

# Daily Occurrence of Technology-Assisted Supplemental Work Events and Their Relationships With Recovery Experiences and Emotional Exhaustion

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**Abstract:** Technology-assisted supplemental work (TASW) has become a common demand in flexible work arrangements. Building on the effort–recovery model, we investigated how two TASW events after work (i.e., continuing work tasks, being contacted) affect psychological detachment and relaxation in the evening and, in turn, emotional exhaustion the next morning. With an event-oriented approach, we analyzed daily diary data of 215 employees (686 daily observations over five consecutive workdays). The results of multilevel path analysis showed a negative direct effect (a) of both TASW events on psychological detachment and (b) of being contacted on relaxation. A similar pattern was found for the indirect effects on exhaustion. The direct relationships between TASW events and emotional exhaustion were not significant. We conclude that employees should avoid TASW whenever possible in order to sufficiently recover from work and begin their next workday refreshed.

**Keywords:** technology-assisted supplemental work, TASW events, psychological detachment, relaxation, emotional exhaustion, daily diary study

## Tägliche technologiegestützte Zusatzarbeit und ihre Auswirkungen auf gedankliches Abschalten und emotionale Erschöpfung

**Zusammenfassung:** Technologiegestützte Zusatzarbeit (TASW) ist zu einer häufigen Anforderung von flexiblen Arbeitsmodellen geworden. Aufbauend auf dem Effort-Recovery-Modell haben wir untersucht, wie sich zwei TASW-Ereignisse nach der Arbeit (Fortsetzung von Arbeitsaufgaben, Kontaktaufnahme durch andere) auf gedankliches Abschalten und Entspannung am Abend und somit die emotionale Erschöpfung am nächsten Morgen auswirken. Mit einem ereignisorientierten Ansatz haben wir tägliche Tagebuchdaten von 215 Beschäftigten (686 tägliche Beobachtungen an fünf aufeinanderfolgenden Arbeitstagen) analysiert. Die Ergebnisse der Multilevel-Pfadanalyse zeigten einen negativen direkten Effekt beider TASW-Ereignisse auf gedankliches Abschalten und von der Kontaktaufnahme durch andere auf Entspannung. Dasselbe Muster wurde für die indirekten Effekte auf Erschöpfung gefunden. Die direkten Beziehungen zwischen TASW-Ereignissen und emotionaler Erschöpfung waren nicht signifikant. Wir kommen zu dem Schluss, dass Beschäftigte TASW nach Möglichkeit vermeiden sollten, um sich ausreichend von der Arbeit zu erholen und erfrischt in den nächsten Arbeitstag zu starten.

**Schlüsselwörter:** Technologiegestützte Zusatzarbeit, gedankliches Abschalten, Entspannung, emotionale Erschöpfung, Tagebuchstudie

Information and communication technologies (ICT), such as laptops, smartphones, and corresponding software solutions (e.g., messenger services or cloud work), increase work flexibility in terms of time and place. As a consequence, employees are able to engage in technology-assisted supplemental work (TASW; Fenner & Renn, 2010). In recent years, TASW has become the norm rather than the exception. In

2022, 39% of the German workforce engaged in work-related tasks outside their regular working hours at least once per week, while approximately 53% were expected to be available for work contacts during off-job time (DGB-Index Gute Arbeit, 2023).

TASW is defined as performing work-related tasks after regular work hours with the help of ICT (Fenner & Renn,

2010). TASW can be performed from home or other places outside one's workplace (e.g., a park, a friend's home, or while on vacation; Fenner & Renn, 2010) and includes various self-initiated (e.g., continuing a work task) and other-initiated (e.g., being contacted and answering work-related phone calls or messages) activities (Kühner et al., 2023). It can be used as an umbrella term for different constructs that refer to work-related ICT use during off-job time, such as work-related ICT or smartphone use after hours (Eichberger & Zacher, 2021).

TASW is a “double-edged sword” (Kühner et al., 2023, p. 15). Meta-analytic results indicate that TASW is associated with higher levels of job satisfaction, performance, and work engagement. At the same time, TASW has shown negative consequences on employee health and well-being (Kühner et al., 2023) – among others, on emotional exhaustion. Turning to the day level, initial studies have also confirmed negative daily relationships of TASW with emotional exhaustion (Derks et al., 2014; Zinke et al., 2024). Given that during the COVID-19 pandemic many employees reported increased emotional exhaustion in response to the high flexibilization of work (e.g., Costin et al., 2023), further exploring the relationship between TASW and well-being outcomes is of relevance for employees.

Furthermore, diary studies revealed that TASW is negatively related to the recovery experience of psychological detachment (e.g., Eichberger et al., 2021; Kunz et al., 2024). A diary study has also shown a negative relationship with relaxation (e.g., Derks & Bakker, 2014). Both recovery experiences help to replenish previously depleted resources and are beneficial for a variety of health and well-being outcomes including emotional exhaustion (see also a meta-analysis by Headrick et al., 2023). However, they relate to different recovery processes, with *psychological detachment* referring to the cognitive process of mentally distancing oneself from work-related thoughts, and *relaxation* referring to a physical–emotional process that targets physical relaxation and low arousal (Sonnentag & Fritz, 2007). In this study, we compared the two complementary recovery experiences by investigating both mediating processes in parallel.

Most studies on TASW focused on the *intensity* of TASW, for example, by asking for the duration of TASW in minutes (e.g., Heissler et al., 2022; Lanaj et al., 2014) and concluded that TASW should be avoided whenever possible. In this study, we focus on the mere occurrence of TASW. Furthermore, we explore whether the other-initiated TASW event of “being contacted” by work-related contacts via phone or e-mail has a more detrimental effect on recovery experiences and emotional exhaustion (compared to the self-initiated TASW event of continuing work tasks).

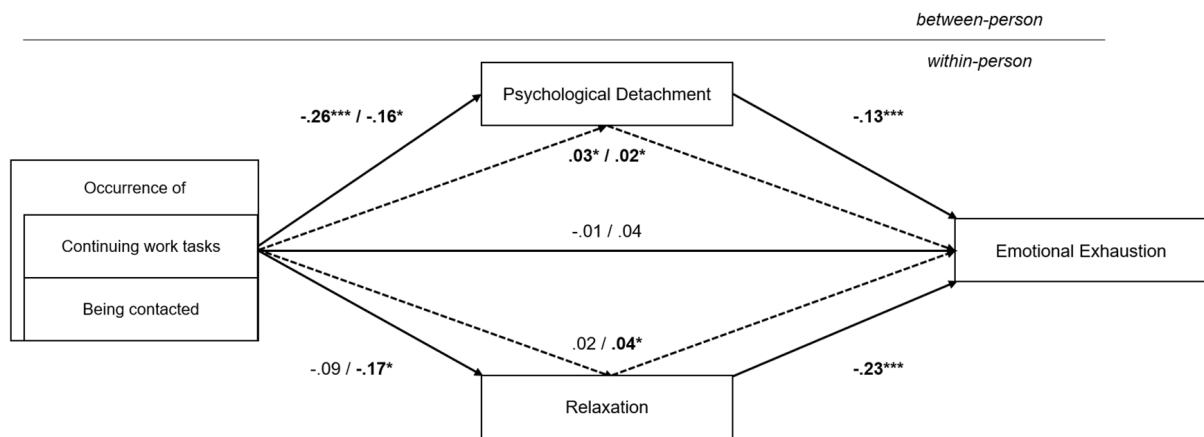
We make the following contributions to scholarly knowledge. First, using a daily diary design, we investigate whether the mere occurrence of TASW events increases employees' emotional exhaustion regardless of their specific characteristics such as the duration, intensity, or valence of the events. We chose emotional exhaustion as a relevant health outcome and core dimension of burnout (Maslach et al., 2001) that has shown substantial day-level variance (Lee et al., 2023). In addition, we consider two mediating mechanisms that facilitate recovery from work in the evening: psychological detachment and relaxation. Doing so, this study is the first to consider two complementary recovery experiences, a cognitive and a physical–emotional process, as two parallel mediators in the relationship between TASW and emotional exhaustion, thus comparing both mechanisms in one model.

Second, we distinguish between two TASW events: (a) continuing work tasks and (b) being contacted. Assuming that both types of TASW events affect psychological detachment, relaxation, and emotional exhaustion in a similar way, we explore whether the magnitude of the effects varies between the types of TASW events. In summary, building on the effort–recovery model (ERM; Meijman & Mulder, 1998), we examine the effects of two distinct TASW events on emotional exhaustion via psychological detachment and relaxation as parallel mediators within one model in a daily diary study over five consecutive workdays (see Figure 1).

## Theoretical Background

### TASW Events and Recovery Experiences

*TASW events* are discrete happenings that involve the use of ICT for performing work-related tasks after regular working hours (Fenner & Renn, 2010; Kunz et al., 2024). As TASW events occur – per definition – solely after hours, they can be understood as interruptions of one's off-job time. According to the ERM (Meijman & Mulder, 1998), this off-job time is a period of recovery during which employees replenish their cognitive, emotional, and physical resources that they use to handle job stressors. When they are no longer confronted with these job stressors and no longer engage in work behaviors, they can replenish their resources, resulting in sufficient recovery during the evening (Meijman & Mulder, 1998). According to Sonnentag and Fritz (2007), there are two important recovery experiences that help to replenish resources: psychological detachment (i.e., not thinking about work-related issues during off-job time) and relaxation (i.e., reaching a state of low activation). They differ in the underlying process: Psychological detachment occurs on a cognitive



**Figure 1.** Within-person results of the multilevel path analysis. Paths with two coefficients refer to paths with the occurrence of TASW events as predictors. The first coefficient represents the results for occurrence of continuing work tasks, and the second coefficient represents the results for occurrence of being contacted. Solid lines represent direct effects, dotted lines represent indirect effects. \* $p < .05$ ; \*\*\* $p < .001$  (one-tailed).

level, whereas relaxation resembles a physical–emotional process (Sonnentag & Fritz, 2007).

When engaging in TASW, employees continue to use their cognitive, emotional, or physical resources instead of using their off-job time to replenish them. First, employees keep thinking about their work and they experience an enduring *mental* activation. Several diary studies have indeed revealed negative relationships between TASW and psychological detachment (e.g., Braukmann et al., 2018; Eichberger et al., 2021; Kunz et al., 2024; Reinke & Ohly, 2021). At the same time, employees may also experience an enduring *physical-emotional* activation, characterized by low levels of relaxation when engaging in TASW. Relaxation is a state of low activation and higher positive affect (Sonntag & Fritz, 2007). Research on relaxation in the TASW context is scarce, but initial diary studies found negative relationships between different kinds of supplemental work and relaxation (e.g., Derks & Bakker, 2014; Weigelt & Syrek, 2017). Moreover, previous studies have shown negative relationships between job stressors related to overload and relaxation, such as time pressure (Chawla et al., 2020; Sonnentag & Fritz, 2007) and workload (Gillet et al., 2020).

TASW events entail insufficient time to reach a state of low mental and physical–emotional activation. We therefore propose that employees who experience TASW events after hours are more likely to report lower levels of psychological detachment and relaxation in the evening:

*Hypothesis 1 (H1):* The occurrence of TASW events after hours is associated with lower (a) psychological detachment and (b) relaxation in the evening.

## TASW Events and Emotional Exhaustion

Emotional exhaustion refers to “feelings of being overextended and depleted of one’s emotional and physical resources” (Maslach et al., 2001, p. 399) and is one of three main symptoms of burnout (Maslach et al., 2001). As such, emotional exhaustion represents a critical strain outcome (i.e., poor health and well-being) that results from daily (Lee et al., 2023) and chronic exposure to job stressors (Maslach et al., 2001). In line with the ERM (Meijman & Mulder, 1998), being confronted with job demands after hours is associated with higher levels of emotional exhaustion. More specifically, previous diary studies found positive relationships between TASW and emotional exhaustion (e.g., Derks & Bakker, 2014; Derks et al., 2014). These studies also showed that TASW and emotional exhaustion can vary from day to day (e.g., Derks & Bakker, 2014; Derks et al., 2014). Building on the ERM and these empirical findings, we hypothesize:

*Hypothesis 2 (H2):* The occurrence of TASW events after hours is associated with higher levels of emotional exhaustion the following morning.

## The Mediating Role of Recovery Experiences in the Relationship Between TASW Events and Emotional Exhaustion

Turning to the relationship between recovery experiences and emotional exhaustion, the literature has shown that, on a daily basis, sustained mental activation after hours prevents employees from sufficient psychological detachment after work, resulting in higher levels of emotional exhaustion (e.g., Chawla et al., 2020; Derks et al., 2014; see also Headrick et al., 2023, for a meta-analysis). Likewise, lower levels of relaxation have been found to be associated with higher levels of emotional exhaustion

in diary studies (e.g., Chawla et al., 2020; Derks & Bakker, 2014; see also Headrick et al., 2023). Building on these empirical findings and the assumption of the ERM, we hypothesize:

*Hypothesis 3 (H3):* (a) Psychological detachment and (b) relaxation in the evening are associated with lower levels of emotional exhaustion the following morning.

Building on the direct effects outlined in the previous sections and in line with the ERM (Meijman & Mulder, 1998), we can assume indirect effects of TASW on emotional exhaustion via psychological detachment and relaxation. For psychological detachment, this assumption has been supported in longitudinal and diary studies that investigated the effects of general job stressors (e.g., Clauss et al., 2021; Sonnentag et al., 2010; see also Sonnentag & Fritz, 2015) as well as of TASW-related constructs (e.g., Derks et al., 2014; Dettmers, 2017; Zinke et al., 2024) on emotional exhaustion. With regard to relaxation, we can only draw on evidence from studies with related constructs. For example, a daily diary study showed that relaxation mediated the effect of goal-frustration events at work and energy the next morning (Parker et al., 2020). However, these studies have not considered TASW-related constructs.

In summary, we expected that on days when employees experience TASW events, they will report lower levels of psychological detachment and relaxation in the evening, which results in higher levels of emotional exhaustion the next morning. We hypothesize:

*Hypothesis 4 (H4):* The occurrence of TASW events after hours has a positive indirect effect on emotional exhaustion the following morning via (a) psychological detachment and (b) relaxation in the evening.

### Additional Research Question

Whereas we postulate the same direction for the effects of both TASW events – “being contacted” and “continuing work tasks” – on psychological detachment, relaxation, and emotional exhaustion, we explore whether these effects differ in their magnitude. Initial empirical findings provide evidence that TASW events initiated by others are more detrimental for well-being outcomes than self-initiated events. Being contacted can be considered a more other-initiated TASW event (compared to continuing work tasks, which is more self-initiated) and, therefore, may be linked to less control over the event (e.g., Höge et al., 2016; Khalid et al., 2022; Kühner et al., 2023). As such, being contacted may be associated with higher levels of controlled motivation, that is, employees are extrinsically motivated or even forced to engage in this TASW event

(e.g., Deci & Ryan, 2000; Ohly & Latour, 2014). Several studies confirm this assumption: They reveal that controlled motivation to engage in TASW has been related to lower levels of psychological detachment (Ohly & Latour, 2014) and higher levels of emotional exhaustion (Huo et al., 2023). Moreover, in a recent daily diary study, participants reported lower levels of psychological detachment when TASW was other-initiated than when it was self-initiated (Chen et al., 2024). A longitudinal study on related outcomes showed that the positive relationship between TASW and work–family conflict was stronger for other-initiated events than for self-initiated events (Khalid et al., 2022). Finally, in a cross-sectional study, other-initiated TASW was positively related to work–family conflict, whereas self-initiated TASW and work–family conflict were unrelated (Höge et al., 2016). To our knowledge, there are no studies on the relationship of the initiator of TASW with relaxation and emotional exhaustion. We therefore explore the following research question:

*Research Question:* Is the proposed negative relationship of other-initiated TASW events (i.e., being contacted) with psychological detachment, relaxation, and, in turn, emotional exhaustion stronger compared to self-initiated TASW events (i.e., continuing work tasks)?

## Method

### Sample and Procedure

We conducted an online survey in Germany in November 2020. In a previous paper, the overall occurrence of TASW events and psychological detachment were used as predictor and mediator of work engagement in a preliminary analysis (Kunz et al., 2024). In that paper, TASW events were not differentiated into continuing work tasks and being contacted, and only a subsample was considered for the main analysis. A transparency table that maps the variables to the different studies can be found in Electronic Supplementary Material 1 (ESM 1). Respondents were recruited via an online panel provider (respondi AG, <https://www.respondi.com>). Registration to this panel is free of charge and open to everyone. Participants collect points for their participation that can be exchanged for different kinds of compensation (e.g., selectable vouchers).

Participants were invited by the panel provider to participate in a general survey. The following week, the provider sent out invitation e-mails to two daily surveys (morning and bedtime surveys) over five consecutive workdays (Monday to Friday). The morning survey had to

be completed before work and took approximately 5 min. The bedtime survey had to be completed before going to bed and took approximately 2 min. At the beginning of the daily surveys, we asked participants to indicate whether they planned to work (morning survey) or if they had worked on the respective day (evening survey). If they did not, they could not access the surveys.

In the general survey, we assessed demographic variables, obtained informed consent from all individual participants, and checked the fulfillment of the inclusion criteria: Respondents had to work (a) regularly between 6 a.m. and 8 p.m. and (b) at least 20 hr per week. They (c) had to generally engage in TASW and (d) were not allowed to perform on-call duty or shiftwork. For our final sample, we included only matching day-level survey sets (evening and the following morning) provided by participants with a processing time per item of more than 1 s for all daily surveys. Consequently, we excluded data from Monday morning and Friday evening, resulting in a maximum of four matching survey sets per person.

Overall, 466 respondents met all the inclusion criteria. Respondents were excluded for (a) failing to provide at least one matching day-level survey set ( $n = 240$ ) and (b) having a processing time per item of less than 1 s ( $n = 11$ ). The final sample comprised 215 participants (89 women, 41.4%) who completed a total of 686 daily survey sets. The mean age was 43.69 years ( $SD = 11.16$ , range = 20–65 years), and 32.6% of participants reported having at least one child living at home. The professional experience of participants ranged from 1 to 46 years ( $M = 15.52$  years,  $SD = 11.91$ ). Participants worked in diverse industries, including the service sector (23.3%), finance and insurance (9.8%), and IT/telecommunications (8.4%). Their mean working time was 38.65 hr per week ( $SD = 6.39$ , range = 20–60 hr). Participants had full-time jobs (79.1%), part-time jobs (10.7%), or were self-employed (10.2%). The most frequent level of education among participants was a master's degree or diploma (30.2%), followed by vocational training (25.6%), a high school degree (13.0%), and a bachelor's degree (11.6%). Leadership responsibilities were reported by 30.7% of participants.

## Daily Measures

### TASW Events

We measured the occurrence of TASW events after hours in the evening survey. Our aim was to assess the occurrence of a TASW event without including evaluations or valence, which has frequently been done in previous studies (e.g., reasons for engaging in TASW, Fenner & Renn, 2010; feeling impelled to reply when contacted,

Derks & Bakker, 2014). In doing so, we steered away from mixing stressor and reaction. To assess the mere occurrence of a TASW event, we built on the TASW event taxonomy by Braukmann et al. (2018). We identified two TASW events that could be phrased neutrally. Participants were instructed to consider only events in which technology had been used to exclude similar events without technological assistance (e.g., running errands for the office or reading a book). The items read “Today, in my free time, I continued to work on or completed unfinished work tasks” (continuing work tasks) and “Today, I was contacted in my free time for professional reasons (e.g., via smartphone, e-mail, SMS)” (being contacted). Response options were 0 (*no*) or 1 (*yes*).

### Recovery Experiences

We measured psychological detachment and relaxation with regard to the previous evening in the morning survey. We used four items for each recovery experience from the Recovery Experience Questionnaire (REQ; Sonnentag & Fritz, 2007), which were adapted for day-specific assessment. Sample items are “Yesterday evening, I forgot about work” for psychological detachment and “Yesterday evening, I used the time to relax” for relaxation. Responses were provided on a 5-point Likert scale ranging from 1 (*I fully disagree*) to 5 (*I fully agree*). Reliability was very good across levels for both psychological detachment (Cronbach's  $\alpha_{\text{within}} = .88$ ,  $\omega_{\text{within}} = .87$ ; Cronbach's  $\alpha_{\text{between}} = .98$ ,  $\omega_{\text{between}} = .98$ ) and relaxation (Cronbach's  $\alpha_{\text{within}} = .84$ ,  $\omega_{\text{within}} = .84$ ; Cronbach's  $\alpha_{\text{between}} = .97$ ,  $\omega_{\text{between}} = .97$ ).

### Emotional Exhaustion

We measured emotional exhaustion in relation to the present moment in the morning survey using five items from the German version (Büssing & Glaser, 1998) of the Maslach Burnout Inventory – General Survey (MBI-GS; Maslach et al., 1996). A sample item is “At this moment, I feel emotionally drained from my work.” Responses were provided on a 5-point Likert scale ranging from 1 (*I fully disagree*) to 5 (*I fully agree*). Reliability was very good across levels (Cronbach's  $\alpha_{\text{within}} = .82$ ,  $\omega_{\text{within}} = .82$ ; Cronbach's  $\alpha_{\text{between}} = .97$ ,  $\omega_{\text{between}} = .97$ ).

To examine the construct validity of our measures, we conducted multilevel confirmatory factor analyses (CFA) with latent factors at both the day and the person level. We specified a two-level model with three factors (psychological detachment, relaxation, and emotional exhaustion) at both levels. This model ( $\chi^2 = 392.152$ ,  $df = 124$ ,  $p < .001$ ; comparative fit index [CFI] = .958; Tucker-Lewis index [TLI] = .947; root mean square error of approximation [RMSEA] = .056; standardized root mean squared residual [SRMR]<sub>within</sub> = .041; SRMR<sub>between</sub> = .048) fit the data better than the alternative models (model with

two factors: emotional exhaustion as one factor, psychological detachment and relaxation as a “recovery” factor on both levels; model with three factors at the day level and one overall factor at the person level; model with one overall factor at each level).

### Analytical Strategy

We used IBM SPSS Statistics (Version 28) for data preparation and R Version 4.3.2 for all other analyses. In our sample, days were nested within individuals. Therefore, we calculated the intraclass coefficients (ICCs) using the multilevel package (Bliese, 2022) and found substantial between-person variance for all five day-level variables (see Table 1). Consequently, we conducted multilevel path analysis using the lavaan package (Rosseel, 2012) and applied the maximum likelihood (ML) estimation method.

To test our directional hypotheses, we applied one-tailed tests of statistical significance (as recommended by LaHuis & Ferguson, 2009; Preacher et al., 2010; Preacher et al., 2011) and included the occurrence of both TASW events as separate predictors to answer our research question. We followed recommendations by Preacher et al. (2010) and modeled all relationships among our day-level variables on both analytical levels<sup>1</sup>. This approach decomposes the variance of day-level variables into latent between-person and within-person components and, therefore, avoids variance conflation. Hence, within-person relationships are represented in path estimates at the day level. Between-person relationships are represented in path estimates at the person level. Consequently, a centering of variables is not necessary (Preacher et al., 2010). To test indirect relationships, we used Monte Carlo simulation procedures, as recommended by Preacher and Selig (2012). Specifically, we used the semTools package (Jorgensen et al., 2022) in R with 20,000 replications. We calculated 90 % Monte Carlo confidence intervals (CIs) to account for the one-tailed significance tests.

To answer our research question, we followed recommendations by Schenker and Gentleman (2001). Specifically, we used the day-level estimated regression weights of continuing work tasks and being contacted as the respective outcomes and calculated 95% CIs of their differences.

## Results

### Descriptive Analysis

The 215 participants in our final sample provided 686 full survey sets ( $M = 3.19$  full survey sets per person). In sum, they experienced 321 TASW events on 245 days (35.8% of days), yielding a mean of 0.36 events per day. By contrast, on 441 days (64.3% of days), no TASW event occurred. We found that employees reported the occurrence of continuing work tasks more often (183 times) than the occurrence of being contacted (138 times). On 76 days, participants experienced both TASW events; on 169 days, either continuing work tasks or being contacted occurred. Table 1 presents the means, standard deviations, and intercorrelations among the study variables at the day and person level as well as the ICC. Most variables correlated as expected. However, against expectations, continuing work tasks revealed no significant correlation with relaxation at the person level and emotional exhaustion at both levels. Further, we found no significant correlation between being contacted and relaxation on both levels or with emotional exhaustion on the person level.

### Hypothesis Testing

Table 2 displays the results of the multilevel path analysis of our overall two-level model with parallel paths on both levels and within-person pathways modeled as fixed slopes<sup>2</sup>. The person-level results are presented in Table 2. In line with our assumptions, continuing work tasks ( $b = -.26, p < .001$ ) and being contacted ( $b = -.16, p = .034$ ) were negatively related to psychological detachment in the evening, thus supporting Hypothesis 1a. Whereas continuing work tasks was not related to relaxation in the evening ( $b = -.09, p = .101$ ), being contacted was negatively related to relaxation in the evening ( $b = -.17, p = .016$ ), thus supporting Hypothesis 1b partially. Contrary to our expectations, neither continuing work tasks ( $b = -.01, p = .586$ ) nor being contacted ( $b = -.04, p = .719$ ) were directly related to emotional exhaustion the next morning. Therefore, Hypothesis 2 was not supported. Further, psychological detachment ( $b = -.13, p < .001$ ) and relaxation ( $b = -.23, p < .001$ ) in the evening were negatively

<sup>1</sup> In this study, we considered age, sex, underaged children, and having leadership responsibilities as control variables. We found three significant person-level correlations between the control and study variables. Age was negatively associated with emotional exhaustion and positively associated with relaxation. Underaged children correlated positively with psychological detachment. We tested our hypotheses both with and without these control variables and obtained identical results. Therefore, we report the results of the analysis without any control variables.

<sup>2</sup> We also ran the model with slopes modeled as random in Mplus 8.9 (Muthén & Muthén, 2017). Results showed that there was no significant variance in the slope estimates on the between-person level. Therefore, we proceeded with all paths modeled as fixed slopes.

**Table 1.** Means, standard deviations (SDs), ICCs, and intercorrelations among study variables

Variable	<i>M</i>	<i>SD<sub>b</sub></i>	<i>SD<sub>w</sub></i>	ICC	1.	2.	3.	4.	5.
1. Continuing work tasks <sup>a</sup>	.27	.326	.443	.258		.322***	-.209***	-.078*	.070
2. Being contacted <sup>a</sup>	.21	.308	.401	.303	.293***		-.139***	-.022	.080*
3. Psychological detachment	3.58	.865	.989	.607	-.244***	-.167*		.645***	-.443***
4. Relaxation	3.68	.751	.872	.577	-.090	.017	.693***		
5. Emotional exhaustion	2.42	.881	.953	.754	.100	.130	-.449***	-.410***	

Note. *M* = person-level mean; *SD<sub>b</sub>* = person-level standard deviation; *SD<sub>w</sub>* = day-level standard deviation; ICC = intraclass correlation (ICC1). Correlations below the diagonal are person-level correlations (*N* = 215), and correlations above the diagonal are day-level correlations (*N* = 686). <sup>a</sup>0 = no / did not occur, 1 = yes / did occur. \**p* < 0.05; \*\*\**p* < 0.001 (two-tailed).

**Table 2.** Results of the multilevel path analysis

Level and variable	Psychological detachment (PD)			Relaxation (R)			Emotional exhaustion		
	Est.	SE	<i>z</i> ( <i>p</i> )	Est.	SE	<i>z</i> ( <i>p</i> )	Est.	SE	<i>z</i> ( <i>p</i> )
<b>Person level</b>									
Intercept	3.86	.12	33.66 (.000)	3.69	.10	36.05 (.000)	4.65	.37	12.54 (.000)
Continuing work tasks (WT) <sup>a</sup>	-.90	.41	-2.19 (.014)	-.44	.37	-1.19 (.117)	-.16	.40	-.41 (.660)
Being contacted (C) <sup>a</sup>	-.20	.40	-.50 (.309)	.50	.35	1.41 (.080)	.55	.39	1.41 (.080)
Psychological detachment (PD)							-.35	.13	-2.79 (.003)
Relaxation (R)							-.29	.14	-2.00 (.023)
							<b>Est.</b>		<b>90 % CI</b>
Indirect effect WT→PD							.31		[.049; .669]
Indirect effect WT→R							.12		[-.047; .379]
Indirect effect C→PD							.07		[-.165; .313]
Indirect effect C→R							-.14		[-.408; .023]
<b>Day level</b>									
Continuing work tasks (WT) <sup>a</sup>	-.26	.08	-3.33 (.000)	-.09	.07	-1.28 (.101)	-.01	.06	-.22 (.586)
Being contacted (C) <sup>a</sup>	-.16	.09	-1.83 (.034)	-.17	.08	-2.15 (.016)	-.04	.06	-.58 (.719)
Psychological detachment (PD)							-.13	.04	-3.20 (.000)
Relaxation (R)							-.23	.04	-5.39 (.000)
							<b>Est.</b>		<b>90 % CI</b>
Indirect effect WT→PD							.03		[.012; .059]
Indirect effect WT→R							.02		[-.006; .051]
Indirect effect C→PD							.02		[.002; .045]
Indirect effect C→R							.04		[.009; .076]
<i>R</i> <sup>2</sup> person-level		.084			.029			.276	
<i>R</i> <sup>2</sup> day-level		.040			.018			.158	

Note. *N*<sub>persons</sub> = 215, *N*<sub>days</sub> = 686. Estimates are unstandardized estimates from one two-level model test in R using the lavaan package (Rosseel, 2012). Consistent with our specification of directional hypotheses, one-tailed tests of statistical significance are reported. <sup>a</sup>0 = no / did not occur, 1 = yes / did occur. WT→PD = indirect effect of continuing work tasks on emotional exhaustion via psychological detachment; WT→R = indirect effect of continuing work tasks on emotional exhaustion via relaxation; C→PD = indirect effect of being contacted on emotional exhaustion via psychological detachment; C→R = indirect effect of being contacted on emotional exhaustion via relaxation; SE = standard error.

related to emotional exhaustion the next morning, supporting Hypotheses 3a and 3b. Regarding the mediation hypothesis, psychological detachment in the evening mediated the corresponding positive relationships between continuing work tasks ( $b = .03$ , 90 % CI [.01, .06]) as well as being contacted ( $b = .02$ , 90 % CI [.00, .05]) and emotional exhaustion the next morning, supporting Hy-

pothesis 4a. In the case of relaxation, we found a positive indirect effect of being contacted ( $b = .04$ , 90 % CI [.01, .08]) but not of continuing work tasks ( $b = .02$ , 90 % CI [-.01, .05]) on emotional exhaustion the next morning, thus supporting Hypothesis 4b partially.

Finally, regarding our research question, we explored whether the effects of both TASW events on well-being

outcomes differed. To rigorously test for statistical differences in the magnitude of the effects reported above, we conducted two-tailed significance tests (Preacher et al., 2011; Preacher et al., 2010). The 95% CIs for the differences in the direct effects on psychological detachment (estimate =  $-0.10$ , 95% CI [ $-.32$ ,  $.13$ ]), relaxation (estimate =  $0.08$ , 95% CI [ $-.13$ ,  $.29$ ]), and emotional exhaustion (estimate =  $0.02$ , 95% CI [ $-.14$ ,  $.19$ ]) contained zero. Similarly, the 95% CI for the difference in the indirect effects via psychological detachment (estimate =  $0.01$ , 95% CI [ $-.03$ ,  $.05$ ]) and relaxation (estimate =  $-0.02$ , 95% CI [ $-.07$ ,  $.03$ ]) on emotional exhaustion contained zero. These results indicate that the effects of both TASW events on the other study variables do not differ significantly in their magnitude.

## Discussion

### Effects of TASW Events on Psychological Detachment, Relaxation, and Emotional Exhaustion

This study aimed to investigate (a) whether the daily occurrence of TASW events impairs employees' emotional exhaustion via two parallel mediating mechanisms of psychological detachment and relaxation and (b) – with a more exploratory approach – to investigate whether the magnitude of effects differs between the two TASW events continuing work tasks and being contacted. On the day level, our results indicate that, as expected, both TASW events, continuing work tasks and being contacted, are associated with a lack of psychological detachment, which, in turn, is associated with higher levels of emotional exhaustion the following morning, thus confirming the expected mediating mechanism. This lack of psychological detachment can be understood as sustained mental activation (Meijman & Mulder, 1998; Sonnentag & Fritz, 2015) during which employees are unable to replenish their cognitive resources. Accordingly, employees start the next day depleted and show higher levels of emotional exhaustion. For relaxation, the effects are less consistent. Being contacted was negatively related to relaxation, but continuing work tasks was not related. Accordingly, we only found a mediating effect of relaxation for the association of being contacted and emotional exhaustion.

Turning to the direct effects, neither TASW event had a direct association with emotional exhaustion, but the effects of both events unfolded indirectly through recovery experiences. This is in line with the stressor-detachment model (Sonnentag & Fritz, 2015), which emphasizes that it may not be the sustaining confronta-

tion with job stressors that is detrimental to employees' health and well-being but rather the enduring activation (see also Sonnentag & Fritz, 2015).

### Differences Between TASW Events

On the basis of theoretical assumptions regarding the motivation to engage in TASW and findings from previous studies, we investigated whether both TASW events differ in the magnitude of their effects. Specifically, we tested whether being contacted (resembling an other-initiated TASW event, which involves controlled motivation; see Theoretical Background section) would be more detrimental for psychological detachment, relaxation, and emotional exhaustion than continuing work tasks. Building on self-determination theory (Deci & Ryan, 2000), we assumed that a self-initiated TASW event such as continuing work tasks would be associated with higher levels of autonomous motivation (i.e., employees are more intrinsically motivated and self-determined). Thus, employees are provided with more control over whether they wish to engage in a work task after hours or not, rendering effects less detrimental for recovery and well-being outcomes. However, this assumption was not supported in our study. Although we only found direct and mediating effects of being contacted (and not of continuing work) on relaxation, the comparison of estimates tested with the research question did not reveal statistically significant differences.

In the following, we discuss potential reasons for the lack of differences between both TASW events and outline avenues for future research. From a theoretical perspective, the originally proposed stronger effect of being contacted on psychological detachment and relaxation may be counteracted by opposing processes. First, continuing work tasks after hours could also be regarded as a form of self-endangering work behavior. When employees cannot finish their work within the regular work hours, they may decide to work longer in the evening. Though self-initiated, this decision may not be an autonomous or free decision after all but may stem from high workload and the pressure of finishing work tasks (Kühner et al., 2023). Research on self-endangering work behaviors shows that when employees are confronted with high workload, they are likely to react to this job demand by extending their working time (Dettmers et al., 2016). Therefore, when workload is high, continuing work tasks after hours may involve lower levels of autonomous motivation than expected as employees are forced into this supplemental work. With regard to well-being outcomes, research has shown that self-endangering behaviors, such as working longer, are associated with fatigue (Hoppe et al., 2023) and irritation (Baethge et al., 2019) –

variables associated with emotional exhaustion. Future studies should therefore include workload as an additional predictor or moderator when investigating the effects of TASW on well-being outcomes, as suggested by Eichberger et al. (2021).

Second, we address a methodological challenge for the assessment of psychological detachment in the evening and while engaging in TASW. TASW events are, per definition, associated with thinking about work-related issues and, thus, a lack of psychological detachment. As employees stop engaging in TASW at some point in the evening but most likely will not go directly to sleep (e.g., they get ready for bed, may read a book in bed, and need a few minutes in bed to fall asleep), we assessed psychological detachment regarding the previous evening in the morning surveys to capture most of the time between the end of the workday and employees going to sleep. However, depending on the TASW event, employees may detach at various points during the evening. For example, employees may already decide to continue a task when they end their workday (Gadeyne et al., 2023; Heissler et al., 2022). From this moment on, they may have a persisting mental activation related to the upcoming task until they stop working on it in the evening. Once they have finished their work, they may be able to detach (Heissler et al., 2022; Weigelt & Syrek, 2017). On the other hand, one may assume that in the case of being contacted, employees can more easily detach from work until they are contacted. The detachment process starts after they end their workday and is only interrupted when being contacted (e.g., when answering a call). However, they may continue to think about work after being contacted and may have problems to detach afterwards. Thus, even though there is a clear difference between the TASW events with regard to the motivation to engage in them, the effect on psychological detachment may not differ to the extent expected, given that both TASW events involve continuous thinking about work-related issues (either before or after the TASW event). To disentangle these processes, multiple measurements of rumination in the evening (e.g., after work and before going to bed) along with an overall assessment of psychological detachment the next morning could provide a more precise picture. In addition, assessing the number of TASW occurrences in the evening along with their duration, ideally with time stamps, would provide precise information on how often and how long the recovery period was interrupted. Challenges in conducting such an intensive study need to be carefully considered and counterbalanced.

Third, diving deeper into the duration of TASW, the assumed longer duration of continuing work tasks may outperform the positive aspects of having more control

over the event. When employees are contacted (e.g., they are called or receive an e-mail) after hours, this event should be of short duration because specific concerns can be dealt with in a short time. By contrast, continuing work tasks may be of a longer duration. First, the technical setup must be established (e.g., switching on the computer, establishing a VPN connection, starting the programs). Second, the actual work on a specific task may take more time than providing information via e-mail or during a call. Consequently, the interruption of one's off-job time may be longer for continuing work tasks than for being contacted, which, in turn, means that employees have less time to detach from work afterwards. Indeed, previous studies found that a longer duration of TASW was related to lower levels of psychological detachment (Chen et al., 2024; Heissler et al., 2022) and poorer well-being (i.e., lower sleep quantity; Lanaj et al., 2014).

## Practical Implications

In this study, the mere occurrence of TASW events was negatively related to psychological detachment and relaxation in the evening, which resulted in higher levels of emotional exhaustion the following day. Further, the effects did not differ in their magnitude between continuing work tasks and being contacted. We thus conclude that engaging in TASW should be avoided whenever possible to maintain and improve employee recovery and well-being. Moreover, organizations should support employees' recovery by encouraging them to create boundaries between their life domains (e.g., Eichberger et al., 2021; Reinke & Ohly, 2021, 2024). Employees should be aware of the consequences of TASW and learn to effectively recover from work. Organizations can facilitate this by offering workshops and training to teach employees recovery strategies and self-regulation (e.g., Hahn et al., 2011; Michel et al., 2023). On the one hand, this may help employees to learn how to detach from work or relax better even when they experience TASW events. On the other hand, they may identify alternatives to reach sufficient recovery even when they are unable to detach or relax (e.g., by engaging in activities aimed at mastery; Sonnentag & Fritz, 2007).

## Limitations and Future Research

The first limitation concerns the operationalization of the TASW events. We distinguished between continuing work tasks and being contacted and used a single item for each event. On the one hand, both contain a summarized range of different activities (e.g., being contacted via different

ways such as calls or e-mails) and represent two prototypical interruptions of one's off-job time (Sonntag et al., 2024). However, in doing so, we excluded other events (e.g., self-initiating a call) and cannot rule out that the events were related to each other (e.g., working on a task after being called by one's supervisor or receiving a call after asking a colleague for information). To overcome this issue, future research may separate the items on TASW and the initiator (e.g., as done by Chen et al., 2024, and Khalid et al., 2022). Furthermore, we only asked whether TASW events occurred after hours or not, but we did not ask for the frequency or duration. However, as discussed above, the relationships between both TASW events and other outcomes may depend on such quantitative characteristics (e.g., Chen et al., 2024; Lanaj et al., 2014). Therefore, future studies should also assess quantitative characteristics of both TASW events in addition to their occurrence. Moreover, as TASW events are, per definition, associated with a lack of psychological detachment, future studies may measure both variables multiple times during the evening to better understand whether TASW events are a predictor or, in fact, a consequence of a lack of psychological detachment (e.g., Heissler et al., 2022).

The second limitation of our study arises from the flexibility of work provided by ICT in general. As more and more employees work from home regularly and are more flexible in organizing their working hours (BAuA, 2022), the boundary between work and private life is increasingly blurred (Mullan & Wajcman, 2019). For example, employees can postpone their working hours until late in the evening to spend the afternoon with their children. Therefore, they may consider the afternoon as leisure and the evening hours as working time. This is specifically important, considering that data collection took place in November 2020, when the second wave of the COVID-19 pandemic had started. There were many restrictions in daily life during this period. For example, employees were forced to work from home whenever possible but often did not have the necessary equipment or workspace (Kniffin et al., 2021) or sufficient childcare. As a result, the boundaries between work and off-job time may have been even more blurred than in pre- or post-pandemic times. Consequently, participants may have considered the events as regular work events (i.e., work extension into the evening; Mullan & Wajcman, 2019) instead of TASW events (i.e., events that occur in their free time after work), which may have resulted in the low number of days with the occurrence of TASW events (35.7%).

Third, the period of one work week chosen for the survey may be too short for our sample. Specifically, participants reported the occurrence of TASW events less frequently than expected over the course of the survey week. We chose this period to retrieve a large sample and

keep the attrition rate low (e.g., Ohly et al., 2010). Also, previous studies on similar constructs had applied this survey period successfully and showed that it was a reasonable time frame (e.g., Eichberger et al., 2021; Reinke & Ohly, 2021). Nevertheless, future studies should consider longer survey periods (e.g., 2 weeks or several weeks spread over several months) to increase the number of days with TASW events. Besides increasing the variance in the data, this may also help to better understand long-term effects of TASW events. Whereas we did not find a significant direct relationship between TASW events and emotional exhaustion on a daily basis, it seems reasonable to assume that the accumulation of TASW events (i.e., experiencing many TASW events over the course of a few weeks) may represent an enduring stressor that can affect employees' emotional exhaustion directly.

## Conclusion

This study shows that the mere daily occurrence of TASW events after hours impairs employees' psychological detachment and relaxation and, in turn, increases their emotional exhaustion the following morning. These findings hold for both TASW events but are more consistent for psychological detachment than for relaxation. Overall, the findings provide additional support for the widespread recommendation that organizations and employees should respect off-job time to maintain employees' well-being and enable them to recover from work. For future studies, we recommend considering different aspects of TASW instead of an overall measure of TASW and investigating specific characteristics of TASW such as the initiator of TASW events, voluntariness to engage in TASW, and the duration of events in addition to their mere occurrence in order to better understand under which conditions TASW events are harmful to employees' well-being.

## Electronic Supplementary Material

The electronic supplementary material is available with the online version of the article at <https://doi.org/10.1026/0932-4089/a000447>

**ESM 1.** Transparency table displaying differences and overlaps between the present paper and another paper building on the same initial data set.

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**Conflict of interest**

All authors declare no conflict of interest.

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**Open Science**

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**Authorship**

Lea Katharina Kunz: conceptualization; data curation; formal analysis; investigation; methodology; project administration; visualization; writing – original draft; writing – review & editing. Antje Ducki: conceptualization; resources; supervision; writing – review & editing. Malte Roswag: formal analysis; writing – review & editing. Annekatrin Hoppe: conceptualization; resources; supervision; writing – review & editing.

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