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# Work-related smartphone use, work–family conflict and family role performance: The role of segmentation preference

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## Abstract

Is work-related smartphone use during off-job time associated with lower conflict owing to the blurring of the boundaries between work and family life? Or does it help employees juggling work and family demands? The present four-day quantitative diary study ( $N = 71$  employees,  $N = 265$ – $280$  data points) aims to shed light on the relationship between daily work-related smartphone use during off-job time, and daily work–family conflict and daily family role performance, respectively. Moreover, individuals' general segmentation preference is investigated as a potential cross-level moderator in the relationships between daily work-related smartphone use during off-job time and both work–family conflict and family role performance. Overall, the results of multilevel modelling support our mediated moderation model indicating that

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for integrators more frequent work-related smartphone use during off-job time is associated with better family role performance through reduced work–family conflict. For segmenters, smartphone use does not have any impact on work–family conflict and family role performance. These findings suggest that for integrators smartphone use during off-job time may be useful to simultaneously meet both work demands and family demands, which has the potential to reduce work–family conflict and enhance family role performance; whereas for segmenters no effects were found.

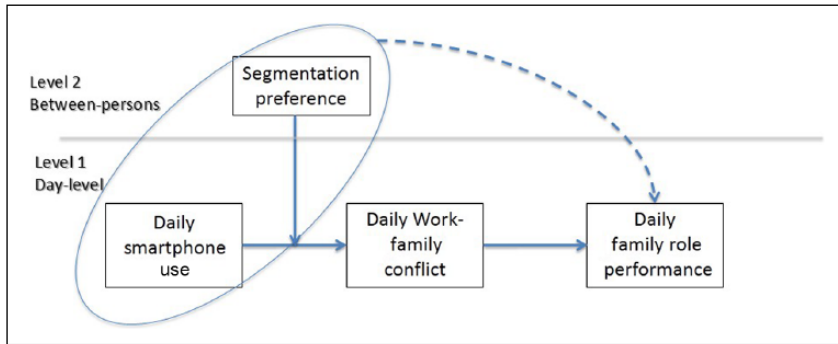
### **Keywords**

boundary management, diary study, family role performance, smartphone use, work–family conflict

New communication technologies, including smartphones, are reputed to blur the boundaries between work and family domains (e.g. Golden and Geisler, 2007; Schieman and Young, 2013; Wajcman, 2008). Additionally, smartphones allow users to extend their working hours (Towers et al., 2006). Consequently, employees can deliberately choose where and when they want to work: at the traditional office, at home or practically anywhere else, anytime.

A smartphone is a mobile phone with extended features to manage your calendar, browse the Internet, play games and have access to social media and (work-related) email. Both the advantages and disadvantages smartphone use has on work–life balance have been discussed (e.g. Valcour and Hunter, 2005). One major advantage is the flexibility that comes from using a smartphone: it can help employees to fulfill their responsibilities from both work and family simultaneously (Allen and Shockley, 2009). On a related note, the increased boundary control offered by smartphones can have a positive impact on work–family conflict (WFC) (e.g. Chesley, 2005; Golden and Geisler, 2007). However, work-related smartphone behaviors, such as keeping smartphones turned on during off-job time to check for work-related mails, glancing at them repeatedly to see whether colleagues have sent a text message, carrying smartphones around all the time to check for responses or emergency calls, and responding to work-related emails in the evening, is rather consistently associated with an imbalance between work and family life (Derks et al., 2014b, 2015; Middleton and Cukier, 2006; Orlikowski, 2007). Towers et al. (2006) describe the ability to work late at home that is facilitated by mobile technology as a double-edged sword. On the one hand, it provides flexibility and permeability, which can be useful to accommodate work and family demands. On the other hand, increased availability for work can increase workload and encroach upon family time (Peters et al., 2009).

Altogether, a main conclusion of two decades of research in the area of work–life conflict is that most employees experience problems balancing work and family demands; however, not everyone experiences work and family conflict to the same extent (Higgins and Duxbury, 2005). In a recent qualitative study, Duxbury and colleagues (2014) show that the adoption of mobile technology changes the work–family boundaries for some



**Figure 1.** Research model.

workers, but not for others. Therefore, the central aim of the present study is to get more insight into the effects on both work and family of work-related smartphone use outside of traditional working hours.

For this reason, we have conducted a diary study with a focus on work-related smartphone use during off-job hours (i.e. normally considered non-working time), rather than focusing on personal smartphone use during office hours. Although much research has focused on the effect of WFC on work-related outcomes, such as job performance, job satisfaction and employee attitudes (see for systematic reviews on this topic: Amstad et al., 2011; Butts et al., 2013; Gilboa et al., 2008; Hoobler et al., 2010), the implications for the family domain have received less research attention. As far as we know, the impact of work-related smartphone use on family role performance (FRP) during the evening hours has never before been studied. Therefore, our focus is on the effects of work-related smartphone use during off-job time on both WFC and FRP. Overall, this study proposes a mediated moderation model (see Figure 1), suggesting that WFC is a mediator in the moderated relationship (by boundary management strategy) between smartphone use and FRP.

## Theoretical background

### *Smartphone use, work–family conflict and boundary management preferences*

Regarding the interactions between the work and family domains, the literature contains two related perspectives. One perspective focuses mainly on the negative interdependencies between the work and family domains by arguing that individuals might experience conflict between the domains (Greenhaus and Beutell, 1985). This WFC is the result of time scarcity, high levels of stress and competing expectations (see for a review, Eby et al., 2005). In our study, we adopt the definition created by Greenhaus and Beutell stating that WFC refers to the degree to which role responsibilities from the work and family domains are incompatible, that is, ‘participation in the work role is made more difficult by virtue of participation in the family role’ (Greenhaus and Beutell, 1985: 77). The other

perspective focuses on the boundaries between the work and family domains, suggesting that boundaries can be impermeable and inflexible, leading to segmentation, or permeable and blurred, resulting in integration (Ashforth et al., 2000; Clark, 2000). This boundary theory (Ashforth et al., 2000; Clark, 2000; Kreiner et al., 2009) states that when boundaries are more permeable, there are more interruptions across domains, which then increases the likelihood that work-related issues will spill over to the private domain.

Boundary theory argues that individuals differ in how much permeability in boundaries they prefer; and, more importantly, it argues that how spillover is experienced depends on the individual preference for segmentation or integration of the work and family domains. In other words, some employees prefer their work and family domains to be as segmented as possible, whereas others prefer their work and family domains to be more integrated (Kossek and Lambert, 2005; Nippert-Eng, 1996; Rothbard et al., 2005). This is particularly relevant for workers in modern society because the family domain is easily encroached upon by work-related demands (Milliken and Dunn-Jensen, 2005; Peters et al., 2009).

Theoretically, the boundary management preference to either integrate or separate work and private roles is considered as a value on which individuals systematically differ (Kreiner et al., 2009) and which is rather stable over time (Rothbard et al., 2005). In contrast, the enactment of this preference, which results in strategies to integrate or segment these roles, can be more short-lived (Ashforth et al., 2000). In an ideal situation, the enacted boundary management strategy is in line with the preferred strategy (Rothbard et al., 2005). However, individuals might enact particular boundary management strategies in response to organizational constraints or perceived expectations from the work or family domain (Nippert-Eng, 1996). In this study, we considered segmentation preference as a between-person variable, and work-related smartphone use after work as potential boundary crossing behavior on the day level.

Work-related smartphone use during off-job time might produce cross-role interruptions as it allows work-related matters to be introduced in the family domain. The use of smartphones blurs the boundaries between work and family, enabling employees to be available for work during the evenings, weekends and holidays (e.g. Valcour and Hunter, 2005). However, we argue that not all employees may be affected in the same way (Derks et al., 2015). Specifically, employees who aim to separate work and family as much as possible (also referred to as 'segmenters') might experience more conflict on days that work-related smartphone use intrudes on their non-work lives than employees who prefer to integrate work and non-work domains (also referred to as 'integrators'). The desired levels of interruptions from the work domain during off-job time should match individual segmentation or integration preferences in order to prevent employees from experiencing WFC (Chen et al., 2009).

Altogether, we expect work-related smartphone use during the evenings to have a differential impact on individuals, depending on their boundary management preferences. For individuals low on segmentation (further referred to as integrators), work-related smartphone use during the evenings might not result in the subjective experience of WFC, since they appreciate interactions across the domains. They may, for example, monitor incoming emails via their smartphones while watching television. Additionally,

smartphones can contribute to flexibility in work schedules, which might help integrators to accommodate their responsibilities and demands from both the work and family domains simultaneously (Allen and Shockley, 2009; Towers et al., 2006). In other words, the smartphone can facilitate an integrator's way of living by providing the flexibility and permeability to fulfill the demands of both domains, which is associated with less WFC.

In contrast, for individuals high on segmentation (further referred to as segmenters), work-related smartphone use can be expected to cause cross-role interruptions, causing them to execute work-related tasks in a place that they aim to dedicate solely to family activities. For them, increased work-related smartphone use might contribute to WFC, as the smartphone makes work conspicuous in the living room, where they would prefer to dedicate all their attention to their private life. As Kreiner and colleagues (2009) argue, boundary violations, such as work intruding into family life when employees prefer to segment the work and family domains as much as possible, can especially lead to increased WFC. Therefore, we hypothesize:

*Hypothesis 1:* Daily work-related smartphone use in the evenings is positively related to daily work–family conflict for segmenters (a) and negatively related to daily work–family conflict for integrators (b).

## Smartphone use, family role performance and boundary management preferences

The concept of job performance has been well developed (see for meta-analyses, Barrick and Mount, 1991; Iaffaldano and Muchinsky, 1985; Riketta, 2002). Chen and colleagues acknowledge, after an extensive review of the literature, that up until now there has been no consensus on the concept of FRP (Chen et al., 2014). Therefore, they present a constitutive definition for FRP, namely: 'the fulfillment of obligations and expectations stemming from the roles associated with participation in the family domain' (Chen et al., 2014: 193). Comparable to job performance, FRP has two sub-dimensions; one focused on relationship-related performance (facilitating the psycho-social context), and the other on task accomplishment (getting things done in family life).

Employees may differ in the extent to which they allow work-related smartphone use during off-job hours to affect their family (Ilies et al., 2009). When work is made conspicuous in the family domain by work-related email messages or phone calls it becomes difficult to set aside work to meet family demands (Desrochers et al., 2005). Smartphones are associated with more permeable boundaries between the work and family domain (Derks et al., 2014a, 2015), which directly influence family life. For most workers, the evening hours used to be mainly dedicated to family life, though nowadays evenings are increasingly being claimed by work demands intruding into the family domain owing to smartphone use, resulting in higher WFC (Boswell and Olson-Buchanan, 2007; Derks et al., 2014a, 2015; Middleton and Cukier, 2006; Orlikowski, 2007). However, just like work-related smartphone use can have a differential impact on employees' WFC, depending on their boundary management preferences, the impact of supplemental work-related smartphone use might have a differential impact on meeting family demands.

Individuals may differ in what routines and habits are most productive for them in different types of situations. More specifically, different individuals will most likely require different levels of segmentation to help them to perform at their preferred pace in order to keep up their FRP (Chen et al., 2009). Employees with a segmentation preference aim to be engaged in a particular role at a particular time slot and they rather devote larger time slots to this role. In this case, in order to perform well, work–family role boundaries have to be separated and the associated time use segmented. Jett and George (2003) acknowledge that employees perform best in the family domain when the number of work-related interruptions matches their preferences. Additionally, Schieman and Young (2013) argue that extending work time owing to work-related smartphone use is especially problematic when it is unexpected or unrelated to the context people are in. Receiving work-related text messages requires a quick switch from the family role to the work role and vice versa and can challenge the individual's non-work performance in the family domain (Ashforth et al., 2000; Olson-Buchanan and Boswell, 2006). The acceptable number of interruptions (Kossek et al., 2012) could plausibly be associated with the individual boundary management preference.

We can also argue that incoming work-related messages affect the employee's FRP, especially when a particular employee prefers work and family domains to be segmented rather than integrated (Shalley, 1991; Zhou, 1998). Integrators might actually perform better in their family role when they stay connected to work by their smartphone for several reasons. Practically speaking, integrators are probably those employees who used to work late at the office doing overtime before they owned a smartphone. The smartphone gives them the opportunity to stay connected to work during off-job hours and simultaneously be involved in family activities. Additionally, disconnecting from work during off-job time reduces the amount of control they have over their work. Especially for integrators, this may lead to stress and rumination that would negatively impact their family performance. Finally, integrators might be simultaneously communicating with family and colleagues/clients on their smartphone. This assumption implies that on the days that they do *not* use their smartphone, they are not communicating with their family either, possibly negatively influencing their FRP.

To summarize, we expect work-related smartphone use in the evening to be associated with lower FRP for segmenters, and higher FRP for integrators:

*Hypothesis 2:* Daily work-related smartphone use in the evenings is negatively related to daily family role performance for segmenters (a) and positively related to daily family role performance for integrators (b).

## Mediated moderation

By integrating the literature from the first two hypotheses (see also Figure 1), we form a final hypothesis, in which we aim to test whether WFC mediates the moderated relationship (segmentation preference as moderator) between smartphone use and FRP. Based on the account given in the previous sections, the smartphone could increase work-related behaviors during non-working hours (e.g. answering work-related emails in the evenings in the family domain while children or other family

members are around). Since the family role requires other qualities than the work role (Chen et al., 2014), the constant switching between work and non-work roles initiated by smartphone messages received during off-job time in the family domain may increase WFC. Integrating boundary theory (Ashforth et al., 2000; Clark, 2000; Kreiner et al., 2009) with the sources of conflict described by Greenhaus and Beutell (1985), we argue that this might also apply when the boundaries between the work and family domain are blurred. That is, work-related smartphone use during off-job time is associated with role permeability, which increases the likelihood of time- and strain-based role conflict.

Additionally, we argue that WFC affects an employee's FRP. In line with Frone et al. (1992), we argue that work that interferes with family life (i.e. WFC) mainly has consequences for the *family* domain. Although the conflict originates in one domain (in this case the work domain), through the process of spillover, it causes problems in the other domain (here, the family domain). For example, when work-related issues enter the family domain (e.g. work-related job demands or job strain), this automatically implies that the attention that must be given to these issues comes at the expense of the attention that is left for the family. Therefore, employees that experience WFC cannot spend as much time (and undivided attention) with their children and spouse as they might have liked. As a consequence, their FRP and quality of family life are generally lower. This reasoning is illustrated in part by the study Stevens et al. (2006) conducted among dual-earner couples. They showed that the perceptions of a workers' romantic partner regarding work-family spillover was associated with lower levels of family cohesion. In line with this, Bakker et al. (2008) examined the consequences of WFC for the family domain in a cross-over model tested in a sample of 168 pairs of dual-earner parents. In short, they showed that employees who experience more job demands (work overload and emotional demands) acted in a more unpleasant way toward their partners. This process could largely be explained by WFC. More specifically, Bakker and colleagues showed that job demands translate into WFC, that is, those with high job demands are unable to relax and recover from their work and are unable to fulfill their family responsibilities.

Several systematic meta-analyses (e.g. Amstad et al., 2011; Mesmer-Magnus and Viswesvaran, 2005, Michel and Hargis, 2008) show empirical support for this spillover process. These empirical studies consistently show that WFC is negatively related to satisfaction and performance outcomes in the family domain.

Considering the whole mediated moderation sequence of our research model (see Figure 1), we expect daily work-related smartphone use in the evenings to be positively related to daily FRP for integrators, through reduced daily WFC. In contrast, we expect daily work-related smartphone use in the evenings to be negatively related to daily FRP for segmenters, through increased daily WFC:

*Hypothesis 3:* The relationship between work-related smartphone use in the evenings and FRP, which is moderated by segmentation preference, is (partially) mediated by WFC: For segmenters, work-related smartphone use in the evenings is associated with lower FRP, mediated through higher WFC (a); for integrators, work-related smartphone use in the evening is related to higher FRP, mediated through lower WFC (b).

## Method

### *Procedure and participants*

We approached potential participants by posting announcements on Facebook and LinkedIn with the request to participate in a four-day diary study on 'working conditions'. We asked interested participants to send an email to one of the researchers. Additionally, the researchers directly approached their own contacts by a personal invitation email including the same information. Both actions together resulted in a heterogeneous convenience sample of employees. Employees had to be in possession of a smartphone for work-related purposes and they had to work for at least four successive days during the week that data was collected in order to be included. Respondents who did not meet these criteria were excluded from the study.

In an email, we explained the data collection process and assured the participants of the confidentiality of their responses. All employees participated voluntarily and were free to decide whether to continue their participation during the research week. We encouraged participation by allowing the participants to participate in a draw for a tablet give-away.

The data were collected through online questionnaires. On the first day, respondents filled out a background questionnaire to inquire about factors that could be regarded as stable, including demographics, their boundary management preferences and additional control variables. Then, participants received an email for four successive workdays within one working week. This email was sent at the end of the afternoon on each study day (approximately 18:00) and contained both instructions and the link to the daily questionnaire. In the introduction section, the researchers explicitly stated that they were interested in their work-related smartphone use *during off-job time*. We instructed them to fill out the daily questionnaire for that specific evening just before going to bed. Data collection took place in the Netherlands, using validated Dutch questionnaires.

In total, 71 employees participated, which led to a total of 265–280 data points at the *within-person level*. Only 7 percent of all possible responses were missing. Participants were 56 percent ( $n = 40$ ) male and 44 percent ( $n = 31$ ) female. The mean age was 37.8 years (standard deviation = 13.09). Most participants (63%) were living together with a partner and of them 37 percent had children living at home. Participants worked 37.5 hours a week on average. The participants' professional background was diverse, comprising health-care professionals (17.1%), construction workers (21.4%), consultants (15.7%), government professionals (10.0%), teachers (2.9%) and other (39.2). The majority (60%) had a bachelor's or master's degree. All participants had full access to their work email account on their devices, also in the evenings.

### *Trait measures*

*Segmentation preference* was measured with the subscale segmentation preferences developed by Kreiner (2006). According to Kreiner, segmentation preference is part of a larger person-environment fit approach (Kristof, 1996). The preference itself is considered rather stable over time, and is not expected to fluctuate within the limited time frame of one week. Example items are (Kreiner, 2006): 'I prefer to keep work life at work' and 'I don't like to have to think about work while I'm at home'. All items were



rated on a five-point Likert scale: 1 = totally disagree to 5 = totally agree. Cronbach's  $\alpha$  of the scale was .85.

*Workload* was measured as a control variable because high workload is potentially related to WFC and may act as a confounding variable. It was measured with the three-item scale developed by Bakker et al. (2003). An example item is: 'I have to work extra hard to finish things': 1 = never to 5 = very often. Cronbach's  $\alpha$  was .73.

*Demographics* included in the research were gender, age, educational level, marital status and number of children living at home.

## State measures

*Daily work-related smartphone use during off-job time* was measured with the four-item smartphone use scale developed by Derks and Bakker (2014a), and adjusted for daily measurement. Besides a reference to time (today), we explicitly included a reference to work-related activities in our measure. All items were rated on a five-point Likert scale ranging from 1 = totally disagree to 5 = totally agree. Items are: 'Today, I used my smartphone intensively during after work hours for work-related purposes', 'Today, I felt obliged to respond to work-related messages during the evening hours', 'Today, I checked my work-related email until I went to sleep' and 'Today, when my smartphone blinked to indicate new messages, I could not resist checking them'. Cronbach's  $\alpha$  of the scale varied across the research days, ranging from .68 to .83, with an average of .78 over all four research days.

*Daily WFC* was measured using the five-item subscale of the Work-Family Conflict Scale (Netemeyer et al., 1996). We adjusted the items to day-level measurement. Example items are: 'Today, the demands of my work interfered with my home and family life' and 'Today, things I wanted to get done at home did not get done because of the demands my job puts on me'. All items were rated on a seven-point Likert scale: 1 = totally disagree to 7 = totally agree. Cronbach's  $\alpha$  of the scale varied across the research days ranging from .92 to .93, with an average of .92 over all four research days.

*Daily FRP* was measured using the eight-item Family Role Performance scale developed by Chen et al. (2014). Respondents were asked to what extent they thought they fulfilled 'this evening' what was expected of them in relation to the following aspects of their current family life. The scale consists of two subscales: task-oriented and relationship-oriented FRP. Example items are: 'Completed household responsibilities' (task), and 'Provided emotional support to my family members' (relationship). All items were rated on a five-point Likert scale: 1 = did not fulfill expectations at all to 5 = fulfilled expectations completely. Cronbach's  $\alpha$  of the task-oriented dimension scale varied across the research days, ranging from .78 to .92, with an average of .87 over all four research days. Cronbach's  $\alpha$  of the relationship-oriented dimension scale varied from .85 to .91, with an average of .89 over the four days. In line with Chen and colleagues' (2014) advice, we examined the separate dimensions of the FRP scale instead of the overall scale.

## Strategy of analysis

Our research design consists of repeated measurements nested within individuals. This two-level model has the repeated measures (daily variables) at the first level ( $N$  = between

265 and 280 study occasions) and the individual participants at the second level ( $N = 71$  participants). We conducted a multi-level analysis using MLwiN (Rasbash et al., 2000). Level 1 predictor variables (daily smartphone use, daily WFC and daily FRP) were centered to the *individual mean*, and level 2 predictor variables (person level: segmentation preference) and control variables were centered to the *grand mean* (for a more detailed discussion on the centering of variables regarding cross-level effects, see Aguinis et al., 2013). For easier comparison, the variables included in the moderation hypotheses were standardized (z-scores) before calculations.

## Results

### *Descriptive statistics*

Table 1 presents the means, standard deviations and correlations among the demographic, control and study variables. In order to examine the proportion of variance that is attributed to the two different levels of analysis, we calculated the intra-class correlation (ICC1) for each day-level variable. Results showed that 19 percent of the variance in work-related smartphone use in the evenings, 52 percent of the variance in WFC and 32 percent of the variance in FRP was attributable to within-person variations, justifying our multi-level approach.

### *Hypotheses testing*

In Hypothesis 1a, we predicted that segmenters would experience higher WFC on days that they use their smartphone more intensively for work-related activities during off-job hours. In contrast, we predicted that the relationship between daily work-related smartphone use during off-job hours and daily WFC would be negative for integrators (H1b). Table 2 shows that the multilevel interaction effect of segmentation preference in the relationship between daily work-related smartphone use during off-job hours and daily WFC is significant ( $\gamma = .54$ , standard error [SE] = .10,  $t = 5.35$ ,  $p < .001$ ). Furthermore, the interaction model showed a significant improvement in model fit over the predictor-only model ( $\Delta -2x \log = 24,13$ , d.f. = 1,  $p < .001$ ).

Figure 2 shows the interaction plot, which indicates that integrators indeed experience a lower degree of WFC on days that they use their smartphone more intensively for work-related activities during off-job hours. For segmenters, however, work-related smartphone use and WFC seem unrelated. To examine the interaction pattern in more detail, we conducted simple slope tests using the online tool suggested by Preacher et al. (2006). For segmenters (H1a), the tested relationship between smartphone use and WFC was positive, but not significant ( $\beta = .25$ , SE = .20;  $t = 1.22$ , NS). For integrators (H1b), the simple slope was negative and significant ( $\beta = -1.21$ , SE = .20,  $t = 5.92$ ,  $p < .001$ ), indicating that these employees experience less WFC on days that they use their smartphone more intensively for work-related activities during off-job hours. All in all, these results do not support Hypothesis 1a, but support Hypothesis 1b.

According to Hypothesis 2, daily work-related smartphone use is associated with lower FRP for segmenters (H2a) and higher FRP for integrators (H2b). We controlled for

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

	Mean	SD	1.	2.	3.	4.	5.	6.	7.	8.
1. Gender (0 = male, 1 = female)	1.43	0.49								
2. Age	37.99	13.09	-.32**							
3. Children at home	.76	1.09	-.25**	.46**						
4. Workload	3.59	0.65	-.12	.27**	.26**					
5. Smartphone use	2.49	0.90	-.42**	.13*	.37**	.19**				
6. Work-family conflict	2.90	1.44	-.12*	-.00	.16**	.30**	.38**			
7. Segmentation preference	3.25	1.35	.28**	-.16**	-.26**	.11	-.24**	-.04		
8. FRP (task-oriented)	3.05	0.84	-.15*	.14*	.12*	-.22**	-.13	-.31**	-.11	
9. FRP (relationship-oriented)	3.60	0.77	-.09	.09	.25**	-.07	-.06	-.31**	-.08	.40**

\*\* $p < .01$ , \* $p < .05$ .

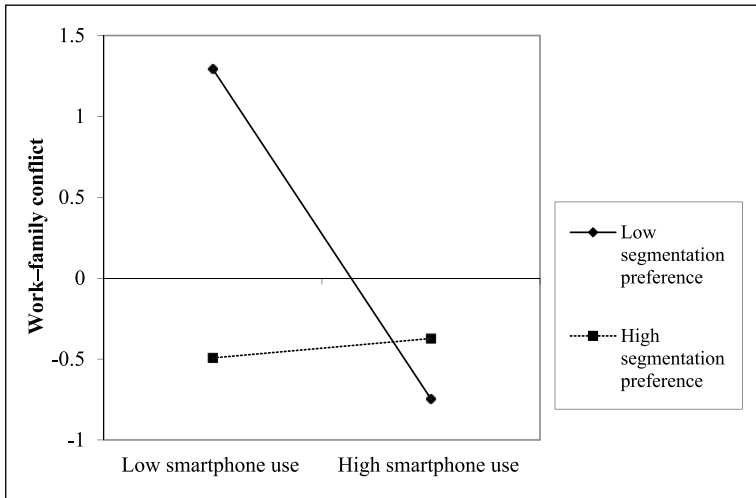
$N = 71$  persons, and  $N = 265-280$  occasions. Correlations between daily variables are based on averaged scores across the four days that the study took place. SD = standard deviation; FRP = family role performance.

**Table 2.** Multilevel results of the interaction of segmentation preference and daily work-related smartphone use during off-job time on experienced work-family conflict.

	<b>Work-family conflict</b>			
	Predictor-only model		Interaction model	
	Estimate	SE	Estimate	SE
Intercept	0.07	0.12	-0.08	0.10
Gender	-0.14	0.18	0.19	0.17
Children living at home	0.06	0.09	-0.01	0.08
Workload	0.29**	0.09	0.22*	0.08
Work-related smartphone use	0.01	0.12	-0.48**	0.15
Segmentation preference	-0.03	0.09	-0.35**	0.10
Segmentation × Smartphone			0.54**	0.10
Variance level 2 (employee)	0.37 (41%)	0.09	0.24	0.07
Variance level 1 (day)	0.53 (59%)	0.05	0.52	0.05
-2 Log likelihood	673.71		649.58	

\*\* $p < .001$ , \* $p < .01$ . SE = standard error. Data points = 265 of 280 cases in use (respondents  $n = 71$ , days  $n = 4$ ).

age, gender, number of children living at home and workload. For FRP, the interaction between work-related smartphone use during off-job hours and segmentation preference was not significant for the task-related dimension ( $\gamma = -.17$ ,  $SE = .11$ ,  $t = 1.50$ , not significant [NS]); but significant for the relationship-oriented dimension ( $\gamma = -.28$ ,  $SE = .12$ ,  $t = 2.41$ ,  $p < .05$ ). Table 3 shows the significant multilevel interaction between



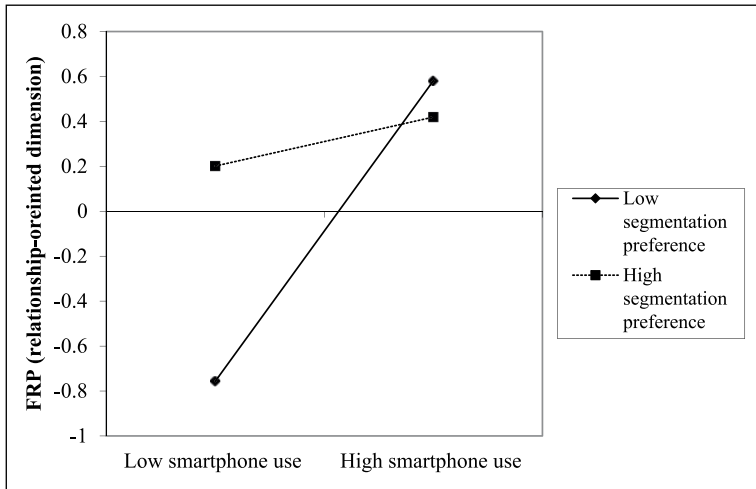
**Figure 2.** Moderation effect of segmentation preference on the relationship between daily work-related smartphone use during off-job time and daily work-family conflict.

**Table 3.** Multilevel results of the interaction of segmentation preference and daily work-related smartphone use during off-job time on experienced family role performance (relationship-oriented dimension).

	Family role performance (relationship)			
	Predictor only model		Interaction model	
	Estimate	SE	Estimate	SE
Intercept	0.03	0.12	0.11	0.12
Age	-0.00	0.01	-0.00	0.01
Gender	-0.08	0.19	-0.26	0.20
Children living at home	0.30***	0.10	0.36***	0.10
Workload	-0.11	0.09	-0.07	0.09
Work-related smartphone use	0.14	0.12	0.39*	0.16
Segmentation preference	0.03	0.09	0.20	0.11
Segmentation × Smartphone			-0.28*	0.12
Variance level 2 (employee)	0.38 (42%)	0.09	0.40	0.08
Variance level 1 (day)	0.53 (58%)	0.05	0.53	0.05
-2 Log likelihood	674.06		668.46	

\*\*\* $p < .001$ , \*\* $p < .01$ , \* $p < .05$ . Data points = 265 of 280 cases in use (respondents  $n = 71$ , days  $n = 4$ ). SE = standard error.

segmentation preference and daily work-related smartphone use in relation to daily FRP (relationship-oriented dimension). The interaction model showed a significant improvement in model fit over the predictor-only model ( $\Delta-2x \log = 5.60$ ,  $d.f. = 1$ ,  $p < .05$ ).



**Figure 3.** Moderation effect of segmentation preference on the relationship between daily work-related smartphone use during off-job time and daily family role performance (relationship-oriented dimension). FRP = family role performance.

Again, we conducted simple slope analyses as suggested by Preacher and colleagues (2006). Figure 3 shows the interaction plot, which indicates that integrators experience higher FRP (relationship-oriented dimension) on days that they use their smartphone more intensively for work-related reasons during off-job hours ( $\beta = .77$ ,  $SE = .22$ ;  $t = 3.43$ ,  $p < .001$ ). Integrators perform better in the family domain on days that they use their smartphone for work-related purposes (H2b). For segmenters (H2a), daily work-related smartphone use during off-job hours and daily FRP are unrelated ( $\beta = .01$ ,  $SE = .22$ ;  $t = 0.49$ , NS). Therefore, these results do not support Hypothesis 2a but do support Hypothesis 2b.

Hypothesis 3 suggested that the relationship between smartphone use and FRP moderated by segmentation preference is (partially) mediated by WFC. Using the technique of mediated moderation effects, as suggested by Mathieu and Taylor (2006), allows us to test our complete research model. With their technique, the proposed interaction term is used when testing the relationship between the independent variable and the outcome variable and the mediator, rather than the single independent variable. To test whether our results indeed imply a mediation model, we first tested whether the interaction between daily work-related smartphone use during off-job hours and segmentation preference was directly related to FRP (Mathieu and Taylor, 2006). As reported above, this direct relationship was only present for the relationship dimension of FRP ( $\gamma = -.28$ ,  $SE = .12$ ,  $t = 2.41$ ,  $p < .05$ ). Next, as MacKinnon et al. (2002) suggest, both the predictor-mediator and mediator-outcome paths have to be significant (see also Kenny et al., 1998). In our case, this implies regressing daily WFC on the interaction between daily work-related smartphone use during off-job hours and segmentation preference. As reported in our analysis of Hypothesis 1, this interaction is significant ( $\gamma = .54$ ,  $SE = .10$ ,

**Table 4.** Multilevel results of the relation between daily work–family conflict and daily family role performance (relationship-oriented dimension).

	Family role performance (relationship)			
	Control model		Predictor model	
	Estimate	SE	Estimate	SE
Intercept	0.02	0.12	0.02	0.12
Age	-0.00	0.01	-0.00	0.01
Gender	-0.06	0.19	-0.06	0.19
Children living at home	0.29***	0.10	0.29***	0.10
Workload	-0.11	0.09	-0.11	0.09
Work–family conflict			-0.31***	0.07
Variance level 2 (employee)	0.38 (42%)	0.10	0.39	0.09
Variance level 1 (day)	0.53 (58%)	0.05	0.48	0.05
-2 Log likelihood	675.43		655.71	

\*\*\* $p < .001$ , \*\* $p < .01$ , \* $p < .05$ . Data points = 265 of 280 cases in use (respondents  $n = 71$ , days  $n = 4$ )  
SE = standard error.

$t = 5.35$ ,  $p < .001$ ). The relationship between WFC and FRP (relationship-oriented dimension of FRP) was, when controlled for gender, age, children living at home and workload, also significant ( $\gamma = -.31$ ,  $SE = .07$ ,  $t = 4.59$ ,  $p < .001$ ; see Table 4). The predictor model showed a significant improvement in model fit over the control variables-only model ( $\Delta-2x \log = 19.72$ ,  $d.f. = 1$ ,  $p < .001$ ). Results from the Sobel test (Sobel, 1982) also support the proposed mediated moderation effect ( $z = -2.28$ ,  $p < .05$ ). Compared with segmenters (H3a), integrators experience better FRP (relationship-oriented dimension) on days that they use their smartphone more intensively during off-job hours for work-related reasons, through reduced WFC (H3b). This automatically implies that we only found support for Hypothesis 3b.

### Additional analyses

In order to explore more thoroughly whether gender differences can account for our results, we conducted multilevel analyses including the three-way interaction effect of segmentation preference, gender and smartphone use on both WFC and FRP (relationship-oriented dimension). Both three-way interaction effects were not significant (WFC:  $\gamma = .10$ ,  $SE = .08$ ,  $t = 1.33$ ,  $p = NS$ ; FRP:  $\gamma = -.11$ ,  $SE = .08$ ,  $t = 1.42$ ,  $p = NS$ ). The interaction models showed no significant improvement in model fit over the predictor-only models ( $\Delta-2x \log$  WFC = 1.75,  $d.f. = 1$ ,  $p = NS$ ;  $\Delta-2x \log$  FRP (relationship dimension) = 2.01,  $d.f. = 1$ ,  $p = NS$ ).

## Discussion

The use of smartphones spans the boundaries between the work and family domains resulting in new opportunities and challenges for employers and employees (Chesley

et al., 2003). The current study aimed to shed light on the differential impact of work-related smartphone use during off-job hours on WFC and FRP. The results of the relationship between smartphone use and WFC are inconclusive. On the one hand, there is empirical evidence that smartphone use as a means of combining work and family, for example, to extend working hours in the evenings and on weekends, is associated with an increase in WFC (e.g. Fenner and Renn, 2010; Higgins and Duxbury, 2005; Middleton, 2007). On the other hand, there is also evidence that this communication technology use can indeed contribute to better work–family balance (e.g. Chesley, 2005; Golden and Geisler, 2007). In line with boundary theory, we examined the role of segmentation preference (as opposed to integration strategy) as a potential moderator between work-related smartphone use during off-job hours and both WFC and the FRP relationship-oriented dimension.

Our results mainly supported the notion that for employees who prefer work and family roles to be integrated, the smartphone has the potential to contribute to less WFC and better FRP (relationship-oriented dimension of FRP). For these ‘integrators’, the smartphone seems to facilitate their preferred lifestyle as they seem to be able to take advantage of the increased flexibility in meeting both work and family demands offered by smartphone use. This is in line with the results of a recent qualitative study on the acceptance of smartphones by Duxbury and colleagues (2014). Their results showed that integrators reported that their work–life balance had improved since they had adopted mobile technology to increase their flexibility and boundary control (see Kossek et al., 2012). This also shows that the relationship between extending work hours owing to smartphone use and WFC is less straightforward than has often been assumed in the literature (e.g. Fenner and Renn, 2010; Mazmanian et al., 2005).

It is remarkable though, that for integrators the smartphone only contributes to the relationship component of FRP and not the task component. This implies that work-related smartphone use during off-job hours does not affect the integrator’s household chores or maintenance tasks around the home, but that it helps in supporting family members or giving them advice, possibly because they can be home when they are needed by their family members. We do not know, however, whether this support and advice to family members is given face-to-face. Therefore, it might be plausible that besides the work-related use of the smartphone, family members are supported by social media use on the same device. These messages might be noticed and answered because they carry their smartphone around for work reasons anyway. This latter explanation may especially apply to the group of integrators in our study that worked late at the office. The smartphone offers an alternative way of working where employees can be involved in family life and available for work at the same time. It would be interesting to examine the influence of the physical location of smartphone use during off-job hours more thoroughly in future research.

For employees who prefer work and family domains to be segmented (‘segmenters’), we hypothesized a negative relationship between work-related smartphone use during off-job hours and WFC and FRP. The rationale behind this was that work-related smartphone use after work might cause unwanted cross-role interruptions (Jett and George, 2003). Therefore, we expected these segmenters in particular to experience higher levels of WFC and lower levels of FRP when work-related smartphone use is higher. However, our results tell a different story.

An alternative explanation for these unexpected findings can possibly be found in the highly significant negative correlation between segmentation preference and daily work-related smartphone use during off-job hours. This negative correlation indicates that employees who aim to segment their work and family domains do not use their smartphones intensively after work for work-related purposes. These segmenters might succeed in preventing work from intruding on their family domains by switching off their smartphone. Duxbury et al. (2014) examined the longitudinal effects of new smartphone adopters, studying workers' boundary management preferences before having started smartphone use for work-related activities. Their results were similar to ours in showing that the segmenters at the outset were still using boundary management strategies to maintain an impermeable boundary between their work and family domains, as they did not see the advantages or need of a smartphone after work and felt that they had to protect their family life by reducing work-related smartphone use outside the work domain (Duxbury et al., 2014).

The literature indicates that there might be gender differences in how work contact during leisure hours is interpreted. For example, both Simon (1995) and Glavin and colleagues (Glavin et al., 2011) argue that there might be gender differences in the extent to which role-blurring activities in the evening (in our case work-related smartphone use) are interpreted as role conflict. Additionally, for men it might be more culturally accepted to introduce work into the family domain, where for women, still considered as the primary source of child care in the family, this might be more complex (Jacobs and Gerson, 2004). Although, we did not take a gender perspective in our study, but instead focused on employees' segmentation preferences (Ashforth et al., 2000; Clark, 2000; Kreiner et al., 2009), we wanted to exclude the possibility that gender can account for our results. By conducting additional analyses including the three-way interaction effect of gender  $\times$  segmentation preference  $\times$  smartphone use in combination with lower order terms on both WFC and FRP, we can now be more certain that in our sample segmentation preference is a stronger moderator than gender differences. This is in line with the findings of Rothbard et al. (2005), who explicitly showed that although important demographic characteristics such as gender and having young children might contribute to explaining segmentation preferences, they cannot in themselves moderate the relation between work–family policy and satisfaction and commitment, whereas segmentation preference can.

## Theoretical contributions

Our study contributes to the scholarly literature in several ways. Foremost, our central aim was to contribute to the debate on whether using smartphones to perform work during off-job hours is mainly associated with an increase in WFC (e.g. Middleton, 2007), or whether it might contribute to a better balance between the two domains (e.g. Chesley, 2005). In the work–family debate, smartphone use has a positive relationship with WFC. This is quite well-established in the literature. The strongest contribution of this study to this debate is the inclusion of our moderator, being grounded in boundary theory (namely segmentation preference), which further qualifies this relationship. In other words, this relationship is not as straightforward as we had previously thought.



Additionally, boundary theory (e.g. Clark, 2000) states that spillover can be experienced differently based on a person's individual segmentation preference. However, the cross-level interaction of segmentation preference as a rather stable factor in time and the daily impact of work contact via smartphones on daily WFC and daily FRP had not been studied before and is therefore innovative and informative in theory building. Evidence for such within-person effects and cross-level interaction effects adds to our knowledge because general patterns found in surveys cannot be equated to subtle patterns found in diary studies that show deviations from the general baseline.

Finally, as stated earlier, although it is likely that spillover of work-related issues to the family domain has consequences for outcomes in the family domain, this is often overlooked in the literature (see for an exception, Amstad et al., 2011). Moreover, the results of our study show that smartphone use has a differential impact on FRP via WFC on a daily basis. For integrators the smartphone has the potential to contribute to less WFC and better FRP (relationship-oriented dimension of FRP); for segmenters these key concepts were unrelated.

## Limitations and future research

Despite the contributions of the study, there is room for improvement as well. First, we have to note that all our daily variables were measured at the same time, namely the end of the day. In other words, the temporal order of the variables could not be established within our design, which has direct implications for the causality of our findings. For future studies, it is important to assess the variables at different points during the day in such a way that the predictor and outcome variables are temporally separated.

Second, all the included instruments were self-report measures, with a certain risk for common-method variance (Podsakoff et al., 2003). Note, however, that in our multi-level approach we were particularly interested in within-person fluctuations over the days. This eliminates the influence of response tendencies stemming from individual differences and reduces the potential problems related to common method variance.

Third, since we focused on work performed using the smartphone during off-job hours, we only included WFC in our design. However, it is important for future studies on the work–family interface to include both conflict and enrichment. In a recent survey study, Daniel and Sonnentag (2015) showed that an employee's preference to integrate work and family domains, which results in boundary permeability, contributed to work–family enrichment. Building on their results, it might be particularly interesting to investigate the cross-level interaction of boundary management preferences as a more stable variable and boundary enactment, enrichment and conflict on a daily basis. Additionally, previous studies have shown that schedule control and job flexibility could be important variables in predicting WFC (e.g. Kelly et al., 2011; Schieman and Young, 2013).

Furthermore, to get more insight into the interaction between domains it is important to examine the impact of the private life on work as well (i.e. family–work conflict or family–work facilitation; Frone et al., 1992; Greenhaus and Beutell, 1985; Kossek et al., 2012). There is a possibility that integrators deal with 'family issues' using the smartphone during job time, which can have a positive impact on their FRP. For example, when an employee orders the ingredients for dinner online during office hours, there is

more time left to spend on the children while at home. Additionally, we did not control for respondents' work addiction and their need to be continuously in control of their work activities. These variables can contribute to the knowledge building around boundary management strategies and smartphone use. Obviously, smartphone use during off-job time has costs and benefits (Derks and Bakker, 2012). It would be interesting to discover the preconditions for these costs, benefits and potential alternatives to make a well-considered decision whether to stay connected to work.

Fourth, we have to be careful in generalizing our results. Note that our sample represents relatively highly educated workers. Additionally, the sample is selective in that all participants possessed smartphones with access to their work-related email, which obviously excludes the segment of the working population without smartphones. However, since smartphone use is a central variable in our design, it is not that problematic that the results are mainly applicable to the specific group of smartphone users.

Fifth, the interaction pattern is partly different from what we expected, especially the finding that integrators experience higher WFC on the evenings that they do not use their smartphones more intensively for work during off-job hours. Although we do not have any information on the location of work-related smartphone use during off-job time, the results can be interpreted in light of work–life balance and boundary management theory. In view of this, it could be that on days that integrators did not use their smartphone during off-job time intensively, they were actually working late at the office, for example doing overtime, and were unable to go home. In this case, they could not simultaneously pay attention to the demands from family members in the family domain. If they had been in the family domain, they could have socialized with their family members, although they would have been interrupted more frequently by work-related messages. Despite these work-related interruptions, however, they may have had the feeling that their family performance was better than if they had had to stay in the office. Integrators might also use their smartphones to communicate with family members (e.g. when working at the office). If this is the case, not using their smartphone might imply that they have fewer options to contact their family members, which might be experienced as WFC and FRP.

A final limitation is that we only included segmentation preference in our current study. However, especially in daily diary studies it might be interesting to consider daily boundary management enactment as well. In the case of smartphone use, which may not always be deliberate, it would be a valuable contribution to the current literature to examine the cross-level interactions of preference and enactment on the potential outcomes of work-related smartphone use during off-job hours.

## Practical implications

Besides our theoretical contributions, our findings are valuable in practice as well, especially since smartphones have become part of the basic tools of many employees in numerous organizations.

Employers provide smartphones to employees en masse without considering how an employee's individual characteristics (like boundary management preference) could affect their smartphone use during off-job time. However, this study provides strong evidence for the importance of an employee's boundary management preference on the relationship between work-related smartphone use during off-job hours and WFC and

FRP. For integrators, a smartphone turns out to be a useful tool to meet family demands, check on events at work or be available for last-minute jobs, without the employee experiencing significantly higher levels of WFC. For employees who would like to segment the work and family domains as much as possible, the added value of using a smartphone during off-job hours is unclear. However, it is also not evident that segmenters suffer from the options smartphones provide when it comes to WFC and FRP. In fact, there are indications that these employees do not use their smartphone intensively after work and, when they do use it, it does not affect the work–family interface and FRP. Therefore, providing smartphones to employees can have beneficial effects for employees who aim to integrate work and family domains.

Perhaps even more importantly, the segmenters in our sample were capable of setting impermeable boundaries between the work and family domains, regardless of them having a smartphone that they can use for work-related activities during off-job hours. These segmenters did not experience any negative consequences in terms of their work–life balance and FRP. It is important to note that not all employees with a high segmentation preference may have the opportunity and freedom to enact their preferred boundary management strategies. In a recent study on supervisor expectations regarding smartphone use during personal time, Derks et al. (2015) showed that, in employees whose supervisors expect them to be frequently available, smartphone use is more positively related to work-home interference [WHI] than in employees whose supervisors do not have these expectations. However, employees' segmentation preferences were not taken into account in this study. It is plausible that some segmenters might experience normative pressure from supervisors and/or colleagues to respond to work-related messages in their family domain. Therefore, we stress the importance of transparency with the expectations of the availability for work during off-job hours in general, and with smartphones in particular. This transparency can prevent segmenters from feeling pressured to use smartphones and integrate domains, where they prefer to keep them separated. In the current study, the integrators could probably profit from the advantages of smartphone use, whereas the segmenters did not experience the often noticed negative consequences.

## Conclusion

The relation between smartphone use and both WFC and FRP turned out to be more complex than it seemed at first sight. Most anecdotal and empirical evidence has pointed in the direction of smartphones affecting family life in a negative way. However, this study used boundary theory to show convincingly that an individual's segmentation preference qualifies the relationship between work-related smartphone use in the evening and WFC and FRP. During the evenings that integrators used their smartphone intensively, they experienced better FRP (relationship dimension) via decreased WFC. Segmenters may succeed in enacting their segmentation preference, since both WFC and FRP are not affected by smartphone use.

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