries between work and non-work domains. This 4-day quantitative diary study ($N = 100$ employees, $N = 367$ – 400 data points) aims to shed light on the relationship between daily smartphone use and daily work–home interference (WHI). Two potential moderators of this relationship are examined: (1) (strong) social norms represented by the influence of colleagues and supervisors regarding availability after work hours and (2) work engagement. Overall, the results of multilevel analyses were in line with the hypotheses. The findings suggest that supervisors should be clear about their expectations regarding smartphone use in private hours in that they should not expect employees to be always available. In addition we conclude that engaged workers can prevent work from interfering too much with their private lives, even when they use their smartphones during evening hours.

Practitioner points

- Employees working in an ‘always-on’ culture experience more WHI.
- Important role models, such as supervisors, should be aware that the emails they send during evening hours and weekends also have recipients.
- Supervisors should be careful in creating expectations regarding availability when they decide to provide smartphones to their employees.

Communication technologies in general and the smartphone in particular have enabled employees to stay connected to their work any place any time (Kossek & Lautsch, 2012; Kreiner, Hollensbe, & Sheep, 2009; Major & Germano, 2006). Prevalent use of smartphones has been both praised and criticized for blurring the boundaries between work and family life (e.g., Valcour & Hunter, 2005). One major advantage of the increased flexibility facilitated by smartphone use is that it can help employees to combine their work and non-work responsibilities (Allen & Shockley, 2009). However, research on smartphone use has also consistently shown that the boundaries between work and family life become permeable (e.g., Green, 2002; Jarvenpaa & Lang, 2005), which may increase the risk of an imbalance between work and family life (e.g., Davis, 2002; Higgins & Duxbury, 2005).

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Theoretically, communication technologies are neutral with respect to promoting access to individuals any place any time. In fact, devices can be switched off, emails can be filtered, and incoming calls can go to voicemail (Chesley, 2005). However, there is evidence that employers expect employees to be available for work outside the workplace, which produces more fluid work–family boundaries (Chesley, Moen, & Shore, 2003; Galinsky, Kim, & Bond, 2001). In line with these findings, Higgins and Duxbury (2005) argue that technology is one of the major causes of work–home interference (WHI). Email has become the primary method of communication for employees at all levels. Additionally, there seems to be a universal expectation that everyone reads and responds to emails constantly. Recent work of Unger, Niessen, Sonnentag, and Neff (2014) on time allocation between work and home domains stresses the importance of being allowed to freely allocate time to private life during evening hours. They advocate that employees should not have to feel guilty when they spent less time to work to meet family and relationship demands, because there will be also days that they allocate more time to work.

Kreiner *et al.* (2009) state that work–life conflict is characterized by tension caused by incompatible expectations and challenges from both work and home domains. A main conclusion of two decades of research in the area of work–life conflict is that most employees have a problem balancing work and family demands; however, not everyone experiences work–family conflict to the same extent (Higgins & Duxbury, 2005). According to boundary theory (Ashforth, Kreiner, & Fugate, 2000), there are individual differences in the creation and maintenance of boundaries between the work and home domain. Boundaries can be conceptualized along a continuum from weak (permeable) to strong (impermeable). Individuals with permeable boundaries integrate work and home domains, whereas individuals with impermeable boundaries aim segmentation of the different domains (Ashforth *et al.*, 2000). Next to the individual perspective, Kreiner (2006) acknowledges that collectives can develop shared norms regarding permeability of given domains. In other words, organizations might differ on how permeable or impermeable the work–home boundary is treated. These socially shared norms on boundary management might become institutionalized (Zerubavel, 1991). Therefore, the current study focuses on which boundary spanning work-related factors strengthen the influence of smartphone use on WHI.

The central aim of this study is to examine how social norms regarding the work–home boundary in general, and availability in specific, moderate the daily impact of smartphone use on WHI. Is daily smartphone use stronger related to daily WHI for employees who are part of an ‘always-on’ culture, characterized by high expectations by the supervisor regarding availability, and strong norms of colleagues to stay connected? After all, employees are part of a social system in which they influence each other. Furthermore, research has shown that engaged workers are best able to psychologically detach from their work during off-job time (Bakker, 2014; Sonnentag, 2003). We therefore expect that daily work engagement will qualify the relationship between daily smartphone use and daily WHI. Figure 1 displays the conceptual model for our study.

Theoretical background

Work–home interference

Today, for many people work involves connectivity, immediacy, and a blurring of boundaries between work and non-work (e.g., Castells, 1996; Mazmanian, Orlikowski, & Yates, 2005). Communication technologies have the reputation to make the boundaries

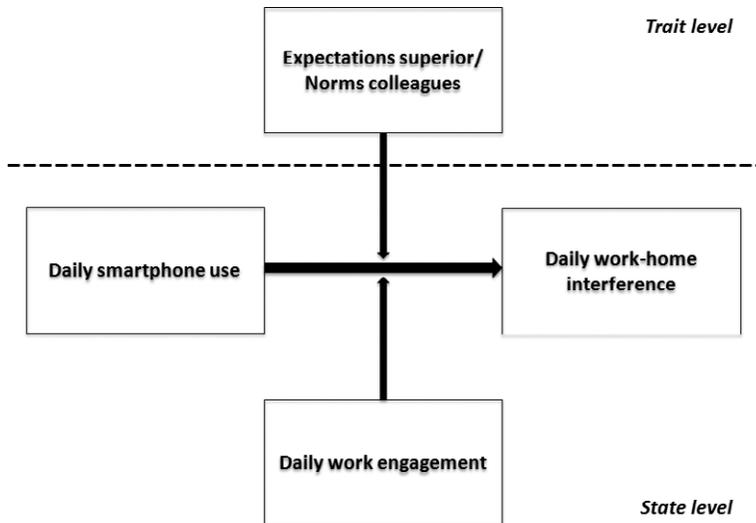


Figure 1. Research model of daily smartphone use and daily WHI. WHI, work-home interference.

between work and home domain more permeable. Boundary theory states that more permeable boundaries increase the chance of spillover from work-related issues to the private domain (Ashforth *et al.*, 2000). In other words, difficulties in balancing work and home demands are commonplace in modern societies (Kossek & Lambert, 2005; Poelmans, 2005). Behaviours such as keeping smartphones turned on during off-job time, glancing at them repeatedly, carrying them around all the time, and responding to emails in the evening may have a negative impact on work-life balance (Middleton & Cukier, 2006; Orlikowski, 2007).

Work-home interference refers to a process of negative interaction between the work and home domain (Van Hooff, Geurts, Kompier, & Taris, 2006). More formally, WHI has been defined as a form of inter-role conflict in which the role pressure from the work domain is incompatible with the role pressure from the family domain, in such a way that participation in the work role conflicts with participation in the home role (Greenhaus & Beutell, 1985, p. 77). The latter authors argue that WHI can take place in three distinct ways. First, time demands imply that time that was previously solely dedicated to the private domain is now shared with time dedicated to work (e.g., working long hours). In the case of smartphone use in the evening where employees mainly work in their own living room, challenging time demands might be more subtle than in the situation where overwork takes place at the office. The problem is that time devoted to smartphone use cannot be devoted to care activities, household chores, or interactions with family members. In particular, this subtle way of extending work hours is of interest because answering emails outside regular office hours seems harmless and therefore consequences (e.g., lack of psychological detachment) might stay unnoticed.

Second, spillover of strain from work to home may occur; that is, work-related stress may make it more difficult to relax at home. The smartphone facilitates reading and responding to work-related messages in the evening, which may enhance the likelihood of WHI. Additionally, solely the presence of a smartphone in a non-work context may make work salient during times that first were solely dedicated to private life.

Finally, WHI may occur because specific behaviour that is expected at work is incompatible with the behaviour that is expected at home (Greenhaus & Beutell, 1985). The smartphone introduces behaviours related to work – for example answering work-related emails – in the home domain. Furthermore, it is possible to answer work-related phone calls while the children are playing in the living room. However, the family role requires other qualities than the ones that are prescribed by the work role. Therefore, the constant switching between roles initiated by messages on the smartphone in the home domain may cause an increase in WHI. In the light of the boundary theory (Ashforth *et al.*, 2000; Clark, 2000), the sources of conflict described by Greenhaus and Beutell (1985) might also apply to the blurring of boundaries between the work and home domain. The role permeability associated with smartphone use might make it easier for work to intrude into the home domain increasing the likelihood of time- and strain-based role conflict.

Besides the theoretical argumentation on the possible impact of smartphone use on WHI, there is increasing evidence that individuals who use technology to work at home experience greater conflict between work and family roles (e.g., Chesley, 2005; Duxbury, Higgins, & Thomas, 1996). More specifically, the link between intensive smartphone use and WHI has already been established (e.g., Boswell & Olson-Buchanan, 2007; Derks & Bakker, 2014). Boswell and Olson-Buchanan (2007) showed that work-related technology use after regular business hours was positively related to employees' perceptions of WHI. There is also some evidence that trait smartphone use is associated with an increase in day-to-day WHI (Derks & Bakker, 2014). The fact that smartphone use might be habit-like does not automatically imply that there are no daily variations in smartphone use. We aim to examine whether daily fluctuations in smartphone use have an impact on the daily experience of WHI. Particularly on the days that employees use their smartphone very often, it is likely that smartphone use interferes with home life because on these days the attentional resources used for smartphone programs (emailing, surfing on the Internet, etc.) cannot be used for social interactions with family members, for example. In other words, in our first hypothesis we aim to replicate the already established relationship between smartphone use and WHI, however, both measured on daily basis.

Hypothesis 1: Daily smartphone use is positively related to daily WHI.

Social norms

Boundary theory suggests that there are individual differences in the extent to which individuals allow different roles (e.g., work and family) to be integrated. How permeable boundaries are is partly dependent on the nature of the job and partly on individual preferences (Ashforth *et al.*, 2000; Kossek, Lautsch, & Eaton, 2005). There is variation in the extent to which organizations or workplaces foster segmentation (Kreiner *et al.*, 2009). Environmental influences might hinder employees to create their personally preferred level of segmentation (e.g., Edwards & Rothbard, 1999; Rothbard, Philips, & Dumas, 2005). In other words, the organization could influence the individual latitude over the degree to which the boundaries between the home and private domain are permeable (Olson-Buchanan & Boswell, 2006). Ashforth *et al.* (2000) argue that situational strengths can affect both boundary creation and maintenance between the work and home domain. Roles are embedded in social domains and organizational contexts that influence the boundary management of the individual. In sum, situational factors affect the individual preferences regarding the setting and preservation of

boundaries between work and home roles (Ashforth *et al.*, 2000). There might be a discrepancy between what an individual desires regarding work–home segmentation or integration and the perception of the affordance by other individuals or groups (Kreiner *et al.*, 2009). Furthermore, there is evidence that role integration is related to conflict between roles, especially in the case of work–non-work permeability (e.g., Duxbury *et al.*, 1996; Kossek *et al.*, 2005; Olson-Buchanan & Boswell, 2006).

Matusik and Mickel (2011) showed that smartphone users have to deal with the complex interplay between demands and expectations to balance and manage their responsibilities in both work and personal life. Smartphone use comes along with expectations for faster reaction times to work-related communications, increasing the time spent working once employees leave their workplace (Milliken & Dunn-Jensen, 2005; Towers, Duxbury, Higgins, & Thomas, 2006). Moreover, smartphones engender the expectation of availability and responsiveness (Mazmanian, Yates, & Orlikowski, 2006), which makes organizational members always on call (Middleton, 2007). Expectations of continuous availability can normalize into the notion that employees should be online and accountable to others at any time and place (Green, 2001). In the context of technology usage, the subjective norm has manifested itself as peer influence and supervisor influence (Taylor & Todd, 1995). Morris and Venkatesh (2000) argue that workers are influenced by and respond to informational input from both peers and supervisors. The interactions within the social group, including colleagues and supervisors, may mould the social norm regarding availability for work during evening hours (Cialdini & Trost, 1998). Hence, supervisor expectations are defined as the urge to respond to messages during evening hours to measure up with what employees believe are the expectations of their supervisor. In a similar vein, norms of colleagues are defined as the urge to respond to messages during evening hours because anyone else does and they want to be part of the group.

Supervisor expectations. Morris and Venkatesh (2000) showed that employees are influenced by both peers and supervisors. Therefore, we expect a similar pattern for the impact of social norms exerted by supervisors on the relation between smartphone use and WHI. Because the supervisor might be an important authority and role model for the employee, we argue that employees feel the pressure to stay connected and react to incoming messages continuously. For example, when a supervisor starts emailing on a Sunday afternoon, (s)he may unconsciously endorse the opinion that it is normal to work during the weekends. Also, it is conceivable that emails are directed to employees.

There is evidence that supervisors produce more fluid work–family borders by requiring computer and communications use outside the workplace (Chesley *et al.*, 2003; Galinsky *et al.*, 2001). In addition, Kreiner (2006) argued that organizations might differ in what they expect regarding the availability during after-work hours. He showed that in organizations where employees could mentally leave their work behind when they went home, employees experienced less WHI than in organizations where employees were expected to be available for work issues during evening hours. Many organizations weaken the boundaries between work and private lives through technological advances, such as the Internet and providing employees with smartphones, which allow work to intrude the non-work sphere. The consequent weakening of boundaries can make it more difficult for employees to prevent different life domains from interfering with one another (Hecht & Allen, 2009). Additionally, those employees who experience pressure from their supervisor to be available might comply with the norm to respond to work-related

messages during the evening because they value the relation with their supervisor or to increase the likelihood of promotion or a permanent position at the organization. Finally, we only included respondents who owned a smartphone of which the employer took care of all the expenses. It is likely that employees whose smartphone was sponsored by their employer felt an obligation to comply with the employers' expectation to stay connected, also after work. Such a process would be consistent with equity theory (Blau, 1964; Walster, Walster, & Berscheid, 1978), which proposes that individuals are inclined to reciprocate outcomes (the smartphone) with investments (work-related effort). Taken these lines of research together, it can be argued that expectations regarding availability for work during evening hours qualify the impact of daily smartphone use on daily WHI.

Hypothesis 2: Daily smartphone use is more strongly related to daily WHI for employees who are expected (vs. not) to stay online by their supervisor.

Norms set by colleagues. In his classic social learning theory, Bandura (1977) argues that people tend to adopt behaviours of relevant others in their social group. In particular, behaviours of significant others with whom individuals can easily identify with are likely to be mimicked (Bandura, 1977). As colleagues share the same profession, spend time together, and pursue joint activities, it is plausible that they adopt each other's behaviours (Voorpostel, van der Lippe, & Gershuny, 2010). Furthermore, colleagues can be seen as important referent others (Fishbein & Ajzen, 1975). Schepers and Wetzels (2007) showed in their meta-analysis on technology acceptance that subjective norms and behavioural intentions are strongly related. Consequently, the intention to use technology and actual use were highly related. Additionally, there is evidence suggesting that social norms may dictate that individuals use communication technologies outside the workplace to always be accessible (Rakow & Navarro, 1993; Ventura, 1995). In other words, when the norm set by colleagues is to be online during evening hours, it might be difficult not to comply because people want to be part of the (social) group.

In a similar vein, Park, Fritz, and Jex (2011) argue that in organizations where it is normal to freely contact each other outside regular office hours to address work-related issues, employees might comply with this norm. Their study showed a positive relation between a segmentation norm and psychological detachment. This implies that employees who perceived other people at work practicing clear boundaries between work and home domains reported higher levels of psychological detachment from work outside regular work hours than employees who perceived the norm as high on integration. In addition, the perceived segmentation norm was related to less technology use at home (Park *et al.*, 2011). Separating the work from the private domain might be especially problematic for employees who are socialized into occupational cultures that equate working long hours with organizational commitment and productivity (Jacobs & Winslow, 2004). This may imply that these employees have heightened ambiguity over when to turn work off and how to effectively manage the juggling of work and family (Kossek, Lautsch, & Eaton, 2006).

Taken together, there is evidence that colleagues are influenced by each other's behaviour regarding smartphone use during leisure time. Susceptibility to normative pressure might differentiate among employees. Overall, employees do comply with the norm to stay connected during evening hours, because they want to be part of the social

group. In addition, they may be directly affected by the smartphone use by colleagues because an important part of their communication is directed at colleagues. In sum, we argue that employees who feel strong norms to mimic their colleagues' behaviour to use their smartphone after work experience a stronger increase in WHI in comparison with employees who experience weak norms to be available.

Hypothesis 3: Daily smartphone use is more strongly related to daily WHI for employees with colleagues who have strong (vs. weak) norms to stay connected during evening hours.

Work engagement

Work engagement is defined as a positive, fulfilling work-related state of mind (Schaufeli & Bakker, 2004). It is a pleasurable experience for many workers that goes along with feelings of energy (vigour), dedication, and absorption in one's work (Bakker, Schaufeli, Leiter, & Taris, 2008; Schaufeli, Salanova, González-Romá, & Bakker, 2002). Being energetic, dedicated, and absorbed at work does not automatically imply that engaged workers work excessively hard or extremely long hours (Sonnentag, Mojza, Binnewies, & Scholl, 2008). In fact, there might be multiple reasons to suggest that work engagement might buffer the impact of smartphone use on WHI. We argue that engaged workers might experience less increase in WHI on days that they use their smartphone intensively during evening hours, than low-engaged workers.

First, Sonnentag *et al.* (2008) argue that although the experience of being fully engaged at work has positive outcomes, continued immersion in one's job might be detrimental for a person's affective state. This should be particularly the case when thoughts about work or work-related activities intrude the home domain after the end of the formal working day (Snir & Zohar, 2008). On the contrary, Oerlemans, Bakker, and Demerouti (2014) showed in a recent study that work-related activities in off-job time are not always associated with negative consequences. Momentary happiness during the activity turned out to be a decisive factor. Employees who enjoyed being engaged in work-related activities during evening hours experienced higher levels of energy and recovery at bedtime compared with those who did not enjoy the work-related activities. In line with this finding, it can be expected that engaged employees, who see work as a positive experience, have less problems in terms of recovery and probably also WHI.

Second, the experience of work engagement during the day is associated with a high activation level. It is plausible that this high activation level is transferred to the private domain when returning home from work. However, Bakker (2014) showed that engaged employees succeed in reducing this high activation level during after-work hours, resulting in mental disengagement from job-related thoughts and activities during the evening. Apparently, engaged workers are able to distance from their work during off-job time; unlike workaholics, engaged workers manage to stop working and engage in other activities, including social activities and hobbies (Bakker, Demerouti, Oerlemans, & Sonnentag, 2013). For example, Kühnel, Sonnentag, and Westman (2009) showed that engagement at work and disengagement from work during off-job time are positively related. In another study, Ten Brummelhuis and Bakker (2012) showed that daily relaxation and psychological detachment from work while being at home coincides with daily engagement at work.

The third line of evidence that builds our argument comes from the fact that work engagement facilitates successful task completion (Halbesleben & Wheeler, 2008; Salanova, Agut, & Peiro, 2005). When tasks are completed, there is less unfinished business that might spill over from work to private life. It is important to note that none of the previous studies considered the use of communication technologies in their research designs. To our knowledge, there is one study that examined the relation between smartphone use, engagement at work, and disengaging from work. MacCormick et al. showed that functionally engaged workers, dynamic connectors as they call it, are capable of switching the device off as a means to disengage from work, enabling them to optimize both organizational and personal priorities. Most smartphone users in their study felt that the technology had enhanced their ability to engage with the workplace, while enjoying increased flexibility and mobility (MacCormick, Dery, & Kolb, 2012).

Taken together, there are several reasons to suggest that engaged workers experience less problems in terms of WHI in response to increased smartphone use.

Hypothesis 4: Daily smartphone use is less strongly positively related to daily WHI for engaged (vs. non-engaged) employees.

Method

Procedure and participants

We used multiple strategies to recruit participants. First, we made announcements using social media, such as Facebook and LinkedIn. Potential participants were asked to send an email to one of the researchers if they were willing to participate. Additionally, contacts of the researchers were directly approached by a personal invitation email with the request to participate in a 4-day diary study on 'working conditions'. Both actions together resulted in a heterogeneous convenience sample. Inclusion criteria were that the employees participating in this survey were all in the possession of a smartphone for work purposes and that their supervisor introduced the smartphone to them and took complete care of all smartphone-related expenses. Employees who did not work full-time were excluded from the study. A convenience sample was appropriate for this study because we needed a representative sample of this specific population together with variation in the variable social norms. Wheeler, Shanine, Leon, and Whitman (2014) showed in their meta-analyses that convenience samples are not substantively demographically different from non-student recruited samples. Furthermore, as Demerouti and Rispens (2014) note, convenience samples can be especially helpful to increase the response rate in elaborated research designs, such as diary studies.

The email explained the survey process and assured confidentiality of the responses. All participants participated on a voluntary basis and did not receive any reward. Participants were free to decide whether they wanted to participate the next day. Every day they received a kind invitation to fill in the diary booklet of that specific day.

The data were collected via online questionnaires. Respondents were first invited to fill out a background questionnaire with demographics and general information about their smartphone use. Subsequently, participants were contacted through email for four successive workdays within one working week. At the end of the afternoon on each study day, respondents received an email with instructions and a link to the daily questionnaire. In the introduction, we stated explicitly that we were interested in their smartphone use during after-work hours. The instructions clearly requested respondents to fill out the

questionnaire at the end of the evening, just before going to bed. Data collection took place in the Netherlands, and we used Dutch questionnaires.

In total, 100 employees participated, of which 79 participants (79%) filled out all four questionnaires on successive working days. This led to a total of 367–400 data points at the within-person level. Only 8% of all possible responses were missing. Participants were 75% ($n = 75$) male and 25% ($n = 25$) female. The mean age was 40.81 years ($SD = 10.11$). Most participants (85%) were living together with a partner, and of them, 67% had children living at home. Eight (2%) participants were single parents with children living at home, and 48 (12%) participants reported to be single without children. The resulting four participants (1%) reported that their marital status did not fit in the categories mentioned. All participants were full-time employed. The sample was heterogeneous consisting of various professions, such as lawyers, (middle) managers, sales representatives, planner, IT professionals, and executive staff members. Our sample was highly educated; most participants (72%) had a college or master degree. All participants had full access to their work email account on their devices.

Trait measures

Supervisor expectations regarding smartphone use and staying connected to work during after-work hours were measured with a self-constructed scale including four items. Ajzen (2002) stated that social norm measures should at least include an important other, an expectation or a value pointing at approval or disapproval. Based on these guidelines, we constructed the items for both the supervisor and the colleagues as important referent others. As we did not anticipate the supervisor expectations to fluctuate on a daily basis, we included it as a trait measure in our questionnaire. Example items are the following: ‘My supervisor expects me to respond to work-related messages during my free time after work’, ‘When I don’t answer my email during my free time, my supervisor clearly shows that he/she does not appreciate it’, and ‘I feel that I have to respond to messages from my supervisor immediately during leisure time’. All items were rated on a 5-point Likert scale, 1 = totally disagree to 5 = totally agree. Cronbach’s α of the scale was .87.

Norms of colleagues regarding smartphone use and staying connected to work during after-work hours were measured with a self-constructed scale including six items. As we did not expect the norms set by colleagues to fluctuate on a daily basis, we included it as a trait measure in our questionnaire. We included both the normative pressure and the behavioural aspects of norms in our scale. Example behavioural items are the following: ‘I often receive emails from my colleagues during the weekend’ and ‘When I send an email to colleagues during the weekend, most colleagues react the same day’, and an example of normative pressure item is ‘If I do not respond to emails from my colleagues, my position in the group is threatened’. All items were rated on a 5-point Likert scale, 1 = totally disagree to 5 = totally agree. Cronbach’s α of the scale was .78.

Workload was measured as a control variable because high workload is potentially related to WHI and may act as a confounding variable. It was measured with the 3-item scale developed by Bakker, Demerouti, Taris, Schaufeli, and Schreurs (2003). An example item is ‘I have to work extra hard to finish things’ (1 = never, 5 = very often). Cronbach’s α was .64.

State measures

Daily smartphone use after work hours was measured with the four-item smartphone use scale developed by Derks and Bakker (2014) adjusted for daily measures. All items were

rated on a 5-point Likert scale ranging from 1 = totally disagree to 5 = totally agree. Example items are 'Today, I used my smartphone intensively' and 'When my smartphone blinked to indicate new messages, I could not resist to check them today'. Participants were instructed to answer the questions just before going to sleep as an evaluation of their evening. Cronbach's α of the scale varied from .71 to .84, with an average of .77 over the 4 days.

Daily WHI was measured using the 8-item subscale of the SWING (Survey Work-home Interaction Nijmegen; Geurts *et al.*, 2005). Van Hooff *et al.* (2006) adjusted the items to day-level measurement. Example items are 'Today, I had difficulties to fulfill my domestic obligations because I am constantly thinking about my work' (strain based) and 'Today, my work schedule made it difficult for me to fulfill my 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 varied from .90 to .92, with an average of .91 over the 4 days.

Daily work engagement was measured with the state version (Breevaart, Bakker, Demerouti, & Hetland, 2012) of the 9-item Utrecht Work Engagement Scale (UWES; Schaufeli, Bakker, & Salanova, 2006). Example items are as follows: 'Today I felt strong and vigorous at my job' (vigour), 'Today, I was enthusiastic about my job' (dedication), and 'Today, I was immersed in my work' (absorption). All items were rated on a 7-point Likert scale, 1 = never to 7 = always. Cronbach's α of the scale varied from .93 to .97, with an average of .95 over the 4 days.

Strategy of 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 (daily variables) at the first level (N = between 367 and 400 study occasions) and the individual participants at the second level (N = 100 participants). We used multilevel analysis with the MLwiN program (Rashbash, Browne, Healy, Cameron, & Charlton, 2000) to analyse our data. Predictor variables at the day level (level 1, daily smartphone use, daily WHI, and daily work engagement) were centred to the individual mean, and the person-level (level 2) predictors (expectations supervisor and norms colleagues) were centred to the grand mean. As the control variable workload was a significant predictor of the outcome variable (WHI), it was included in all further analyses. For easier comparison, the variables included in the moderation hypotheses were standardized (z -scores) before the calculations. The hypothesized moderations were tested in separate models. The rationale behind this is both theoretical and statistical. First, theoretically norms and work engagement are different concepts. Whereas engagement refers to an affective state, norms refer to the social context. This would plead for one analysis with both norm indicators included. However, as the correlation between norms of colleagues and supervisor expectations was relatively high, multicollinearity was at risk. Additionally, when too many predictors are included in one model, statistical power is reduced, undermining all relations. Therefore, in the end, we decided to test the moderation hypotheses in three separate interaction models.

Results

Descriptive statistics

Table 1 presents the means, standard deviations, and correlations between the study variables. The average smartphone use in our sample was 2.71 (SD = 0.95), and the variable was normally distributed.

Table 1. Means, standard deviations, and correlations for all study variables

	Mean	Std.	1.	2.	3.	4.	5.	6.	7.
1. Gender (1 = male, 2 = female)	1.24	0.43							
2. Age	40.81	10.11	.38**						
3. Workload	3.50	0.56	.17**	.11*					
4. Smartphone use	2.71	0.95	.07	.13*	.16**				
5. Work-home interference	1.94	0.73	.12*	.17**	.32**		.35**		
6. Work engagement	4.61	1.16	-.04	-.11*	-.05	-.01	-.31**		
7. Expectations supervisor	2.60	0.89	.11*	-.03	.26**	.29**	.29**	-.11*	
8. Norms colleagues	2.96	0.69	.17**	.05	.29**	.40**	.40**	-.23**	.55**

Note. * $p < .05$; ** $p < .01$; $n = 100$.

To examine the proportion of variance that is attributed to the different levels of analysis, we calculated the intraclass correlation (*ICCI*) for each day-level variable. Results showed that 33% of the variance in daily smartphone use, 44% of the variance in daily WHI, and 26% of the variance in daily work engagement could be attributed to within-person variations, thus justifying our multilevel approach.

Hypotheses testing

According to Hypothesis 1, there is a positive relationship between daily smartphone use in the evening and daily WHI. The multilevel model that contained daily smartphone use as the predictor of daily WHI and workload as a control variable was compared to the null model that included only the intercept. The model (see Table 2) containing smartphone use and workload as predictors was a better fit to the data than the null model ($\Delta -2 \times \log = 44.29$, $df = 2$, $p < .001$). The estimate of smartphone use ($\gamma = .291$, $SE = 0.053$, $t = 5.49$, $p < .001$) was positive and significant, supporting Hypothesis 1. On the evenings participants used their smartphone intensively, they experienced the highest levels of WHI.

According to Hypothesis 2, daily smartphone use is more strongly positively related to daily WHI for employees who experience normative pressure from their supervisor to respond to work-related messages in the evening. Table 3 shows the significant multilevel interaction between expectations of the supervisor and daily smartphone use in relation to experienced daily WHI. After controlling for workload, expectations of the supervisor significantly moderated the relationship between daily intensive smartphone use and daily WHI ($\gamma = .102$, $SE = 0.050$, $t = 2.04$, $p < .05$). Furthermore, the interaction model showed a significant improvement in fit over the predictor model ($\Delta -2 \times \log = 4.17$, $df = 1$, $p < .05$).

Figure 2 shows the interaction plot, indicating that the positive relation between daily smartphone use and daily WHI is stronger for employees who have to deal with high expectations of their supervisor, confirming Hypothesis 2. Simple slope analyses (Preacher, Curran, & Bauer, 2006) showed that when faced with an increase in smartphone use, employees who are expected to respond to work-related messages during after-work hours experience significantly more WHI ($t = 4.26$, $p < .001$) than employees without such expectations ($t = 2.13$, $p < .05$).

Table 2. Multilevel results of the link between daily smartphone use and daily WHI

	WHI			
	Null model		Predictor model	
	Estimate	SE	Estimate	SE
Intercept	0.013	0.082	0.007	0.072
Workload			0.272***	0.072
Smartphone use			0.291***	0.053
Variance level 2 (employee)	0.556 (44%)	0.096	0.391	0.072
Variance level 1 (day)	0.436 (56%)	0.038	0.412	0.036
-2 Log-likelihood	909.240		864.950	

Note. WHI, work-home interference.

Data points = 367 of 400 cases in use (respondents $n = 100$, days $n = 4$).

* $p < .05$; ** $p < .01$; *** $p < .001$.

Table 3. Multilevel results of the interaction between expectations of the supervisor and daily smartphone use on experienced daily WHI

	WHI			
	Predictor model		Interaction model	
	Estimate	SE	Estimate	SE
Intercept	0.006	0.070	-0.022	0.071
Workload	0.236***	0.072	0.230***	0.072
Expectations	0.154*	0.074	0.128*	0.075
Smartphone use	0.270***	0.054	0.272***	0.053
Expectations \times Smartphone use			0.102*	0.050
Variance level 2 (employee)	0.371 (47%)	0.070	0.375	0.070
Variance level 1 (day)	0.412 (53%)	0.036	0.405	0.035
-2 Log-likelihood	860.710		856.545	

Note. WHI, work-home interference.

Data points = 367 of 400 cases in use (respondents $n = 100$, days $n = 4$).

* $p < .05$; *** $p < .001$.

Hypothesis 3 stated that the norms set by colleagues regarding responding to work-related messages during after-work hours moderate the positive relation between daily smartphone use and daily WHI. We predicted that for employees with strong norms to stay connected, daily intensive smartphone use would be more strongly positively related to daily WHI in comparison with employees without such norms. Table 4 shows the multilevel interaction coefficient between norms of colleagues and daily smartphone use in relation to experienced daily WHI. Norms of colleagues did not significantly moderate the relationship between daily intensive smartphone use and daily WHI ($\gamma = .072$, $SE = 0.044$, $t = 1.65$, $p = .10$). The interaction model showed no significant improvement in fit over the predictor model ($\Delta -2 \times \log = 2.70$, $df = 1$, $p < .10$). This implies that Hypothesis 3 has to be rejected. As the interaction effect was marginally significant, it is still interesting to take a closer look at the interaction pattern to find out

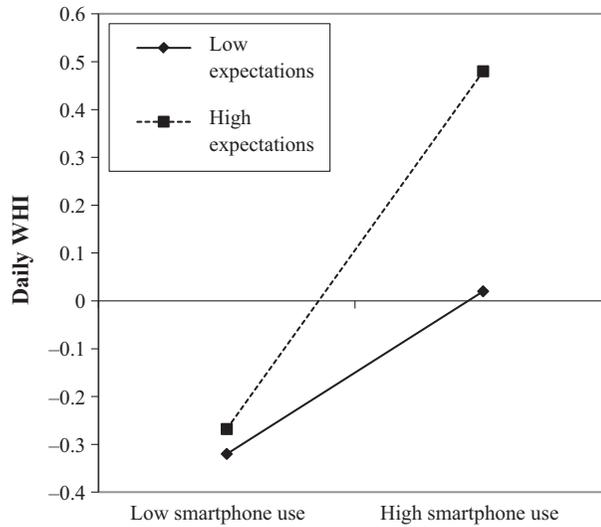


Figure 2. Moderation effect of expectations of the supervisor on the relationship between daily smartphone use and daily work-home interference (WHI).

whether the trend in the data is in the expected direction. To examine the interaction patterns in more detail, we again conducted simple slope analysis (cf. Preacher *et al.*, 2006). As expected, the relation between smartphone use and WHI was more positive for employees who perceive strong norms to stay connected by their colleagues ($t = 3.76$, $p < .001$) in comparison with employees who experience a less strong norm by their colleagues ($t = 2.52$, $p < .01$). In other words, the results indicate that those employees who experience normative pressure of colleagues to stay connected experience more WHI on days that they are confronted with an increase in smartphone use.

Table 4. Multilevel results of the interaction between norms of colleagues and daily smartphone use on experienced daily WHI

	WHI			
	Predictor model		Interaction model	
	Estimate	SE	Estimate	SE
Intercept	0.009	0.068	-0.019	0.070
Workload	0.209**	0.071	0.211**	0.071
Norms colleagues	0.242***	0.073	0.231**	0.074
Smartphone use	0.242***	0.054	0.251***	0.054
Norms × Smartphone use			0.072	0.044
Variance level 2 (employee)	0.340 (45%)	0.065	0.349	0.066
Variance level 1 (day)	0.412 (55%)	0.036	0.406	0.035
-2 Log-likelihood	854.634		851.939	

Note. WHI, work-home interference.

Data points = 367 of 400 cases in use (respondents $n = 100$, days $n = 4$).

** $p < .01$; *** $p < .001$.

Table 5. Multilevel results of the interaction between daily work engagement and daily smartphone use on experienced daily WHI

	WHI			
	Predictor model		Interaction model	
	Estimate	SE	Estimate	SE
Intercept	0.006	0.065	0.004	0.063
Workload	0.264***	0.065	0.273***	0.064
Work engagement (WE)	-0.234***	0.053	-0.270***	0.053
Smartphone use	0.292***	0.051	0.290***	0.050
WE × Smartphone use			-0.198***	0.045
Variance level 2 (employee)	0.308 (43%)	0.061	0.289	0.057
Variance level 1 (day)	0.413 (57%)	0.036	0.393	0.034
-2 Log-likelihood	847.451		828.565	

Note. WHI, work-home interference.

Data points = 367 of 400 cases in use (respondents $n = 100$, days $n = 4$).

*** $p < .001$.

The final hypothesis stated that daily work engagement moderates the relation between daily smartphone use and daily WHI (Hypothesis 4). We expected that engaged employees experience a less strong increase in WHI in response to intensive smartphone use than non-engaged employees. Table 5 shows the significant multilevel interaction between daily work engagement and daily smartphone use in relation to experienced daily WHI. Daily work engagement significantly moderated the relationship between daily intensive smartphone use and daily WHI ($\gamma = -.198$, $SE = 0.045$, $t = 4.40$, $p < .001$). Furthermore, the interaction model showed a significant better fit than the predictor model ($\Delta -2 \times \log = 18.89$, $df = 1$, $p < .001$).

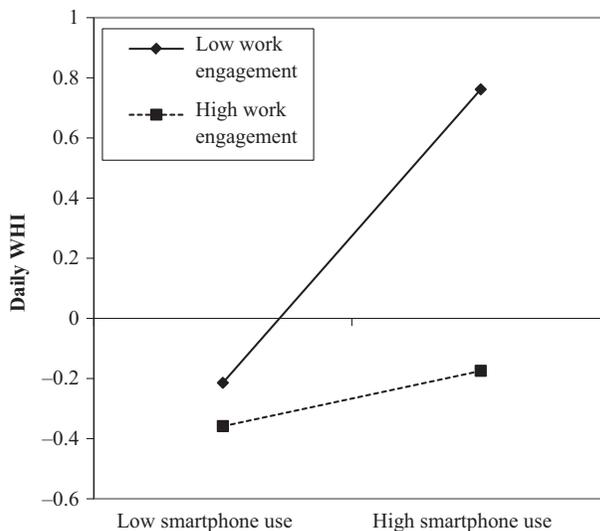


Figure 3. Moderation effect of daily work engagement on the relationship between daily smartphone use and daily work-home interference (WHI).

Figure 3 shows the interaction plot, indicating that the positive relationship between daily smartphone use and daily WHI is less strong for highly engaged employees ($t = 0.76$, $p = .50$) in comparison with lowly engaged employees ($t = 6.56$, $p < .001$). In other words, on days that employees use their smartphone intensively, low-engaged employees experience significantly more WHI than high-engaged employees. These results confirm Hypothesis 4.

Discussion

A steadily increasing group of employees use electronic tools (e.g., smartphones) to do their job away from the traditional office (Hill, Ferris, & Mårtinson, 2003). Smartphone use is frequently associated with blurred boundaries between the work and home domain (e.g., Galinsky *et al.*, 2001; Jarvenpaa & Lang, 2005; O'Mahony & Barley, 1999). Therefore, the central aim of this study was to replicate the link between smartphone use and WHI and more importantly to examine whether the social context and the employee's daily work engagement would moderate this relationship. Social context was operationalized by colleagues' norm to stay connected and by supervisor expectations regarding availability for work, both core characteristics of the 'always-on' culture.

Theoretical contributions

As expected, we replicated the finding that smartphone use was positively related to WHI (Boswell & Olson-Buchanan, 2007; Chesley, 2005; Derks & Bakker, 2014; Duxbury *et al.*, 1996). This contributes to the generalization of this relation and reduces the chance that results found in earlier studies were due to specific sample characteristics. In addition, the present findings add to earlier work, in showing that daily fluctuations in smartphone use are related to daily fluctuations in WHI. Besides the steady results in trait, habit-like smartphone use, there is also evidence of variation on the day level. This finding supports the theoretical argumentation of the boundary theory (Ashforth *et al.*, 2000; Kreiner *et al.*, 2009) that permeable boundaries between the work and non-work domain are related to higher work-family conflict also on the day level. The literature is quite clear about the potential negative consequences of high WHI. There is evidence that high levels of WHI are associated with increased stress and decreased performance (e.g., Amstad, Meier, Fasel, Elfering, & Semmer, 2011; Butts, Casper, & Yang, 2013), decreased family satisfaction (e.g., Amstad *et al.*, 2011; Michel & Hargis, 2008), deteriorated health (both somatic and psychological health), reduced life satisfaction (e.g., Amstad *et al.*, 2011), and decreased sleep quality (e.g., Lallukka, Rahkonen, Lahelma, & Arber, 2010; Nylen, Melin, & Laflamme, 2007).

An important contribution of this study is that it shows that the norms regarding availability, set by the organization (both by supervisor and by colleagues), are related to how the smartphone intrudes into the family lives, which is associated with increased levels of WHI. First, we expected that for employees who have to deal with high expectations regarding their availability during evening hours, daily smartphone use is more strongly related to daily WHI than for employees without such expectations. Our results showed that indeed for employees who perceive high availability expectations of their supervisor, smartphone use is strongly positively related to WHI than for employees without these expectations. This finding contributes to boundary theory in showing that integrators have more difficulties in creating boundaries particularly when the norms and expectations around these boundaries are not well institutionalized. Attending to two

domains at the same time leads to a blurring of the boundaries and is associated with higher WHI (Ashforth *et al.*, 2000). This is in line with work from Hill, Hawkins, and Miller (1996), which indicated that mobile teleworking had a negative impact on employees and their families, especially when they felt compelled to work in this manner. Furthermore, Kreiner (2006) already showed that supervisors who allowed employees to separate their work and private life experienced less family–work conflict. Altogether, there is increasing evidence that the expectations of supervisors regarding the use of communication technologies after regular work hours exacerbate the experience of WHI of the employee.

Second, we expected that norms set by colleagues, regarding smartphone use and staying connected during after-work hours, would moderate the positive relation between smartphone use and experienced WHI. Boundary theory would predict that social norms to always be accessible by communications use outside the workplace would produce fluid boundaries between work and home (e.g., Ventura, 1995). This in turn would be related to an increase in WHI. Although the observed interaction pattern points in the expected direction and is similar to that of the perceived expectation of their supervisor, it was not significant. Though not evident in the present study, previous research suggests that colleague norms can be important moderators of the relation between smartphone use and WHI. For example, there are indications that employees who are part of an organization characterized by an always-on culture experienced higher levels of WHI in response to an increase in smartphone use. This indicates that employees indeed might adopt behaviours of others in their social group (Bandura, 1977), namely close colleagues.

Furthermore, Voorpostel *et al.* (2010) proposed that colleagues sharing the same profession plausibly mimic each other's behaviours. An alternative explanation for the non-significant effect of norms set by colleagues might be that we included expectations of the supervisor as well in our questionnaire. It is conceivable that answering both questions on the impact of the supervisor, an important authority and role model, and on the impact of colleagues on the same hierarchical level made employees aware of power differences. Therefore, the influence of the supervisor in setting the social norm within an organization might be more powerful than that of colleagues. Future research with a larger sample is necessary to settle this issue and to find out whether norms set by colleagues is a significant moderator of the relation between smartphone use and WHI.

Finally, we hypothesized that daily smartphone use would be less strongly related to daily WHI for employees who were engaged on that day. Our data indeed confirm this pattern. In particular, the experienced WHI of non-engaged employees increases dramatically when they start to use their smartphone more intensively during evening hours. This is evidence for our assumption that for engaged employees smartphone use might not be experienced as work negatively interfering with their family life. This is in line with Bakker's (2014) reasoning that engaged workers have found a way to detach from work when being at home. Furthermore, Sonnentag *et al.* (2008) showed in a week-level study that engagement at work and disengagement after work were most beneficial for the affective states of employees.

This study adds to these results by extending this finding to smartphone users. Apparently, engaged workers can prevent work from interfering too much with their home domain, even when they use their smartphone during evening hours. Furthermore, there is evidence that work engagement is related to higher task completion during the workday (Halbesleben & Wheeler, 2008; Salanova *et al.*, 2005), which might in turn decrease the likelihood that work-related issues spill over to the private domain. However, the exact process behind this effect is still open to discussion and has to be examined more

thoroughly in future studies. In conclusion, there are indications that engaged workers have found a way to prevent intensive smartphone use to let work negatively interfere with their home domain.

Overall, our findings contribute to prior survey research indicating that employees' use of communication technology is strongly influenced by organizational culture (Fulk, Schmitz, & Schwarz, 1992; Markus, 1994; Orlikowski, 1992, 2000). Additionally, to our knowledge, this is the first empirical study that addresses this issue using a diary design including cross-level interactions between expectations and norms (both trait measures) and daily smartphone use (a state variable). A fundamental benefit of a diary study is that the amount of time elapsed between an experience and the account of the experience is minimized (Bolger, Davis, & Rafaeli, 2003), resulting in more accurate observations. Additionally, the explained variance on the day level (ICC1) was high in our sample, which adds to our argument that daily measurements are justified and supports our assumption that these variables fluctuate from day to day. As both norms and expectations are more stable in time, these variables were treated as trait measures and therefore they were measured once, in the background questionnaire. Finally, both the interactions regarding norms and expectations were cross-level interactions, excluding the possibility of common-method variance.

Limitations and future research

Like most studies, this study also has several limitations that need to be considered. First, it should be noted that the reported findings were all synchronous effects. We conducted multilevel analyses using diary data, but the temporal order of the variables could not be established within our design. All our data were collected at the same time: At the end of the day. Therefore, it is important that future studies establish the temporal order of the model variables by assessing the variables at different points in time during the day. One issue that could be a useful contribution to the field is to examine the effects of smartphone use by using a longitudinal quasi-experimental design with zero-history groups on smartphone use for business purposes. For example, trainees that start their careers might be a useful population to examine in such a field experiment. Then, it is possible to examine what the consequences of smartphone use are in terms of experienced WHI, performance, and well-being on the long run, in comparison with a control group.

Second, three issues should be considered in interpreting our results. First, we could not include overall time dedicated to work at home, besides smartphone use, in our model. It is possible that employees engaged in work-related activities other than smartphone use, for example, preparing a presentation for the next day or reading work-related literature. Furthermore, we had no insight into all activities that participants conducted on their smartphones during evening hours. Our scale measured whether employees had a tendency to check their smartphone after work. As a consequence, we cannot be entirely sure that our respondents who used their smartphone used this solely for work-related purposes. However, as they used a business smartphone with an employer taking care of all expenses, we assumed that they used it mainly for work issues. Still, it is possible that employees used them for private purposes as well. However, as we found a positive relation between smartphone use and WHI, it is unlikely that employees used their smartphone solely for private purposes. Future studies should consider including these two variables. Finally, due to relatively small sample size, we have to be careful in generalizing the results.

Third, our data rely on self-report measures, raising concerns on common-method variance (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Note, however, that we conducted multilevel regression analyses and investigated intraindividual fluctuations. This reduced the problems associated with common-method variance because we eliminated the potential influence of response tendencies stemming from individual differences.

Finally, in this study we did not include the boundary management preference of the employee. Former studies have shown that people differ in how they create and maintain boundaries between their work and home domains (e.g., Ashforth *et al.*, 2000; Rothbard *et al.*, 2005). Besides being part of an 'always-on' culture, the boundary management strategy of the employee might be the other side of the medal. In future studies, it would be very interesting to explore whether the (mis)fit between the preferences of the employees on the one hand and the norms of colleagues and/or expectations of the supervisor on the other hand is critical for the impact of smartphone use on WHI. Additionally, we only considered the relation between smartphone use and negative spillover from work to home domain in this study. It is important to note that it is plausible that there is positive spillover as well. For example, when you receive a notification in the evening that a business deal is closed, positive affect may also spill over to the home domain. It would be interesting to include both positive and negative spillovers from work to life in future studies.

Implications for practice

Next to the contribution to theory development on smartphone use and WHI on a daily basis, our findings also have important practical implications. We found strong evidence that perceived expectations of the supervisor and norms of colleagues regarding smartphone use during evening hours are related to the perceived WHI of colleagues. For employees working in a so-called always-on culture, smartphone use was strongly associated with the negative interference from work into the home domain. This finding is in line with the general opinion expressed in the popular press that smartphone use and mobile email tie employees to their jobs, even during after-work hours that once were solely dedicated to the family life (e.g., Robinson, 2006; Zambrowicz, 1998). Therefore, supervisors should be careful in creating expectations regarding availability when they decide to provide smartphones to their employees. One way to deal with this is to be transparent about what is expected and to make employees aware of the potential pitfalls of smartphone use regarding a disturbed work-home balance. Furthermore, supervisors should realize that actual behaviour has more impact than a policy. In particular, supervisors, who serve as important role models, should be aware that the emails they send during after-work hours also have recipients. These recipients might think that it is normal to respond to work-related messages during leisure time, which may end up in a collective norm to be connected everywhere, all the time.

However, there is also positive news. Namely, we have indications that engaged employees can benefit from the advantages of smartphone use without the negative experience of interference from work into their private life. Possibly, engaged employees are better capable of managing the boundaries between the work and home domain. Organizations should aim to foster work engagement among their employees. The increased flexibility and mobility facilitated by smartphones might contribute to higher levels of control over when and where to work. In addition, the smartphone enables employees to monitor their work because it gives access to real-time information (Rood, 2005; Taylor, 2003), which results in a feeling of control over work. As we already noticed,

smartphone use is still increasing. Therefore, it is important to find ways to optimize smartphone use without losing consideration for a healthy work–home balance.

To conclude, supervisors and colleagues should not create expectations and norms towards each other to be available after regular working hours as this does not contribute to satisfied employees. On the contrary, focusing on the individual's flexibility to do his/her work any place any time is more likely to result in engaged employees who freely choose to work after regular working hours. In the end, both supervisors and employees profit from enthusiastic, healthy, and mobile employees.

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