

Recovery from Work: Advancing the Field Toward the Future

Sabine Sonnentag,¹ Bonnie Hayden Cheng,²
and Stacey L. Parker³

¹Department of Psychology, School of Social Sciences, University of Mannheim, Mannheim, Germany; email: sonnentag@uni-mannheim.de

²Department of Management and Strategy, Faculty of Business and Economics, The University of Hong Kong, Pok Fu Lam, Hong Kong; email: drbonnie@hku.hk

³Centre for Business and Organisational Psychology, School of Psychology, University of Queensland, St Lucia, Queensland, Australia; email: s.parker@psy.uq.edu.au

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Abstract

Unwinding and recovering from everyday work is important for sustaining employees' well-being, motivation, and job performance. Accordingly, research on work recovery has grown tremendously in the past few decades. This article summarizes research on recovery during work breaks, leisure-time evenings, weekends, and vacations. Focusing on day-level and longitudinal field studies, the article describes predictors as well as outcomes of recovery in different recovery settings and addresses potential between-group and cross-cultural differences. It presents findings from intervention research demonstrating that recovery processes can be improved by deliberate training programs. The article then discusses how future recovery research can address emerging themes relevant to the future of work—changing boundaries between work and nonwork life, increased reliance on teams and technology, and changes in employment arrangements. We conclude with an overall summary, open research questions, directions for methodological improvements, and practical implications.

1. INTRODUCTION

For decades, organizational stress researchers have focused on how work in general and job stressors in particular affect workers' well-being, health, and performance behaviors (Bliese et al. 2017). Apart from a few exceptions, questions of how workers use their nonwork time to undo the negative impact of stressful work did not receive much attention. Since the turn of the millennium, however, researchers have increasingly studied how workers unwind and recuperate from their daily work. This research area has grown exponentially over the years, as reflected in several meta-analyses (Bennett et al. 2018, Karabinski et al. 2021, Steed et al. 2019, Wendsche & Lohmann-Haislah 2017). These meta-analyses mainly focused on correlational patterns between variables and did not address the dynamic processes operating at the day level and over longer time periods. We review the organizational recovery literature with a specific focus on findings from day-level and longitudinal studies. We adopt this perspective because day-level studies allow for the examination of how recovery processes—along with their preceding factors and their potential consequences—unfold within relatively short time frames (hours, days, weeks). Longitudinal designs overcome limitations of cross-sectional studies and enable researchers to address longer-term processes, to gain insights into the time frame of underlying psychological mechanisms, and to rule out obvious alternative explanations for the assumed processes studied (e.g., reverse causation).

We start by explaining the recovery concept and presenting major theoretical frameworks used in recovery research. We introduce the distinction between recovery activities and recovery experiences. We then review research evidence on the outcomes of recovery during evening leisure time and weekends, both short term and longer term. Subsequently, we describe antecedents of recovery and discuss recovery in specific groups and cultures. We address recovery in specific settings such as work breaks and vacations. We present research evidence on the effectiveness of interventions targeting recovery before suggesting broad themes for future recovery research in light of how work will develop in the future. We conclude with an overall summary of findings and highlight important next steps in terms of questions to be answered, research methods to be used, and practices to be implemented by individuals and organizations. **Table 1** (see Section 12) summarizes the key issues resulting from our review.

2. THE RECOVERY CONCEPT

In the organizational literature, recovery refers to “unwinding and restoration processes during which a person’s strain level that has increased as a reaction to a stressor or any other demand returns to its prestressor level” (Sonnentag et al. 2017, p. 366). Typical psychological short-term strain symptoms occurring as a reaction to job demands include negative states characterized by high arousal such as distress, anger, and anxiety, as well as negative states characterized by low arousal such as fatigue, exhaustion, and depressed mood. These strain symptoms decrease after exposure to job demands has ended, with this recovery process being contingent on specific recovery activities (e.g., physical exercise) and experiences (e.g., psychological detachment from work). Recovery may occur within the work setting, for instance during breaks (Troughakos et al. 2008), and during leisure time in the evenings or in between shifts (Sonnentag et al. 2008), during weekends (Fritz & Sonnentag 2005), and longer periods such as vacations (Flaxman et al. 2012).

3. THEORETICAL FRAMEWORKS FOR STUDYING RECOVERY

Recovery research mainly builds on job-stress theories [particularly the effort-recovery model (ERM) (Meijman & Mulder 1998)] and resource theories [particularly the conservation of

resources (COR) framework (Hobfoll 1998)]. In line with the Allostatic Load Model (McEwen 1998), the ERM posits that facing high demands at work will lead to load reactions in the employee, which are experienced as physiological (e.g., increased cortisol levels) and psychological (e.g., fatigue) strain symptoms. When the employee is not exposed to further demands after the end of the work shift, load reactions are alleviated and strain symptoms decrease (i.e., recovery occurs). However, when demands continue to be present or mentally represented or when strain levels remain elevated due to other stressors, no recovery can take place and the employee returns to work for the next shift in a less than optimal state. As a consequence, load reactions accumulate over time. Thus, within the ERM, the absence of demands during nonwork time is essential for the recovery process. The COR framework puts its emphasis on the availability and use of resources that may help in the recovery process. According to this framework, working under high demands threatens employees' energetic and affective resources. To restore these resources that suffered during a demanding workday, employees will invest additional resources (e.g., time, exposure to satisfying experiences) that help to replenish the resources needed for the return to work. However, it remains relatively vague within the COR framework what characterizes the resources that are successfully invested during nonwork time and what makes these resources particularly effective in the recovery process.

4. RECOVERY ACTIVITIES AND RECOVERY EXPERIENCES AS CORE RECOVERY PROCESSES

Research on recovery has used two distinct, but interrelated, approaches to study the core process of recovery. One approach focuses on activities during which recovery occurs; the other focuses on the underlying psychological experiences. The activity approach refers to what people are doing during nonwork time, that is, what kind of activity they are pursuing. Such recovery activities include, for instance, physical exercise, engaging in a hobby, and socializing with friends and family. Recovery activities usually have a low-duty profile and can therefore be differentiated from other off-the-job activities that have a high-duty profile, such as household activities or childcare (Sonnentag 2001, Steed et al. 2019). Overall, recovery activities such as physical exercise, social activities, and low-effort activities are associated with well-being and feelings of recovery, whereas activities with a high-duty profile show the opposite pattern of findings (Sonnentag 2001, ten Brummelhuis & Bakker 2012, ten Brummelhuis & Trougakos 2014). However, the type of activity an individual pursues is only one factor relevant for well-being and feelings of recovery. The motivation for specific types of activities matters as well. For instance, high intrinsic motivation for activities with a high-duty profile can offset their usually positive association with exhaustion, and high intrinsic motivation for low-effort or physical activities can strengthen their relationship with feelings of recovery (ten Brummelhuis & Trougakos 2014).

The experience approach refers to psychological states people are in during nonwork time, that is, how they live through and experience their nonwork time. Sonnentag & Fritz (2007) developed an initial taxonomy of recovery experiences comprising psychological detachment from work, relaxation, mastery, and control. Psychological detachment, which has received the most research attention, implies refraining from work-related thoughts and gaining mental distance from one's work during nonwork time. Lack of psychological detachment from work is empirically related to rumination but is conceptually distinct from it (Sonnentag & Fritz 2015). Relaxation refers to the experience of low sympathetic activation that can be achieved by meditation or breathing practices as well as everyday activities that calm the body and mind. Mastery refers to the experience of growth, for instance by successfully coping with challenges and by undergoing learning experiences. Control implies some degree of self-determination and agency (Ouyang et al. 2019) in

deciding what to do during nonwork time and how to do it. These four recovery experiences can be differentiated conceptually and empirically (Sonnentag & Fritz 2007). Some researchers, however, prefer using an overall score of recovery experiences comprising all four recovery experiences (Halbesleben et al. 2013, McGrath et al. 2017) or a subset of them (van Wijhe et al. 2013).

Activities people pursue during their leisure time are associated with recovery experiences: Low-duty leisure activities are positively related to all four recovery experiences, particularly to relaxation, whereas high-duty activities are negatively related to three of the four recovery experiences [psychological detachment, relaxation, control (Steed et al. 2019)]. All four recovery experiences are positively related to psychological and psychosomatic well-being as well as performance (Steed et al. 2019; for more details see Sections 5 and 6). Not only what one does but also with whom one pursues those activities are important. For instance, Hahn et al. (2012) found that the more time individuals spent on joint activities with their spouses predicted psychological detachment, relaxation, and mastery during the weekend.

Newman et al. (2014) suggested a subsequent, somewhat broader taxonomy of recovery experiences, comprising detachment-recovery, autonomy, mastery, meaning, and affiliation (the DRAMMA framework) as crucial leisure experiences that contribute to well-being. This framework overlaps with the categories Sonnentag & Fritz (2007) describe but in addition introduces meaning and affiliation as relevant leisure experiences. Meaning refers to leisure experiences that help to “gain something important or valuable in life” (Newman et al. 2014, p. 567). Meaningful experiences can be derived from activities including (but not limited to) intense physical activity, specific hobbies such as arts and crafts, or religious and spiritual activities. The experience of affiliation results from social activities and is associated with social support and feelings of interpersonal connectedness. Empirical research using the DRAMMA framework is still in its infancy (Kuykendall et al. 2020, Virtanen et al. 2021). The framework, however, is promising because it emphasizes meaning and social connectedness as important dimensions related to fundamental human needs that may facilitate individuals’ overall recovery process.

Whereas the majority of research on recovery activities and experiences used a variable-centered approach to look at activities and experiences in isolation, some studies took a person-centered approach. This research showed that people are using different combinations (i.e., profiles) of recovery activities (de Bloom et al. 2018) and recovery experiences (Bennett et al. 2016) and that these profiles fluctuate day-to-day (Chawla et al. 2020). Interestingly, people with activity profiles comprising physical activities (particularly in an outdoor environment) and social activities reported higher levels of psychological detachment, relaxation, mastery, and control than people who were relatively inactive (de Bloom et al. 2018). People whose profiles also included creative and cultural activities had the highest levels of psychological detachment and mastery (de Bloom et al. 2018). Taken together, profile analysis is a valuable approach because it reflects the fact that people often pursue multiple activities in combination and enjoy a mix of different recovery experiences.

Overall, both the activity and the experience approach have their benefits for understanding and promoting recovery processes. The activity approach is particularly helpful when specific recommendations are needed (How should I spend my time in order to recover?), whereas the experience approach promises insights into why recovery occurs (What is happening when I recover?).

5. SHORT-TERM OUTCOMES OF DAILY RECOVERY PROCESSES DURING EVENINGS AND WEEKENDS

Recovery is a process that happens within work-and-rest cycles (Zijlstra & Sonnentag 2006). After a period of work (e.g., a day at work, a week at work), people usually have some free time

that allows for recovery processes to occur (Meijman & Mulder 1998). Accordingly, recovery researchers often examine what actually happens during this time on a day-to-day basis, for instance by studying time spent on recovery activities and analyzing the occurrence and intensity of recovery experiences. From a study-design perspective, many recovery studies, therefore, use a daily-diary or an experience-sampling approach, in which study participants are surveyed over one, two, or even more workweeks, often multiple times a day. This study approach focuses on within-person processes—rather than between-person differences. It allows conclusions about the characteristics of the days (e.g., duration and intensity of evening recovery activities or experiences) when people enjoy better sleep, well-being, less exhaustion in the morning, and higher work engagement the next workday.

In this section, we review studies that examined recovery processes between work shifts, typically occurring during free evenings or weekends (recovery resulting from breaks or vacations is described in Section 8). The outcomes of these recovery processes cover a broad range of psychological phenomena: well-being and affective states, motivational constructs, and performance-related outcomes.

5.1. Well-Being and Affective States

Research on the short-term outcomes of recovery activities and experiences has addressed a broad range of well-being indicators and affective states, including overall well-being assessments and more specific states such as high-arousal positive affect (e.g., feeling active, energetic, and vigorous), low-arousal positive affect (e.g., feeling serene, calm, and relaxed), high-arousal negative affect (e.g., feeling tense, anxious, and irritated), and low-arousal negative affect (e.g., feeling tired, exhausted, and depressed).

Day-level studies showed that engaging in recovery activities is related to overall well-being at bedtime (Sonnentag 2001) and to low exhaustion and high vigor the next morning (ten Brummelhuis & Bakker 2012, ten Brummelhuis & Trougakos 2014). Among the various recovery activities, active leisure activities (e.g., physical activities, social activities, creative activities) are more helpful for improving well-being than passive leisure activities [e.g., watching TV (Kuykendall et al. 2020)]. Physical exercise is particularly effective in improving well-being (Calderwood et al. 2021). The role of cyber activities (e.g., using digital devices such as smartphones or tablets for recovery purposes) has received increased research attention. In a recent study, Liu et al. (2021) reported that spending time on cyber activities was positively related to bedtime procrastination that in turn was related to low sleep quality and low vitality. However, spending time on cyber activities was also positively related to psychological detachment from work that in turn was related to high sleep quality and high vitality. This study demonstrates that some activities may affect individual well-being in complex, and sometimes contradicting ways.

Recovery experiences during the evening are related to subsequent well-being and favorable affective states. For instance, McGrath et al. (2017) used a summary measure of four recovery experiences (e.g., detachment, relaxation, mastery, and control) and found that, on days in which people had high recovery scores, they slept better and subsequently enjoyed higher levels of activated positive affect the next morning. Research examining recovery profiles points to a similar direction: Day-specific profiles that included a combination of high psychological detachment, high relaxation, and high control predict better sleep quality and less exhaustion the next morning [mastery did not matter (Chawla et al. 2020)].

Some studies suggested that not all recovery experiences are uniformly related to all affect dimensions in the same way. For instance, psychological detachment that mainly implies refraining from negative work-related thoughts was related to low levels of negative affect but not to high levels of positive affect (Eichberger et al. 2021, Sonnentag et al. 2008). Relaxation that refers to

low activation was related to low-arousal positive affect but not to other affective states (Ouyang et al. 2019, Sonnentag et al. 2008). Mastery, with its positively activating nature, was related to high-arousal positive affect but not to other affective states (Ouyang et al. 2019, Sonnentag et al. 2008). Other studies, however, reported more unspecific patterns of relationships between recovery experiences and affective outcomes (Hahn et al. 2014, Parker et al. 2020). The inconsistent findings might imply that there are specific core affective benefits of the various recovery experiences and that some generalizations beyond these core affective benefits might occur. It might be that the core affective benefits result immediately and rather easily from specific recovery experiences (e.g., high-arousal positive affect from mastery experiences) and the generalizations to other affective dimensions may occur when the immediate core affective benefits are particularly strong (e.g., high-arousal positive affect may reduce negative affective states).

In addition, within couples, not only is one's own recovery experience important, but also the spouse's recovery experience seems to matter for affective well-being outcomes. Rodríguez-Muñoz et al. (2018) found that experiencing detachment and relaxation in the evening was related to one's own and to one's spouse's positive emotions. Hahn et al. (2014) reported similar findings, with psychological detachment being related to the spouse's low negative affect and high serenity but only for couples who did not have children. It may be that caring for children might have a strong impact on affective well-being that overrides the effects of psychological detachment from work.

Moreover, recovery experiences might not be equally important in all situations. For instance, Park et al. (2018) reported an interaction effect of evening psychological detachment from work and distress at work on feelings of distress the next morning. Their findings imply that psychological detachment from work mattered only on days when distress at work had been high, suggesting that psychological detachment from work is particularly important when work that day elicited high levels of stress.

Taken together, research has shown that recovery experiences such as psychological detachment from work, relaxation, mastery, and control are related to better well-being and more favorable affective states at bedtime and at the start of the next morning (for an exception, see Haun et al. 2018). Although the benefits of day-level psychological detachment are well documented, under specific circumstances, not detaching from work predicts positive affect, for instance when thinking about work in a positive way (Sonnentag & Niessen 2020) or when engaging in problem-solving rumination (Firoozabadi et al. 2018). Research on the affective benefits during the next workday is still limited and inconclusive (for exceptions, see Hülshager 2016, Liu et al. 2021). On the one hand, events happening at work the next day could interact with previous night recovery experiences in the prediction of next-day well-being and affect at work. For instance, events happening at work the next day might wash out the effects of last night's recovery experiences rather quickly. On the other hand, recovery experiences from the previous evening could buffer the detrimental impact of next-day negative work events. Moreover, a recent study suggests that psychological detachment predicts anticipatory appraisals of the upcoming workday (Casper & Wehrt 2021). These appraisals, in turn, may influence subsequent affect during work.

5.2. Motivational Constructs

Research on the motivational benefits of recovery mainly have addressed work engagement but included other indicators as well (e.g., role breadth self-efficacy). This research has provided rather consistent evidence that on days when people feel well rested and recovered in the morning, they are more engaged at work (Kühnel et al. 2012, Sonnentag 2003). According to COR (Hobfoll 1998), the availability of energy after a successful recovery process makes it easy to fully immerse oneself into work and to be engaged. However, when not well recovered and

lacking energy, people will be reluctant to invest remaining energy into work, as they may choose to save it for other purposes instead. Studies showed that various factors impact the motivational benefits of being recovered. On the one hand, facing stressors (e.g., organizational constraints) at work can extinguish benefits that would be derived from recovery (Sonnentag et al. 2012). On the other hand, Venz et al. (2018) found that under certain circumstances, employees showed high work engagement during the day, even when morning recovery level was low. Specifically, when they used the self-regulatory strategy of selection-optimization-compensation (e.g., when they focused on the most important goals and asked for help when needed), then morning recovery state lost its relevance for high work engagement.

With respect to other motivational constructs, Ouyang et al. (2019) found that evening mastery and control experiences (termed agency in their study) were positively related to morning role breadth self-efficacy, a proactive motivational construct reflective of one's perception of capability in taking on proactive roles (Parker 1998).

5.3. Performance-Related Outcomes

A few studies have examined how recovery relates to job performance the next day, covering various performance concepts such as task performance, proactive behavior, and organizational citizenship behavior (OCB). Overall, there is evidence that feeling recovered in the morning is positively related to the self-perception of task performance, proactive performance, and OCB (Binnewies et al. 2009a, Sonnentag 2003). With respect to specific recovery experiences, Liu et al. (2021) reported that evening psychological detachment from work was positively related to next-day job performance, partly mediated by high sleep quantity. Evening relaxation was found to be associated with performance-related behaviors the next day, such as deep acting—a desirable behavior in interactions with customers (Hur et al. 2020) and OCB (Rodríguez-Muñoz et al. 2020). Also, evening mastery and control experiences predicted next-day proactive behavior (Ouyang et al. 2019).

5.4. Conclusion

To sum up, day-level research demonstrated that recovery activities and experiences have benefits for well-being and favorable affective states as well as motivation and performance. These findings imply that neglecting recovery needs and skipping opportunities for recovery will be rather immediately reflected in suboptimal affective and motivational states. Although the findings on the benefits of recovery for job performance are promising, a caveat is needed. So far, studies have focused only on self-reported performance. Therefore, it remains to be seen if recovery increases actual day-level performance or just individuals' perception of their own performance. Moreover, cross-sectional research has suggested that very high levels of detachment may undermine performance (Fritz et al. 2010). Studies are needed that test if this occurs at the day level as well.

6. LONGER-TERM OUTCOMES OF RECOVERY PROCESSES DURING EVENINGS AND WEEKENDS

Although there is convincing cross-sectional evidence that low-duty recovery activities as well as recovery experiences are related to well-being and health indicators (Steed et al. 2019) and that daily recovery contributes to day-to-day fluctuations in well-being, motivation, and (to a lesser degree) performance (Sonnentag et al. 2017; see also Section 5), longitudinal research that spans longer time periods (e.g., several months to several years) and examines if recovery activities and experiences predict meaningful outcomes over time is still relatively sparse.

6.1. Long-Term Well-Being

Evidence from longitudinal studies that examined if recovery activities and recovery experiences are associated with an improvement in well-being over a longer time period is mixed. For instance, in some studies that spanned time lags from 6 to 12 months, a lack of psychological detachment predicted an increase in exhaustion over time (Gu & You 2020, Schulz et al. 2021, Sianoja et al. 2018a, Sonnentag et al. 2010), suggesting that this recovery experience indeed helps to maintain one's well-being. In other studies spanning time lags between 4 and 24 months, however, lack of psychological detachment was unrelated to any change in exhaustion or fatigue over time (Kinnunen & Feldt 2013, Kinnunen et al. 2019, Muhamad Nasharudin et al. 2020). For other recovery experiences (e.g., relaxation) and other well-being outcomes (e.g., depression, vigor, sleep problems), evidence is inconsistent as well (Gu & You 2020, Kinnunen & Feldt 2013, Kinnunen et al. 2019, Muhamad Nasharudin et al. 2020, Schulz et al. 2021, Sianoja et al. 2018a, Sonnentag et al. 2010). Further analyses suggest that the recovery experiences may have no or only a limited long-term benefit in themselves, but they may help to attenuate the detrimental effects of high job demands (Sonnentag et al. 2010) or help to strengthen the beneficial effects of job resources (Muhamad Nasharudin et al. 2020).

6.2. Motivation and Performance

When it comes to other outcomes such as motivation or performance, the number of longitudinal studies is even more limited, and findings must be seen as preliminary. In Sonnentag et al.'s (2010) study, psychological detachment from work during nonwork time did not predict any change in work engagement over 12 months. However, psychological detachment helped to maintain work engagement irrespective of the level of job demands. When psychological detachment was low, high job demands were associated with a decrease in work engagement over 12 months.

With respect to performance outcomes, studies focused on general recovery indicators. For instance, Binnewies et al. (2009b) found that feeling recovered during leisure time predicted an increase in task performance over a six-month period; feeling recovered, however, did not predict change in proactive behavior, OCB, or creativity. Similarly, Vahle-Hinz et al. (2017) reported that a positive view of one's recovery processes (e.g., feeling that one's leisure activities make one restored and relaxed) did not predict change in work-related creativity (i.e., idea generation) over a period of 12 months.

6.3. Conclusion

Although it is highly plausible that recovery could protect individual well-being and may foster work engagement and performance, empirical evidence is not yet fully convincing. Several reasons may contribute to this pattern of finding. First, between-person differences in well-being and engagement (Brauchli et al. 2013) are relatively stable over time. Accordingly, it is difficult for a single factor (i.e., recovery) to substantially and sustainably change well-being or work engagement. Second, it might be that recovery activities and recovery experiences only matter when demands are high (Sonnentag et al. 2010). This would imply that for people who do not face major job stressors over extended periods of time, recovery may not play an important role. Third, in the long run, not all recovery activities and recovery experiences may be equally important for everyone. People may differ in their preferences for specific recovery activities and experiences (ten Brummelhuis & Trougakos 2014). Only those recovery activities and experiences that actually match one's preferences will unfold their benefits (see also Section 8.1). Finally, study design issues, particularly timing of measurement points, may play a role. Dormann & Griffin (2015) have argued that time

lags in longitudinal studies must match the assumed speed of change processes. One-year time lags used in many longitudinal recovery studies might be too long to detect any changes. In addition, there might be interindividual differences in the speed with which changes occur.

7. ANTECEDENTS OF EFFECTIVE RECOVERY PROCESSES

Recovery activities and recovery experiences fluctuate within persons and differ between persons. Accordingly, research has addressed the question of what predicts within-person fluctuations and between-person differences in recovery activities and experiences. Similar to research on the outcomes of recovery activities and experiences, within-person studies have mainly focused on rather short-term predictors of activities and experiences, mostly happening on a daily basis. Between-person studies have used cross-sectional or longitudinal designs, with the latter examining longer-term changes in recovery activities and experiences.

In this section, we cover empirical findings on well-being and affective states, job-related factors, interpersonal and organizational factors, as well as individual differences. With respect to research on well-being and affective states as well as job-related factors, we focus on research that used within-person or longitudinal designs. With respect to research on interpersonal and organizational factors as well as research on individual differences, we review cross-sectional findings as well, because within-person and longitudinal designs are still rarely used in this research area.

7.1. Well-Being and Affective States

Recovery activities and recovery experiences do not only predict subsequent well-being and affective states. Momentary well-being and affective states predict recovery activities and recovery experiences as well. Within-person studies have shown that well-being and affect during and at the end of the workday are related to recovery activity choice and having intense recovery experiences. For instance, feelings of high vigor and low fatigue at the end of the workday were found to predict engagement in physical exercise after work (Niermann et al. 2016).

Being in a state of high positive and low negative affect also benefits some recovery experiences. For instance, Rodríguez-Muñoz et al. (2020) found that positive affect at the end of the workday predicted high levels of relaxation in the evening. With respect to negative states, van Wijhe et al. (2013) reported that experiencing negative emotions at the end of the workday was negatively related to a summary score of recovery experiences, and Cangiano et al. (2019) found that end-of-workday anxiety was associated with a low level of psychological detachment from work during evening hours. Interestingly, Parker et al. (2020) found this link between well-being and evening recovery experiences in physiological data as well. They reported that heart rate variability, as a physiological indicator of dealing well with stressful situations, was a predictor of evening relaxation.

These findings on well-being and affective states on one hand, and recovery activities and recovery experiences on the other hand, are puzzling because when well-being and affect are impaired, recovery is particularly needed. But exactly in this situation, recovery processes are less likely. Sonnentag (2018) described this pattern of findings as the recovery paradox and has explained that the experience of job stressors calls for recovery and at the same time increases high-arousal negative affect and depletion—states that make recovery less likely.

There is some evidence from longitudinal research that poor well-being impairs recovery activities and recovery experiences over time. For instance, high levels of work-related exhaustion and low levels of vigor predicted a decrease in physical leisure activities over 12 months (de Vries

et al. 2016). With respect to recovery experiences, Schulz et al. (2021) reported that a high level of exhaustion was associated with a decrease in psychological detachment from work six months later. Other studies, however, did not find a lagged relationship between exhaustion and recovery experiences (Sianoja et al. 2018a, Sonnentag et al. 2010), suggesting that additional factors such as personality or chronic job stressors may matter as well.

7.2. Job-Related Factors

Job-related factors play an important role for recovery. Research has examined job stressors and job resources, job performance and performance-related behaviors at work, as well as job-related behavior at home.

7.2.1. Job stressors and job resources. Within-person analyses showed that having faced job stressors during the workday makes it less likely to enjoy recovery experiences (e.g., psychological detachment, relaxation) at night. Such a negative relationship between day-specific job stressors and low levels of detachment or relaxation were found for stressors such as emotional demands (Haun et al. 2018), self-control demands (Germeys & De Gieter 2018), workplace bullying (Rodríguez-Muñoz et al. 2017), and other negative work events (Bono et al. 2013).

With respect to day-specific workload and time pressure, however, findings are mixed, with some studies finding that detachment from work (Germeys & De Gieter 2017) and other recovery experiences (Chawla et al. 2020) suffer when workload or time pressure had been high on a particular day, whereas other studies did not find such an association (Lanaj et al. 2021, Smit 2016). This inconsistent pattern of findings points to possible moderator effects. Indeed, studies suggest that both individual-difference variables (e.g., dispositional self-control) and momentary states (e.g., state mindfulness) help in attenuating the relationship between a high workload and lack of detachment (Haun et al. 2018, Smit & Barber 2016).

Cross-sectional between-person studies showed that overload (i.e., heavy workload and time pressure) and emotional demands, but not cognitive or physical demands, were negatively related to engagement in low-duty recovery activities (Steed et al. 2019). Overload as well as cognitive and emotional demands had negative relationships with psychological detachment, relaxation, and control but not with mastery experiences (Steed et al. 2019). A similar picture emerged for hindrance demands (Bennett et al. 2018). Job resources were unrelated to engagement in low-duty recovery activities but had positive relationships with mastery experiences and control and, to a lesser degree, with psychological detachment and relaxation (Steed et al. 2019).

Longitudinal research on longer-term associations between job demands and job resources with recovery is still very limited. There is some evidence that high quantitative demands (e.g., workload, time pressure) predict a decrease in psychological detachment and relaxation over time but no change in other recovery experiences (Kinnunen & Feldt 2013, Meier & Cho 2019) or physical exercise as a recovery activity (de Vries et al. 2016). Findings on interpersonal stressors such as tension at work and workplace incivility are mixed as well, with some studies finding a relationship between interpersonal stressors and lack of detachment (Meier & Cho 2019, study 2; Schulz et al. 2021) and other research not finding such a relationship (Meier & Cho 2019, study 1). Job resources predicted an increase in mastery experiences over time but not other recovery experiences (Kinnunen & Feldt 2013).

Taken together, it appears that job stressors that result in mostly negative activation may impair psychological detachment and relaxation. Job resources, however, that increase individuals' action repertoires seem to stimulate growth and learning in the nonwork domain.

7.2.2. Job performance and performance-related behaviors. Favorable perceptions of one's workday can help recovery experiences. For instance, perceiving that one has performed well at work is associated with higher levels of psychological detachment and relaxation in the evening (Hur et al. 2020, Lanaj et al. 2021). Also, engagement during work was found to be positively related to subsequent recovery experiences (McGrath et al. 2017). Relatedly, difficulties with goal completion were negatively related to evening detachment (Smit 2016) and relaxation (Parker et al. 2020). This pattern of findings can be interpreted in line with the recovery paradox (Sonnentag 2018): On workdays that are perceived as successful and satisfactory, detachment and relaxation are high. However, on more unfavorable workdays and thus when recovery is needed most, it is less likely to happen. Interestingly, this pattern of findings seems not to be limited to a person's own recovery experiences. For instance, Rodríguez-Muñoz et al. (2018) found that one's task performance, extrarole performance, and day-specific job satisfaction were related to the evening relaxation experiences of one's spouse.

Longitudinal evidence on performance-related constructs as predictors of recovery is still limited. Overall, self-perceptions of performance do not matter much for recovery over longer periods of time (Binnewies et al. 2009b). Thus, the short-term benefits of performance on recovery-related processes (Lanaj et al. 2021) are not observed over extended time periods, suggesting that people adjust rather quickly to their self-perceptions of performance.

7.2.3. Job-related behavior at home. Beyond workplace behaviors, engaging in job-related behaviors at home matters for recovery. Research has paid particular attention to the use of job-related technology at home and its relationship with recovery. Several day-level studies showed that the job-related use of smartphones and other technologies during evening hours negatively related to evening recovery experiences (Braukmann et al. 2018, Derks et al. 2014) and positively to morning depletion (Lanaj et al. 2014). This noteworthy finding highlights that it is the job-related nature of the specific activity that impedes recovery, because cyber activities for leisure purposes are related to psychological detachment from work (Liu et al. 2021).

7.3. Interpersonal and Organizational Factors

Interestingly, research on the role of interpersonal and organizational factors on recovery is relatively sparse and often limited to cross-sectional study designs. This cross-sectional research has found that supervisor support for recovery is related to employees' recovery experiences (Bennett et al. 2016). Moreover, supervisor's own recovery, in the form of detachment from work, is related to subordinates' overall psychological detachment from work (Sonnentag & Schiffrin 2019). This finding may indicate that leaders serve as role models for recovery. However, because leaders and subordinates share the same work environment, it could be that job stressors present in the work environment impede detachment processes in both the leader and the subordinates.

Organizational culture and norms about segmenting versus integrating work and home life (i.e., segmentation norms) relate to individual experiences of psychological detachment from work in cross-sectional research. The higher the segmentation norms, the more employees detach from work during nonwork time (Park et al. 2011). This finding implies that in organizations embracing a culture of integrating work and home life, employees will find it more difficult to detach from work. Studies with day-level and longitudinal designs are needed that examine how the role of the supervisor and organizational norms unfold to impact employee recovery during daily life. There may be differences between industries with some industries embracing (and expecting) a stronger integration between work and home than other industries.

7.4. Individual Differences

Some studies have investigated the role of personality and other relatively stable individual differences, with mixed results. Overall, the Big Five personality factors are only weakly related to recovery experiences (Sonnentag & Fritz 2007), but negative affectivity showed a consistent, albeit small negative correlation with psychological detachment (Wendsche & Lohmann-Haislah 2017). Among other individual-difference variables, high learning-goal orientation (Mehmood & Hamstra 2021), high job involvement (Barber & Santuzzi 2015), and perceiving one's job as a calling (Clinton et al. 2017) are related to low psychological detachment, highlighting potential downsides of otherwise positive job-related orientations. Moreover, workaholism seems to impede recovery processes (Huyghebaert et al. 2018).

Taken together, knowledge on the role of rather stable individual difference variables for recovery is still limited, possibly because the first analyses on personality factors were not particularly encouraging (Sonnentag & Fritz 2007). Personality and other individual difference variables may unfold their impact only under specific circumstances (e.g., low situational strength or low-stress situations).

7.5. Conclusion

Research on the predictors of recovery activities and experiences covered a broad range of constructs. From within-person studies, there is rather consistent evidence that positive states and experiences prior to potential recovery time are positively associated with actually engaging in recovery activities and experiencing detachment or relaxation. More negatively toned states and experiences prior to potential recovery time tend to undermine recovery activities and experiences, although under such circumstances, recovery would be needed most. An exception from this rather consistent picture of short-term processes are workload and time pressure, suggesting that additional factors need to be taken into consideration before coming to a definitive conclusion. With respect to longer-term influences on recovery, empirical evidence is still relatively scarce and inconclusive. Research is needed that includes moderator variables and that explicitly addresses the question of adequate time lags (Dormann & Griffin 2015).

8. A CLOSER LOOK AT SPECIFIC RECOVERY SETTINGS

Beyond the recovery settings studied as part of typical work-and-rest cycles (i.e., evenings and weekends), recovery can occur during other time periods as well. Research has examined recovery occurring at work, via breaks and other energy-management strategies, and during vacations, via more extended and purposeful respite.

8.1. Work Breaks and Energy-Management Strategies at Work

The momentary recovery of energy (i.e., high vitality and low fatigue) during the workday can occur via different strategies employees enact (i.e., reappraisals, behaviors). Research on energy management identified 42 specific strategies, which can be classified as microbreaks or work-related strategies (Fritz et al. 2011, Zacher et al. 2014). Microbreaks involve taking a short respite from work and can include activities, for example, taking a walk outside, having a social chat, or engaging in a relaxation exercise. In contrast, work-related strategies entail approaching one's work differently, for example, organizing or scheduling work, reflecting on the meaning of work, or prosocial helping. Thus, energy management can create opportunities for respite and recovery (via work breaks), as well as target work itself (via work-related strategies), to make it more motivating or less draining (Troughakos & Hideg 2009).

Day-level research that directly compared microbreaks and work-related strategies found that microbreaks were more effective for the momentary recovery of energy [i.e., hour-by-hour within the workday (Zacher et al. 2014)]. However, the energy-related benefits of work-related strategies are evident in between-person comparisons (Fritz et al. 2011, Kinnunen et al. 2015). These observations have led some researchers to conclude that work-related strategies might cost resources in the moment when used [i.e., consume energy, increase stress arousal (Parker et al. 2017)] but reveal benefits over time with repeated use, potentially through other mechanisms [e.g., building personal resources, receiving social support, enjoying intrinsic motivation (Troughakos & Hideg 2009, Zacher et al. 2014)]. Interestingly, profile studies of energy management have found that the use of more work-related strategies in combination with physical microbreaks (i.e., going for a walk, stretching), as compared with less frequent use of these strategies and more use of private microbreaks (i.e., reading, listening to music, web surfing), was associated with more vitality (Kinnunen et al. 2015). Thus, it might not be a question of whether microbreaks or work-related strategies are optimal but, rather, a question of which combinations of approaches are most beneficial for restoring energy. In any case, to date, research on work-related energy management strategies has been scarce, whereas it has paid much more attention to microbreaks and other types of work breaks.

Microbreak activities that are restorative for energy during the workday include physical or social activities (Kim et al. 2017, Zacher et al. 2014) and spending the break outdoors (Sianoja et al. 2018b, von Dreden & Binnewies 2017). However, some social activities can be less restorative, for example, spending the lunch break socializing with a supervisor (von Dreden & Binnewies 2017) or if the socializing is not by autonomous choice (Troughakos et al. 2014). Also, breaks that are used for errands (Troughakos et al. 2008) or that occur later in the day (Hunter & Wu 2016) are less restorative, although breaks taken early in the morning can detract from daily work engagement (Kühnel et al. 2017). Interestingly, breaks that involve passive recovery activities, such as a person privately reading, web surfing, or listening to music, are found to be restorative in some studies but not others (Kim et al. 2017, Kinnunen et al. 2015). Thus, there might be individual or work factors that influence the optimal timing and content of a break.

Beyond considering specific break activities, researchers have examined the experiences a break can provide. This research has found that lunch breaks that support basic psychological needs (i.e., autonomy, relatedness, competence) are more restorative than lunch breaks that do not (Troughakos et al. 2014). In addition, breaks that involve more recovery experiences (i.e., detachment, relaxation, and control) are more restorative (Sianoja et al. 2018b, Virtanen et al. 2021). More specifically, Sianoja et al. (2018b) found that relaxation activities (i.e., progressive muscle relaxation, deep breathing, mindfulness) during the lunch break enabled momentary detachment from work, which in turn was associated with better concentration that afternoon. Meanwhile, a walk in the park was associated with enjoyment, which in turn predicted more concentration and less fatigue that afternoon. More recently, research applying the DRAMMA model (Newman et al. 2014) to the break setting has found breaks that enable more detachment, meaning, and affiliation are particularly important for feeling well in the afternoon and evening [i.e., experiencing more positive and less negative affect (Virtanen et al. 2021)].

Researchers have also investigated the individual differences and work factors that can shape energy management and its consequences. Break activities that are suited to individual preferences are particularly restorative (Hunter & Wu 2016, Troughakos et al. 2014), which has led researchers to become interested in the notion of person-break fit (Venz et al. 2019). Moreover, employees who take breaks more intentionally, through active planning and structuring the day to support breaks, experience more energy-related benefits and stress recovery, including less fatigue and distress (Blasche et al. 2017). However, research has also found that employees are more likely to take breaks when work tasks are aversive (Bosch & Sonnentag 2019), thus break-taking also

can be a consequence of poor-quality work. As one might expect, job demands can compromise energy management (Parker et al. 2017), whereas job resources, in particular, job autonomy and social support, can support it (Kinnunen et al. 2015). Moreover, a climate that supports health and microbreak autonomy can enable employees to take more microbreaks when needed (Kim et al. 2021). Trait mindfulness has been found to enhance detachment during work breaks and thus improve recovery (Chong et al. 2020). However, Kim et al.'s (2018) study found that microbreaks are only beneficial for daily work performance for employees who are less engaged.

Overall, there are many factors that can shape the recovery potential of work breaks. One challenge for future research lies in measurement, because of the lack of established and validated measures for break experiences and energy-management strategies, which might explain some of the inconsistent findings on specific types of work breaks. Although many researchers base their measure on the original checklist by Fritz et al. (2011), the choice of items and composition of scales has varied (e.g., Kim et al. 2018, Kinnunen et al. 2015). Meanwhile, other researchers have used custom measures (e.g., Bosch & Sonnentag 2019, Kühnel et al. 2017, Trougakos et al. 2008). More day-level and longitudinal research is needed to understand the recovery potential of energy management and particularly work-related strategies.

8.2. Vacations

Vacations, which refer to extended and uninterrupted periods of respite from work, have also been examined as an important setting for recovery. Recovery during a vacation can occur by abstaining from work and reminders of work, as part of a passive recovery process via removal of job stress (Horan et al. 2021), as well as an active route through the pursuit of leisure activities. Various activities, including relaxing and pleasurable activities, physical activities (e.g., sports), and spending time conversing with a partner, have all been found to improve immediate health and well-being benefits, during and at the end of the vacation (de Bloom et al. 2012, 2013; Pereira et al. 2017). However, understanding what factors can extend the well-being benefits of a vacation is important, as the effects of a vacation on employee well-being are small and fade out relatively quickly (de Bloom et al. 2009). Specifically, reduced distress and burnout, and increased engagement, fade within one month of returning to work (Kühnel & Sonnentag 2011).

Similar to other recovery settings, in addition to understanding what is done on a vacation, research has also considered what is experienced on vacation, and recovery experiences, in particular, seem to be important for reducing the vacation fade-out effect. For example, more recovery experiences during a Christmas vacation are associated with a slower fade-out effect (Syrek et al. 2018). In addition, experiences of relaxation, control, pleasure, and savoring have been found to strengthen and prolong the benefits of a longer vacation [i.e., one month (de Bloom et al. 2013)]. In contrast, experiences of relaxation and detachment seem important for shorter vacations (i.e., four to five days), both in terms of enhancing well-being during the vacation and reducing the fade-out effect upon returning to work (de Bloom et al. 2012).

Other factors, including job demands before and after a vacation and individual differences, can also shape how restorative a vacation is. Employees who have fewer high-duty tasks (both work and nonwork-related) before a vacation, as well as fewer unfinished tasks upon returning to work, experience greater benefits during a vacation and a slower fade-out effect after their vacation (Syrek et al. 2018). Similarly, after a vacation, higher job demands on the return to work can accelerate the fade-out effect, whereas more relaxation experiences during post-vacation leisure time can delay it (Kühnel & Sonnentag 2011). In relation to individual differences, perfectionism was associated with stronger immediate benefit during a vacation, but steeper fade-out effects post vacation (Horan et al. 2021). Indeed, the immediate benefits were only evident when

perfectionistic employees refrained from work tasks during the vacation (Flaxman et al. 2012, Horan et al. 2021).

Overall, to get the most out of a vacation, it is important to both refrain from work as well as engage in activities that enhance relaxation and pleasure experiences. However, for some workers, it can be difficult to completely detach during a vacation (e.g., perfectionists, those with unfinished tasks), which can make the vacation less restorative and the return to work more challenging, especially for those with high job demands. Moreover, unlike research in other recovery settings, scholars have yet to consider vacation profiles, which could help to shed light on combinations of vacation activities and experiences that can best support recovery.

8.3. Conclusions

Research on specific recovery settings such as work breaks and vacations has offered a broad range of study findings that highlight the nuances of the particular settings (short periods of recovery occurring near one's workplace versus staying away from work for a longer period of time). Accordingly, recovery activities during work breaks versus vacations are quite different. However, the underlying psychological experiences are rather similar to the beneficial recovery experiences observed in the evening or on the weekend. Future research may examine whether certain concepts used in research on breaks and vacations can be transferred across contexts, such as whether person-break fit can be applied to person-weekend fit or person-vacation fit (e.g., in terms of vacation location and duration) and whether vacation fade-out effects can be applied to break fade-out effects or fade-out effects occurring after a leisurely evening.

9. RECOVERY IN SPECIFIC GROUPS AND CULTURES

In the previous sections, we have reviewed research evidence on recovery, focusing on findings that may apply to almost everyone. However, some aspects of recovery may be particularly important for specific groups (e.g., demographic or occupational groups) or cultures. Interestingly, research on this question is quite limited. In this section, we provide a short overview of what is known about differences between various demographic and occupational groups as well as cross-cultural differences.

9.1. Differences Between Demographic and Occupational Groups

Primary studies that explicitly addressed the question of whether demographic variables matter for recovery processes are rare. Nevertheless, in their meta-analysis, Wendsche & Lohmann-Haislah (2017) examined how age and gender may be related to psychological detachment as one core recovery experience. They found that age and gender were uncorrelated with psychological detachment. Moreover, they did not detect any moderation effect for age, neither for the relationship between psychological detachment and outcomes such as sleep, well-being, work motivation, nor for the relationship between antecedents (e.g., job demands, neuroticism) and psychological detachment. Out of 16 analyses involving gender as a moderator, they found two significant moderation effects. In sum, there is no, or only weak, evidence that age or gender has an influence on the relationship between psychological detachment and its antecedents and outcomes. With respect to other recovery activities and experiences, meta-analytic findings on age and gender are not yet available.

In terms of occupational background, recovery studies have been conducted in a broad range of job settings. Many of the samples included in recovery research comprise professionals, administrative workers, and other white-collar employees (Sonnentag et al. 2008, Zhu et al. 2019) who typically work in jobs with low physical demands. Some studies included other occupational groups

such as health-care workers (Schulz et al. 2021) or entrepreneurs (Wach et al. 2021). Of note, little attention has been paid to the question of whether recovery processes and the effectiveness of specific recovery activities or experiences differ between various occupational groups. This is a serious oversight because in specific occupational settings, for instance those that include shiftwork or remote work, effective recovery activities and experiences are particularly important. One may expect that the lack of adequate recovery is most detrimental in highly demanding occupations and when workers have atypical work-rest cycles. We anticipate that these work arrangements will increase in the future (see Section 11), making recovery a particularly pressing issue.

9.2. Cross-Cultural Differences

With respect to cultural settings, most recovery studies have been conducted in Western cultures, including Europe (Hülshager et al. 2014, Sianoja et al. 2018a), North America (Chawla et al. 2020, Halbesleben et al. 2013), and Australia (Cangiano et al. 2019, Parker et al. 2020). Recovery studies from Asian countries are still relatively rare (Firoozabadi et al. 2018, Ouyang et al. 2019). The question of whether the findings of recovery research differ between countries and cultures has rarely been addressed in a systematic way. One can assume that the functions work and leisure play in a country's culture may impact the role of specific recovery activities and experiences for employees' well-being. For example, legal differences between countries with respect to work time and time that is available for recovery (hours available in the evening, number and length of work breaks, number of vacation days) may reveal cross-cultural effects of recovery processes. It might be that in countries in which less overall recovery time is available, recovery processes (need to) happen faster, whereas in countries with more overall recovery time, recovery processes in themselves may slow down, may take more time to unfold, or may even be qualitatively different when more time is available.

Moreover, self-concepts prevalent in a specific culture may matter for recovery. For instance, subjectively preferred recovery activities and the benefits derived from these activities may differ between cultures that put an emphasis on the interdependent self [i.e., construing "oneself as part of an encompassing social relationship" (Markus & Kitayama 1991, p. 227)] versus the independent self [i.e., seeing oneself "as an autonomous, independent person" (Markus & Kitayama 1991, p. 226)]. Activities spent with family members and friends might be more important in cultures that emphasize the interdependent self than in cultures that emphasize the independent self, where activities that allow for individual control and self-expression might be more important. Furthermore, it might be that people in cultures emphasizing the interdependent self are more tolerant toward a sacrifice in recovery time when they can contribute to the community instead, whereas people in independent-self cultures might tend to prioritize their personal recovery time.

A final suggestion for advancing recovery research on cross-cultural differences is to examine whether there are universally relevant recovery activities and experiences. For instance, the benefits of attending cultural events or listening to music seem to be rather invariant across cultures (Wang & Wong 2014). Moreover, across many countries, thinking about work during leisure time is cross-sectionally associated with lower happiness levels (Wang & Wong 2014). Nevertheless, we need to be aware that questions around leisure and recovery may be fundamentally different in countries of the Global South where poverty, deprivation, precarious employment, or lack of any employment often dominates people's lives (Gloss et al. 2017).

9.3. Conclusions

To conclude, potential differences in recovery processes across various groups and cultures are a highly needed topic for future research. Until now, it seems that differences in the psychological

mechanisms underlying recovery processes are not major ones, but research evidence is still too limited to come to a definitive conclusion.

10. INTERVENTIONS

A growing number of intervention studies have been conducted, which provide insights on how to improve the recovery of workers. Whereas some interventions directly target how to recover (e.g., recovery activities, recovery experiences), others have indirectly targeted recovery via different approaches (e.g., mindfulness, work-life integration, and other strategies).

10.1. Interventions Directly Targeting Recovery Activities and Recovery Experiences

In relation to recovery activities, interventions have targeted what participants do with their “free time” and also how they engage with their activities. For example, in early research in this area, Tucker et al. (2008) conducted an experimental within-subjects study over four consecutive evenings to compare recovery effects of various activities. Across three conditions (pursuing quiet leisure activities at home, pursuing active leisure pursuits, doing additional work), they found that the lowest evening satisfaction and recovery were associated with an evening spent doing additional work. However, being satisfied with the activities pursued during the evening, regardless of condition, as well as evenings spent exerting lower mental effort were associated with better sleep and feeling recovered the next day. More recently, Almén et al. (2020) designed a 10-week intervention where participants were taught to practice recovery activities and use relaxation techniques (e.g., progressive muscle relaxation) alongside their activities. Compared to the control group, the intervention group experienced reduced perceptions of stress, tension, burnout symptoms, anxiety, and depression post intervention and three months later. The effect sizes were moderate to large, and the intervention was most effective for those with high perceived stress.

Interventions have also specifically targeted recovery experiences. These interventions typically involve a one-day session, or a module on recovery as part of a larger intervention program, and can include education, exercises, and goal-setting designed to enable recovery experiences. Of note, Hahn et al. (2011) developed a training program to target each of the recovery experiences: detachment, relaxation, mastery, and control. Intervention participants learned about the benefits of recovery and how to implement recovery in their daily life. They completed individual and small-group exercises, including goal-setting activities, to help them put their recovery training into practice. This quasi-experimental study found that the training was associated with an increase in recovery experiences, although mastery demonstrated the weakest effect. In addition, improvements in recovery-related self-efficacy, sleep quality, perceived stress, and negative affect were observed, but no training effects were found for emotional exhaustion. In terms of the duration of effects, although most studies evaluate outcomes shortly after training (e.g., three to six weeks post training), at least one study has shown that the benefits (i.e., improved sleep quality and well-being, reduced distress, rumination, and depression) are evident six months later (Ebert et al. 2015).

10.2. Interventions Indirectly Targeting Recovery Experiences

To date, many types of interventions beyond recovery-specific training have been found to improve recovery experiences, for example, workload interventions, work-break interventions, stress management training, work-life boundary training, and mindfulness training (see Verbeek et al. 2019, Karabinski et al. 2021 for reviews). A recent meta-analysis on interventions for psychological detachment identified 34 interventions with a small to medium positive effect on detachment [i.e., overall effect size of $d = 0.36$ (Karabinski et al. 2021)]. Interventions that incorporate training

on how to improve sleep were particularly effective ($d = 0.88$) compared to interventions without any sleep training ($d = 0.29$). In addition, interventions that included primary appraisal content, that is, training to divert attention away from stressors and/or reappraise stressors ($d = 0.45$), were more effective than those that did not ($d = 0.17$).

Two categories of interventions that have received considerable research attention are boundary-management and mindfulness training. Given that the domains between work and life are becoming increasingly blurred for employees, interventions have focused on helping employees learn how to segment work from life, to help create greater opportunities for recovery during nonwork time. The Karabinski et al. (2021) meta-analysis found that interventions targeting boundary management were most effective for improving detachment ($d = 0.65$), as compared with interventions without any boundary-management approach ($d = 0.25$). Interventions designed to increase mindfulness (i.e., being attentive and aware of the present moment) are relatively effective for detachment as well [$d = 0.46$ (Karabinski et al. 2021)]. Some researchers have paired training on work-life segmentation with a mindfulness intervention. For example, Michel et al. (2014) found that a three-week online training program increased psychological detachment and satisfaction with work-life balance and decreased strain-based work-family conflict for the intervention group two weeks later. These findings highlight the benefit of integrative intervention strategies.

Thus, overall, there is growing evidence that a broad range of interventions, even if not tailored specifically to recovery, can facilitate recovery experiences (Verbeek et al. 2019), in particular psychological detachment during evenings and weekends (Karabinski et al. 2021). Until now, however, these interventions have not been able to reduce need for recovery (Verbeek et al. 2019) or emotional exhaustion (Hahn et al. 2011). Furthermore, although detachment outside of work is improved by interventions, detachment during work breaks does not benefit from interventions (Karabinski et al. 2021).

10.3. Conclusions

Although there is growing evidence for the efficacy of recovery interventions, more research is needed to understand what types of interventions will work best for specific recovery settings (e.g., within-day work breaks, evenings, weekends, or vacations), for specific recovery experiences beyond psychological detachment (e.g., relaxation and mastery), and for specific outcomes (e.g., sleep, need for recovery, burnout). Beyond interventions at the individual level, one key challenge moving forward will be discovering what types of organizational-level interventions can best enable recovery. For example, work redesign or supervisor training will be important here so that organizations can better support employee recovery.

11. THE FUTURE OF WORK RECOVERY: A FRAMEWORK

In this section, we pave a pathway for research opportunities on work recovery, guided by future work trends. We develop three major themes for future work recovery research (Figure 1), along with seven specific research questions for consideration.

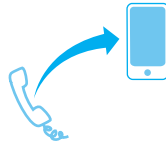
11.1. Theme 1: Changing Boundary Between Work and Life—The New Work-Life Interface

As the future of work continues to adopt remote work in terms of time (flexible schedules) and location (flexible workspaces) (McKinsey 2021), boundaries between work and life outside work will become more permeable. As such, Theme 1 addresses how employees' social context, including personal networks and work teams, will play a vital role in employees' recovery.



Changing boundaries between work and life

As work contexts become increasingly remote and flexible, boundaries between work and life will become increasingly blurred; recovery will become inextricably linked with one's social context, such that personal networks and work teams will play a larger role in recovery.



Changing nature of technology

As the future of work increasingly relies on technological tools, technology will frustrate recovery, yet also provide opportunities for enhanced recovery, through leveraging application-based interventions.



Changing nature of employment arrangements

As work becomes increasingly short term and contract based, with more underrepresented groups including unskilled, shift, and precarious workers, what it means to recover will fundamentally change, because unstable and unpredictable schedules will limit opportunities for recovery.

Figure 1

Three themes for the future of work recovery: changing boundaries between work and life, changing nature of technology, and changing nature of employment arrangements.

11.1.1. Research question 1: What emerging experiences facilitate recovery for boundary-less workers?

As workers experience increased flexibility in the way they organize their work with respect to time and location, future research is needed to explore the constraints and opportunities impacting recovery for these workers. On one hand, blurred boundaries between work and various life domains, as well as increased use of technology, may make detachment from work more difficult (Mellner et al. 2016). On the other hand, greater work schedule flexibility may facilitate recovery and work-related outcomes (Gajendran & Harrison 2007). What boundary and time management strategies facilitate recovery experiences? Does quantity [e.g., more microbreaks (Troughakos & Hideg 2009)] or quality [e.g., preferred breaks (Hunter & Wu 2016), meaningful break experiences (Newman et al. 2014)] of recovery activities and experiences matter more for individual recovery? How might various resources accumulate, compensate, or suppress recovery across the various contexts of work and life?

11.1.2. Research question 2: How does the social context impact employee recovery?

The second research question concerns the impact of an employees' social context, including family members and friend networks, on employees' recovery. Under what contexts do key individuals within one's social system act as resource generators who transfer resources to the focal employee? These individuals may help focal employees generate social support (Mathieu et al. 2019), energy (Baker 2019), and affect-based resources, which may broaden focal employees' recovery experiences. Alternatively, under what contexts do key individuals within one's social context act as a resource drain? Family members who provide medical or special needs care, for instance, to individuals within the household, face added strains that affect their own recovery (Greaves et al. 2017). Future research might examine how individuals make trade-offs between resource drain and resource generation in positive and negative cycles of recovery between work and life domains. For example, the physical strain of caring for ill or elderly individuals may be offset to some extent by the emotional returns of witnessing any health improvements of these individuals, which may be reinvested into the work domain and manifested in greater empathy.

11.1.3. Research question 3: How do teams recover together?

Blurred boundaries between work and life suggest that social connections with team members may increase, such that team

members may form close friendships. Fostered by the rise in mobile teams that eliminate geographic barriers to team composition (Hancock et al. 2020), an increased reliance on team member support raises the question of how teams recover together. A team-level recovery construct may yield important insights beyond individual levels of recovery. Team-level detachment may consider how members collectively “switch off” and how they reattach to work following work breaks. Team-level relaxation may consider the impact of activities such as team happy hours as a means of recovery. Team-level mastery may consider team learning-related experiences as a means of gaining resources to reinvest into team tasks. Various companies have adopted team volunteering to help members bond while contributing to social impact. Team sports may be another avenue in which teams collaborate and develop new skills together. Team-level control may consider the extent to which teams have autonomous choice over how they spend their work breaks. Whether control represents a decision made by consensus, by the team leader, or most vocal member may carry unique consequences for team recovery. Research is also needed to explore how team-level recovery emerges as a collective construct (Chan 1998) and consequences when teams have diverse perspectives on their recovery. Moreover, an important team-level recovery issue concerns whether recovery can be effectively achieved at the team level or whether recovery necessitates being away from all reminders of work, including one’s team members. Does pressure to spend breaks with team members add additional stress on individual members such that recovery is restricted?

Factors facilitating and constraining team recovery are likely unique to those at the individual level, given disparate factors, preferences, and values inherent within a team. The following are additional questions to consider: Are there threshold effects beyond which team-level recovery is inhibited? What are the short- and long-term impacts of team-level recovery activities and experiences? What differences underlie in-person versus virtual team recovery? What are the team-level antecedents and moderating factors (e.g., team personality, fault lines, mood, cohesiveness), mechanisms (e.g., team interdependence, mental models), and outcomes (e.g., team well-being, satisfaction, engagement, creativity, proactivity, performance) that impact team-level recovery?

11.2. Theme 2: Changing Nature of Technology—Technology and Recovery

Perhaps the most discernable trend associated with the future of work is the mounting reliance on technology (Manyika 2018), such that technology (e.g., enhanced digitalization, artificial intelligence, big data, cloud computing, and machine learning) continues to fundamentally change the nature of work (Colbert et al. 2016). Theme 2 addresses the potential for technology to impact employee recovery.

11.2.1. Research question 4: How does technology impact recovery? Increased reliance on video- and teleconferencing has, on one hand, facilitated meeting efficiency. However, it has also introduced new stressors, as being always “on” contributes to “zoom fatigue” (Fosslien & Duffy 2020). Given the possibility for technology to both constrain and aid employee recovery (Liu et al. 2021), future work should more explicitly examine how technology impacts the recovery process. As discussed in relation to Theme 1, time and boundary management strategies, such as developing personalized rituals to signal the end of the workday, will become increasingly critical for facilitating recovery.

11.2.2. Research question 5: How can technology be leveraged to aid recovery? Beyond descriptive research on how technology impacts recovery, research is needed to proactively investigate how to make use of the best parts of technology—accessibility, efficiency, accuracy—to facilitate employee recovery. For example, future work should leverage application-based interventions (e.g., mindfulness exercises, fitness trackers, sleep apps) to foster improved recovery practices for

employees. Of course, the challenge is to balance these strategies with recovery that separates individuals from digital media entirely as a potentially more effective strategy for recovery.

11.3. Theme 3: Changing Nature of Employment Arrangements—New Employment Paths and Recovery

Future trends indicate a shift toward short-term or contract work gigs (Deloitte 2021) that will inevitably change the current understanding of recovery processes. Theme 3 targets how new employment opportunities will shape how recovery is defined.

11.3.1. Research question 6: How do new employment contracts affect the recovery of employees? The future of work is projected to be less defined by a single career and is rather a collective portfolio of temporary positions (Marr 2019). Combined with changing work processes that are increasingly technology based, the labor market favors alternative work arrangements (Spreitzer et al. 2017), supportive of a gig economy with freelance or contract workers that hold short-term, task-based, and time-bound roles. Future research needs to develop models that support recovery for these workers, including understanding of recovery activities and experiences that aid recovery and targeted interventions that capitalize on the structure of these workers' unique schedules. These strategies will coincide with changing boundaries (Theme 1) and technology (Theme 2).

11.3.2. Research question 7: How can recovery be supported for unskilled, shift, and precarious workers? As work becomes increasingly fluid, there will also be an increase in unskilled workers, reflecting those who work in industries that do not require complex intellectual skill and are typically manual workers; shift workers, reflecting those who primarily work outside of regular daytime hours; and precarious workers, reflecting nonstandard or temporary employment workers who are typically denied the rights of permanent employees, who earn low wages, and who often work in dangerous conditions. Research has linked unskilled workers with high stress (Schabracq & Cooper 2000), shift workers with cardiovascular diseases (Bøggild & Knutsson 1999), and precarious workers with increased health issues (Schneider & Harknett 2019). As recovery opportunities for these workers are likely limited, interventions are required at the organizational and societal levels. In combination, it is important to understand recovery for these workers to better implement programs that benefit them. This research will need to consider workers' constraints due to socioeconomic status, as well as unstable and unpredictable schedules.

12. MOVING RECOVERY RESEARCH FORWARD

Research on recovery has provided important insights into how spending and experiencing work breaks as well as leisure time during evenings, weekends, and vacations is relevant for workers' well-being, motivation, and—to a lesser extent—performance-related outcomes. It is evident that recovery does not happen automatically but largely depends on a person's momentary affective state and also on their experiences during the workday.

In **Table 1**, we summarize five core findings of recovery research, highlight five open questions that should be addressed in future studies, suggest five methodological improvements that are needed, and point to five pieces of advice for working individuals, supervisors, and organizations. For instance, we suggest that research should broaden the scope of recovery activities and experiences, including family activities, hobbies, and serious-leisure activities (e.g., participating in semiprofessional sports competitions) as well as religious and spiritual experiences. In addition, future studies should shed light on the question of how short-term benefits of day-level recovery

Table 1 Findings, questions, methodological improvements, and advice for practice

Five core findings from empirical studies on recovery	<ol style="list-style-type: none"> 1. Evening recovery activities and experiences are related to improved well-being and motivational benefits during the day, with physical activities and psychological detachment from work being particularly effective. 2. Evening recovery activities and experiences depend on a person's momentary affective state, job stressors, and performance during the workday. 3. Long-term benefits of recovery are weaker than short-term gains and depend on additional factors. 4. Microbreaks during the workday are more effective for sustaining energy than are work-related strategies; effective breaks include physical activity and recovery experiences. 5. Recovery processes, particularly psychological detachment from work on evenings and weekends, can be improved through intervention programs.
Five questions to be addressed in future research	<ol style="list-style-type: none"> 1. What role do family activities, hobbies, serious-leisure activities, and religious and spiritual experiences play for recovery? 2. How do evening recovery experiences and next-day work events in combination affect daily well-being? 3. How do the short-term benefits of day-level recovery translate into longer-term gains in health and well-being, and when do the short-term benefits dissipate over time? 4. What are the underlying processes that make breaks from work successful, and are specific combinations of activities and experiences particularly effective in certain contexts and cultures and for certain groups? 5. How can recovery address the challenges of future work such as the changing boundaries between work and nonwork life, increased reliance on teams and technology, and changes in employment arrangements?
Five methodological improvements needed	<ol style="list-style-type: none"> 1. Mid-term time frames with weekly or monthly assessments should be used to bridge the time gap between day-level studies and longitudinal studies. 2. Reciprocal, cyclical, and nonlinear processes should receive more attention in study designs. 3. Measurement protocols that allow in-depth daily data collection in shift workers without overburdening study participants need to be developed. Qualitative studies to guide theory development about recovery in specific occupational groups and across cultures are needed. 4. Physiological measures, technology-based approaches (e.g., actigraphy, app-based interventions) should be incorporated into recovery research. 5. Recovery research should use a multilevel perspective with individuals nested in teams that are nested in organizations.
Five pieces of advice for individuals, supervisors, and organizations	<ol style="list-style-type: none"> 1. To enhance recovery, individuals should engage in active recovery activities (e.g., physical exercise). 2. Individuals should optimize their recovery experiences during nonwork time—with a particular emphasis on psychological detachment from work—and should explore combinations of recovery experiences that are personally beneficial for them. 3. Individuals should find ways to initiate recovery activities and experiences even when they are in a suboptimal state, for instance after a stressful day or when they feel depleted. 4. Supervisors should be supportive of employee recovery, for instance by not interrupting subordinates during designated nonwork time, encouraging work breaks, and being aware of fade-out effects after a vacation. 5. Organizations should provide resources (space, outdoor facilities) that enable employees to pursue their preferred break activities.

translate into longer-term gains in health and well-being. Methodological improvements are needed in terms of study designs, measurement protocols, and measures. Advice for individuals is pretty straightforward: Research findings on recovery encourage individuals to engage in recovery activities and to incorporate recovery experiences into their daily lives. Supervisors, coworkers, and organizations are important for facilitating recovery by not expecting continued availability, ensuring uninterrupted recovery periods, and providing support for the optimal use of rest time.

Achieving recovery is a complex process that is influenced by numerous factors. Developing a deeper understanding of these factors will contribute to more effective recovery processes, such that individuals can better protect their well-being, motivation, and capability to perform.

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