Needing to Recover – (Lagged) Main and Interaction Effects of Daily Work-Related Smartphone Use from the Perspective of Self-Control

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Abstract: The current study examines the adverse consequences of work-related smartphone use on employees' well-being from the perspective of self-control. Drawing on the Limited Strength Model of Self-Control, which states that self-control depletes limited regulatory resources, we propose lagged effects of work-related smartphone use during non-work time on next-day need for recovery after work (as an indicator of resource depletion). Furthermore, we suggest interaction effects between work-related smartphone use and next-day self-control demands at work on next-day need for recovery after work, arguing that both demands jointly deplete the same limited resource. The results from our daily diary study support both hypotheses. Our findings thus strongly suggest that work-related smartphone use involves self-control.

Keywords: daily diary study, depletion, need for recovery, self-control, self-control demands, work-related smartphone use

1. Theoretical background

Nowadays, many situations of everyday life require people to exert self-control (Cascio 2003), which refers to the ability to regulate one's thoughts, emotions, and behaviors, in order to align them with goals, rules, or other standards (Vohs & Baumeister 2016). Despite positive effects on personal success, exerting self-control can also render psychological costs (Hagger et al. 2010). The Limited Strength Model of Self-Control accounts for these findings, suggesting that different acts of self-control draw on and deplete a common limited regulatory resource, which reduces resource capacity available for further self-control efforts and can cause impairments in psychological well-being (Muraven & Baumeister 2000).

Especially at work individuals frequently have to cope with demands on self-control (Cascio, 2003). Correspondingly, a broad range of studies indicates that work-related self-control demands (in abbreviated form "SCDs"), which include (but are not limited to) the demands to control impulses, resist distractions, and overcome inner resistances, can increase burnout and absence behavior (Schmidt & Diestel 2015). In addition, technological advances in recent years have raised further demands that may also require employees' self-control. For instance, smartphones have become a prevalent technology for employees to stay connected to work during non-work time (e.g., via messages or phone calls; Lanaj et al. 2014). Correspondingly, in view of empirical evidence indicating that intensive work-related smartphone use during non-work time is related to impaired well-being (e.g., burnout, Derks &

Bakker 2014), Lanaj and colleagues (2014) suggest that the depletion of regulatory resources following acts of self-control may be responsible for this effect and claim for research that sheds further light on this proposition.

Thus, the present study investigates the adverse consequences of work-related smartphone use during non-work time from the perspective of self-control using a daily diary design. Proposing that work-related smartphone use depletes limited regulatory resources and drawing on research that indicates daily spillover effects of regulatory resource depletion, we examine lagged effects of daily work-related smartphone use during non-work time on next-day need for recovery (as an indicator of regulatory resource depletion) after work.

Furthermore, we examine combined (interaction) effects between work-related smartphone use and next-day SCDs at work on next-day need for recovery after work, suggesting that if both demands deplete a common limited resource, the combination of high levels of both stressors will overtax the limited resource and thus, result in higher levels of need for recovery than the sum of their additive effects. Our study aims at expanding previous research by a) examining the exertion of self-control and resulting regulatory resource depletion as an underlying mechanism responsible for the adverse effects of work-related smartphone use during non-work time, and b) providing further evidence for spillover effects and thus for the persistence of depletion effects across days.

2. Method

We conducted a daily diary study covering ten working days to test our hypotheses. In total, 60 employees (Level 2) participated in our study, resulting in 562 data points at the within-person level (Level 1). 55 % of the participants were female, the mean age was 39.5 years (SD = 13.69) and the mean employment duration 18.01 years (SD = 12.97). Most of the participants worked in the service sector.

The data were collected through online questionnaires, including a background questionnaire to assess demographic variables as well as day-specific questionnaires that were sent to the participants three times per day. The morning survey comprised items to measure work-related smartphone use during off-job time in the previous evening, the afternoon-survey assessed self-control demands at work and in the evening survey employees' rated their need for recovery.

Self-control demands were measured with 15 items developed by Schmidt and Neubach (2007) by which participants rate their work in terms of the requirements to inhibit impulses, resist distractions and overcome inner blockades during "the last hours" of work. Work-related smartphone use was assessed with the smartphone use scale developed by Derks and Bakker (2014) adjusted for daily measurement and applied with the instruction to participants to answer the questions in the morning referring to the previous evening. The scale consists of four items rated on a 5-point scale, and includes an explicit reference to work-related smartphone activities. The measurement of need for recovery was based on five items indicating the extent to which employees perceive a strong need for a rest period to recover depleted resources (van Veldhoven & Broersen 2003).

3. Results

To test our hypotheses, we used multi-level modeling, because the day-level data (self-control demands, work-related smartphone use, and need for recovery) from our study were nested within the person-level data. To reduce the risk of confounding effects, all variables (except gender) were centered around their grand mean. As the control variables age and gender exhibited significant influence on our outcome variable, they were included in the further analyses.

Table 1 shows the results of the multi-level analyses. As indicated by Model 2 and consistent with our expectation, after controlling for age and gender, there is a lagged positive effect of daily work-related smartphone use during non-work time on next-day need for recovery after work ($\beta = 0.12$, $p < .01$). Moreover, Model 2 exhibits an improvement of model fit compared with Model 1 as indicated by the difference in log likelihood ratio (Δ - 2*log = 70.27, df = 2, $p < .01$).

Furthermore, the results demonstrate an interaction between daily work-related smartphone use during non-work and next-day SCDs at work on next-day need for recovery after work. Model 3 in Table 2 reveals that the proposed interaction is significant ($\beta = .10$, $p < .05$). In addition, Model 3 showed a significant improvement in model fit over Model 2 (Δ - 2*log = 6.38, df = 1, $p < .05$). Figure 1 shows the interaction plot, which indicates that in line with our expectations, participants experienced highest levels of need for recovery when both work-related smartphone use and next-day SCDs were high. Accordingly, when work-related smartphone use during non-work time was low (-1 SD), there was no significant relationship between next-day SCDs at work and next-day need for recovery after work ($\beta = .23$, n.s.), whereas when work-related smartphone use during non-work time was high (+1 SD), this relationship reached significance ($\beta = .42$, $p < .01$). Thus work-related smartphone use during non-work time strengthened the adverse effect of next-day SCDs on next-day need for recovery.

Table 1: *Multilevel estimates for predicting need for recovery after work (next-day)*

	Need for Recovery							
	Null model		Model 1		Model 2		Model 3	
Parameter	β	SE	β	SE	β	SE	β	SE
Intercept	1.93**	(0.06)	2.25**	(0.18)	2.30**	(0.15)	2.30**	(0.15)
Age			-0.01*	(0.01)	-0.01	(0.00)	-0.01	(0.00)
Gender			-0.22**	(0.12)	-0.26**	(0.10)	-0.26**	(0.10)
Next-day SCDs					0.32**	(0.04)	0.32**	(0.04)
Smartphone use (SU)					0.12**	(0.04)	0.11**	(0.04)
SU x next-day SCDs							0.10*	(0.05)
Level 1 Intercept variance	0.29		0.29		0.27		0.26	
Level 2 Intercept variance	0.24		0.21		0.12		0.12	
— 2*log (lh)	1042.82		1034.22		963.96		957.58	
Δ — 2*log (lh)			8.60^{+}		70.27**		6.38*	
df			2		2		1	

Note: Age and gender are person-level (Level 2) variables; SCDs and smartphone use are day -level (Level1) variables.
**p < .05. **p < .01. $^{+}$p < .10. N = 562.*

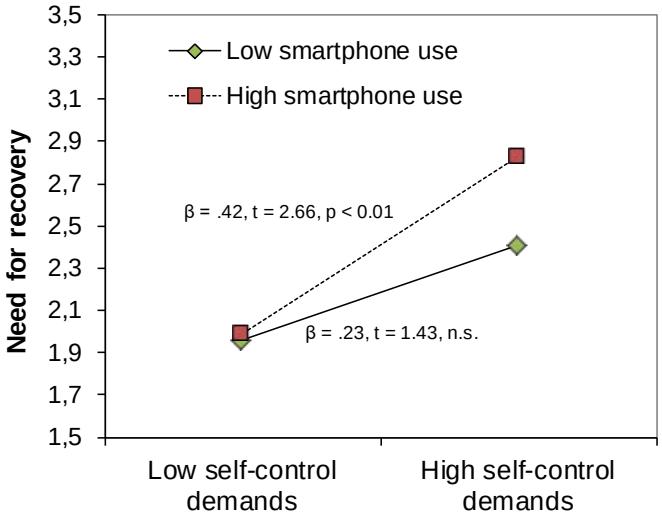

Figure 1: *Interaction effect of work-related smartphone use and next-day SCDs at work on next-day need for recovery after work.*

4. Discussion

In line with our assumption, we found that daily work-related smartphone use during non-work time was associated with an increase in next-day need for recovery after work. This finding suggests that work-related smartphone use depletes regulatory resources and indicates, in line with previous findings (e.g., Lanaj et al. 2014), that resource depletion effects can spill over to the following day. Furthermore, the results revealed an interaction effect of work-related smartphone use during non-work time and next-day SCDs at work on next-day need for recovery after work. In particular, following days with intensive work-related smartphone use during non-work time, the relationship between SCDs at work and need for recovery after work was particularly high. This evidence can be aligned with the Limited Strength Model of Self-Control (Muraven & Baumeister 2000), suggesting that regulatory resources have already been depleted through smartphone use when employees are confronted with SCDs at work on the following day, and as a result, coping with SCDs is more straining.

Our findings suggest different practical interventions for individuals and organizations. Employees ought to set adequate boundaries between work and private life, and use their smartphones for work during non-work time with caution, as it may lead to regulatory resource depletion. Moreover, they should engage in behaviors that reduce depletion and can help replenish their regulatory resources (e.g. breaks at work, naps, ensure sleep quality and quantity, e.g. Barnes 2011). From an organization-nal point of view, the topics of daily time pressure and workload should be addressed to prevent losses of organizational productivity and performance. Therefore, general guidelines for the use of work-related technologies at home could be helpful to set adequate expectations on employees' availability for work during non-work time.

In sum, our study contributes to research on self-control and work-related smartphone use and underlines the importance of diary studies to investigate within-person processes such as spillover of regulatory resource depletion.

5. Literature

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Grundlage für Management & Kompetenzentwicklung

64. Kongress der
Gesellschaft für Arbeitswissenschaft

FOM Hochschule für
Oekonomie & Management gGmbH

21. – 23. Februar 2018

GfA Press

Bericht zum 64. Arbeitswissenschaftlichen Kongress vom 21. – 23. Februar 2018

FOM Hochschule für Oekonomie & Management

Herausgegeben von der Gesellschaft für Arbeitswissenschaft e.V.
Dortmund: GfA-Press, 2018
ISBN 978-3-936804-24-9

NE: Gesellschaft für Arbeitswissenschaft: Jahresdokumentation

Als Manuskript zusammengestellt. Diese Jahresdokumentation ist nur in der Geschäftsstelle erhältlich.

Schriftleitung: Matthias Jäger
im Auftrag der Gesellschaft für Arbeitswissenschaft e.V.

USB-Print:
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Screen design und Umsetzung
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