A Diary-Study on Work-Related Smartphone Use and Employees' Well-Being: The Moderating Role of Basic Need Satisfaction

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Abstract: Smartphones provide employees with an instant access to work-related information outside of the office. The current study investigates the day-level effects of work-related smartphone use in the evening on indicators of psychological well-being. Moreover, we examine the role of basic need satisfaction at work as a potential buffering moderator. A diary study covering ten working days (N = 74) was conducted. Results indicate that day-specific work-related smartphone use has a negative effect on psychological well-being. Yet, the satisfaction of basic psychological needs at work (autonomy, competence and relatedness) can buffer these effects.

Keywords: work-related smartphone use, psychological well-being, basic need satisfaction, self-determination theory

1. Theoretical Background

Technological innovations continually blur the traditional spatial and temporal boundaries of work. In particular smartphones provide employees with an instant access to work-related information outside of the office. They include functions to manage the calendar, make phone calls, browse the internet and to receive and answer e-mails anytime, anywhere. Despite some benefits, e.g. a higher productivity (Gajendran & Harrison 2007), work-related smartphone use after official working hours might also carry costs. Many organizations have increasing expectations about employees' availability, and employees might feel forced to respond immediately to work-related messages, even at home (Bergman & Gardiner 2007). In line with this, previous studies have revealed that technology use is one of the main causes for work-home interference (e.g. Derks & Bakker 2014).

The current study aims to shed light on further potential costs of work-related smartphone use by examining its effects on employees' well-being at day-level. Drawing on the limited strength model of self-control (Muraven & Baumeister 2000), we suggest that smartphone use, as a means for staying online and checking for new messages, consumes and depletes employees' limited regulatory resources. Moreover, the prolonged work-related effort associated with smartphone use prevents employees from getting sufficient rest and recovering depleted resources. Thus, we propose that smartphone use has an adverse impact on employees' well-being.

A second aim of the study is to investigate whether basic need satisfaction as a personal resource can buffer these adverse effects. Our proposition draws on the self-determination theory (SDT) (Deci & Ryan 1985; Ryan & Deci 2000), which states that the satisfaction of basic psychological needs at work (autonomy, competence,

and relatedness) facilitates autonomous (in contrast to controlled) regulation or intrinsic motivation, which in turn fosters well-being. We suggest that employees with high levels of basic need satisfaction are more intrinsically motivated and exert autonomous regulation while using their smartphones for work. As a result, regulatory resources are less depleted and can be restored instead. The adverse relationship between work-related smartphone use and well-being consequently is expected to be weaker for employees with high levels of basic need satisfaction.

2. Method

To test our hypotheses, we conducted a diary study in Germany. Our data were collected via online-surveys. In advance of the day-specific measurements, the participants responded to a general questionnaire that assessed biographical variables and basic need satisfaction. Afterwards, participants received emails two times per day over 10 consecutive work days including instructions and links to the day-specific questionnaires. The morning survey, which was sent at 7 AM every day, measured work-related smartphone use in the evening before. This procedure was due to the fact that we wanted to avoid a questionnaire at bedtime. The evening survey, which was sent to participants at 7 PM each evening, assessed the outcome variables (ego depletion, and need for recovery).

Overall, 74 participants were included in our study. Participants were 58 % female and 42 % male. The mean age was M = 34.86 years (SD = 13.88) with a range from 19 to 68 years. Most participants worked in full time (73%) and the average of work experience was 14 years (SD = 14.92).

Work-related smartphone use was measured with the smartphone use scale developed by Derks and Bakker (2014). The scale consists of four items, which are rated on a 5-point scale ranging from 1 = not at all to 5 = a great deal. We assessed basic need satisfaction with nine items from a scale developed by Van der Broeck et al. (2010). Day-specific ego-depletion was measured using five items related to the participant's current experiences with resource depletion. The scale was developed and validated by Bertrams et al. (2011). To measure day-specific need for recovery, we used five items from Van Veldhoven and Broerson's (2003) scale.

3. Results

As the day-level data (Level 1: work-related smartphone use, ego depletion, need for recovery) from our diary study were nested within the person-level data (Level 2: basic need satisfaction, age), we used multi-level analyses with the software MLWin (Rasbash et al. 2012) to test our hypotheses. To reduce the risk of confounding effects, day-level variables (Level 1) were centered on their person-mean. Person-level variables (Level 2) variables were centered on their grand mean. As the control variables age and gender exhibited significant influence on our outcome variables, they were included in the further analyses.

Table 1 shows the results of the multi-level analyses. As indicated by Models 2, after controlling for age and gender, work-related smartphone use was related to ego depletion and need for recovery with signs corresponding to our expectations (ego depletion:$\gamma = .08$; need for recovery:$\gamma = .08$; ps $< .10$).

Hypothesis 2 predicted that basic need satisfaction moderates (buffers) the adverse effects of smartphone use on day-specific indicators of well-being. As demonstrated in Models 3 (Cf. Table 1), the day-level interaction effects of smartphone use and basic need satisfaction on well-being were significant (ego-depletion: γ= -.22, p < .05; need for recovery: γ = -.22, p < .05).

Figure 1 shows the interaction plots, indicating that basic need satisfaction can buffer the day-specific adverse relations between smartphone use and well-being. In particular, on days when smartphone use in the evening is high, only employees whose basic needs are not satisfied in their job experience impairments of well-being, whereas there is no effect for employees with high levels of basic need satisfaction.

Table 1: *Multilevel estimates for predicting ego-depletion and need for recovery*

	Ego Depletion							
	Null model		Model 1		Model 2		Model 3	
Parameter	γ	SE	γ	SE	γ	SE	γ	SE
Intercept	1.89**	(0.07)	2.38**	(0.17)	2.45**	(0.17)	2.45**	(0.17)
Age			-0.02**	(0.00)	-0.02**	(0.00)	-0.02**	(0.00)
Gender			-0.35**	(0.11)	-0.40**	(0.11)	-0.40**	(0.11)
Smartphone use (SU)					0.08^{+}	(0.04)	0.09*	(0.04)
Basic need satisfaction (BNS)					-0.28*	(0.11)	-0.28**	(0.12)
SU x BNS							-0.23*	(0.11)

	Need for Recovery							
	Null model		Model 1		Model 2		Model 3	
Parameter	γ	SE	γ	SE	γ	SE	γ	SE
Intercept	1.83**	(0.05)	2.21**	(0.16)	2.28**	(0.15)	2.28**	(0.15)
Age			-0.01	(0.00)	0.00	(0.00)	0.00	(0.00)
Gender			-0.27*	(0.11)	-0.32**	(0.10)	-0.32**	(0.10)
Smartphone use (SU)					0.08^{+}	(0.04)	0.09*	(0.04)
Basic need satisfaction (BNS)					-0.32**	(0.11)	-0.32**	(0.11)
SU x BNS							-0.22*	(0.10)

Note: Gender, age, and basic need satisfaction are person-level (Level 2) variables; smartphone use is a day -level (Level 1) variable.
*$^{+}$p < .10. *p < .05. **p < .01.*

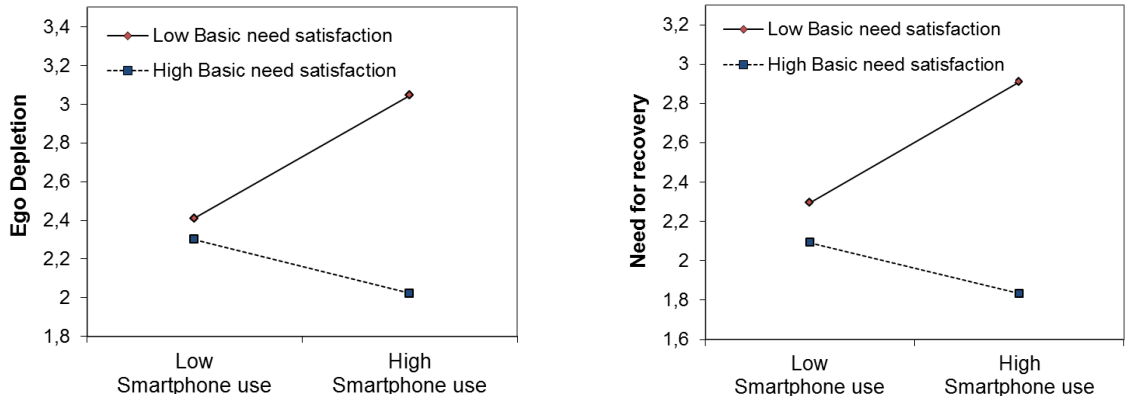

Figure 1*: Interaction effect of work-related smartphone use and basic need satisfaction on ego depletion and need for recovery*

4. Discussion

In line with our expectations, work-related smartphone use had a negative effect on well-being at day-level as indicated by higher levels of ego depletion and need for recovery. This finding suggests that smartphone use might deplete limited regulatory resources and prevent its recovery, which in turn impairs well-being.

Furthermore, results demonstrated that the negative relationship between smartphone use and indicators of psychological well-being is weaker when people report a high satisfaction of their basic psychological needs at work. This is in line with arguments that technology use is sometimes experienced as an opportunity instead of a hassle (Ohly & Latour 2014). Based on Self-Determination Theory, we expected and found that employees with high levels of basic need satisfaction are more intrinsically motivated while using their smartphones and might experience positive emotions while continuing their work in the evening. In contrast, for people who do not find their basic psychological needs satisfied in their job, work-related smartphone use is more stressful.

Our results suggest different practical interventions to foster employees' well-being. From an individual's point of view, employees should refrain from too intensive smartphone use in the evening. Instead, they should engage in behaviors that replenish depleted resources (e.g. psychological detachment, relaxation, sufficient sleep). From an organizational point of view, guidelines on the use of technologies for work after official working hours could be established to prevent impairments of employees' well-being. Moreover, organizations should try to foster employees' basic need satisfaction, for example through leadership.

In sum, our study suggests that work-related smartphone use is not detrimental for all employees but that this effect depends on the experience of autonomy, competence and relatedness at work.

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