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Solving problems or seeing troubles? A day-level study on the consequences of thinking about work on recovery and well-being, and the moderating role of self-regulation

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ABSTRACT

This study examined, using a within-person design, how fluctuations in work-related affective rumination and problem-solving pondering are related to recovery and well-being ($N = 171$; 677 day-level data points over five consecutive work days). We hypothesized that trait self-regulation moderates the relationship between problem-solving during the evening and the state of being recovered at bedtime. We analyzed our data using a moderated multilevel mediation approach. The results showed that affective rumination during the evening was indirectly related to impaired well-being in the subsequent morning through its negative relationship with the state of being recovered at bedtime. Problem-solving was indirectly related to well-being in the subsequent morning through its relationship with the state of being recovered at bedtime. However, this indirect effect was moderated by trait self-regulation in a way that problem-solving pondering was positively related to the state of being recovered, and consequently, to improved well-being for employees higher in self-regulation, whereas it was negatively related to the state of being recovered, and consequently, to impaired well-being for those lower in self-regulation. These findings suggest that problem-solving pondering may be beneficial or unfavorable for recovery and well-being depending on the degree to which employees can regulate their cognitions and feelings.

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For many people, work nowadays is primarily mentally demanding. Moreover, advances in communication technologies have created a more diffuse boundary between work and off-work time (Perlow, 2012). Therefore, employees are more likely to be mentally exposed to work-related issues and stressors during their off-work time (Park, Fritz, & Jex, 2011). This prevents psychological detachment, which is a crucial aspect of the recovery process (Sonnentag & Bayer, 2005). Psychological detachment is defined as the sense of being away from the work situation and the ability to switch off mentally from work-related issues during off-work time (Etzion, Eden, & Lapidot, 1998). A substantial body of empirical research has shown that lack of detachment from work during off-work time impedes the recovery process and causes impaired well-being (see Sonnentag & Fritz, 2015, for a review). However, Cropley and Zijlstra (2011) posed that this may not always be true; they argue that whether or not being mentally engaged with work-related issues during off-work time inhibits or facilitates the recovery process depends on the type of perseverative thinking.

Cropley and Zijlstra (2011) conceptualized two fundamentally different experiences of work-related perseverative thinking: affective rumination and problem-solving pondering. Affective rumination is defined as an intrusive, pervasive, and recurrent cognitive experience in which thoughts are mainly

directed to dysfunctional emotions associated with work-related issues. Problem-solving pondering is defined as a prolonged cognitive experience in which thoughts are directed to discover solutions to work-related problems or re-evaluate work-related performance to consider how it can be improved. Cropley and Zijlstra (2011) argue that these two types of work-related perseverative thinking may have different effects on recovery from work and psychological well-being due to their differing impacts on psychophysiological activation (Brosschot, Pieper, & Thayer, 2005). Affective rumination impedes the recovery process because it activates prolonged psychophysiological reactions and draws on individuals' emotional resources. In contrast, problem-solving pondering is less likely to cause prolonged psychophysiological activation and may even act as a resource-providing experience (Fritz & Sonnentag, 2006) by facilitating progression towards solving problems. In accordance with this proposition, a number of between-person studies have shown that affective rumination is detrimental to individuals' well-being, whereas the effects of problem-solving pondering on well-being have not been consistent, indicating positive or non-significant effects (e.g. Firoozabadi, Uitdewilligen, & Zijlstra, 2018; Hamesch, Cropley, & Lang, 2014; Querstret & Cropley, 2012).

The present study aims to extend this prior research by considering two principles. First, where previous studies have

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focused on between-person effects, perseverative thinking may differ not only between but also within persons over time; individuals may experience different levels of affective rumination and problem-solving pondering across working days. According to Xanthopoulou, Bakker, and Ilies (2012), the study of within-person fluctuations is important because it provides insight into the dynamics of work and well-being and furthers the understanding of employee well-being on a day-to-day basis. Given that previous research indicates that a significant amount of variance in core indicators of employee well-being may be attributed to within-person fluctuations (Xanthopoulou et al., 2012), a within-person design can explain additional variation on recovery and well-being by daily variations on these two different types of work-related perseverative thinking. Second, problem-solving pondering may not be beneficial for everyone as it is likely to depend on the extent to which employees experience progress in thinking (e.g. discovering a solution), whether they experience positive affect and prolonged cognitive processing is terminated. There may be crucial contingency factors that influence people's ability to generate solutions to work-related problems, and thereby, the effect of problem-solving pondering on recovery from work. One such factor is self-regulation, which refers to the set of cognitive and affective processes that enable individuals to guide their goal-directed activities over time and across changing circumstances (Karoly, 1993). Thus, this study investigates how the relationship between problem-solving pondering during the evening and the state of being recovered at bedtime is influenced by between-person differences in trait self-regulation.

Taken together, this study makes three contributions to the literature. First, by adopting a day-level approach, we examine the idea that being mentally engaged with work-related issues does not necessarily inhibit the state of being recovered during the evening as this depends on the type of work-related perseverative thinking. Second, our study contributes to the work-related rumination literature by investigating whether the extent to which individuals are able to regulate their cognitions and emotions acts as a moderator in the relationship between problem-solving pondering and the state of being recovered. Therefore, our findings may shed light on inconsistent previous findings concerning the relationship between problem-solving pondering and well-being (Bennett, Gabriel, Calderwood, Dahling, & Trougakos, 2016; Firoozabadi et al., 2018; Hamesch et al., 2014; Querstret & Cropley, 2012; Syrek, Weigelt, Peifer, & Antoni, 2017). Third, we shed light on the mechanisms underlying these relationships by examining whether affective rumination and problem-solving pondering are related to well-being via inhibiting or facilitating the state of being recovered.

Two types of perseverative thinking: affective rumination and problem-solving pondering

Perseverative thinking refers to a class of recurrent, pervasive, and prolonged thoughts representing work-related issues in the absence of immediate environmental demands. Scholars (e.g. Brosschot et al., 2005; Flaxman, Ménard, Bond, & Kinman, 2012) conceptualized perseverative thinking as worry and

rumination about stressors that cause impaired well-being. However, Cropley and Zijlstra (2011) distinguished between two fundamentally different types of work-related perseverative thinking, namely affective rumination and problem-solving pondering. According to Cropley and Zijlstra (2011), compared to problem-solving pondering, affective rumination is more likely to cause prolonged psychophysiological activation and straining effects on the organism because it leads to prolonged exposure to dysfunctional emotions associated with work-related issues.

To explain the differential impact of affective rumination and problem-solving pondering on psychophysiological activation, we draw on the Cognitive Activation Theory of Stress (CATS: Ursin & Eriksen, 2004, 2010). According to CATS, the key feature in determining the degree to which psychophysiological activation may be influenced by dealing with stressors is the type of associated response outcome expectancies. Response outcome expectancies refer to individuals' outlooks about the outcomes of their available responses. Response outcome expectancies are described as negative or positive if the produced response is expected to handle the problem with negative or positive results, respectively. Based on this theoretical framework, we argue that affective rumination leads to prolonged activation because it is more likely to be associated with negative outcome expectancies. This means that individuals expect that their available responses lead to negative results and they are not able to solve the problem and cope with the situation. On the contrary, problem-solving pondering can be conceptualized as a form of thinking about work-related issues that is more likely to be associated with positive outcome expectancies. Therefore, individuals may have a feeling of being able to control the situation by finding a solution to the problem. Finding a solution and feeling a sense of control are both known as adequate ways of reducing psychophysiological activation (Ursin & Eriksen, 2004).

Effects of affective rumination and problem-solving pondering on recovery

Recovery refers to the process during which individuals are no longer confronted with work-related stressors (Meijman & Mulder, 1998) and their depleted resources are replenished (Hobfoll, 1989). Therefore, depending on the degree of unwinding from work demands and work stressors, as well as the amount of resources that are replenished, employees experience different levels of being recovered after off-work time. In this study, we focused on the subjective state of being recovered at bedtime as an indicator of the success of recovery during the evening after controlling for the state of being recovered immediately after work. The state of being recovered indicates the degree to which individuals feel recovered and physically and mentally refreshed (Binnewies, Sonnentag, & Mojza, 2009a; Sonnentag & Krueger, 2006).

Psychological detachment has been argued as an essential recovery experience that benefits well-being (Sonnentag & Fritz, 2015; Wendsche & Lohmann-Haislah, 2017). Several diary studies showed that experiencing psychological detachment during off-work time facilitates the recovery process (Binnewies, Sonnentag, & Mojza, 2010; Sonnentag & Bayer,

2005; Sonnentag, Binnewies, & Mojza, 2008). Lack of detachment during the evening implies that individuals remain mentally engaged with work-related issues. Although employees may experience lack of detachment in different ways, one such experience that seems to have a crucial effect on the recovery process is ruminative thinking. A few studies have investigated the effects of work-related rumination on the recovery process during off-work time. Rydstedt, Cropley, Devereux, and Michalianou (2009) showed that trait rumination is positively related to levels of evening cortisol and need for recovery. A study (Cropley, Rydstedt, Devereux, & Middleton, 2013) with a sample of school teachers also found that, compared with low ruminators, people scoring high on work-related rumination during a mid-week evening showed high levels of cortisol secretion at bedtime. However, neither of these studies explicitly distinguished between affective rumination and problem-solving pondering.

Cropley and Zijlstra (2011) suggest that being mentally occupied with work-related thoughts is not necessarily an inhibiting factor of the recovery process, as it may depend on the type of work-related perseverative thinking, whether it has a detrimental or beneficial effect. When experiencing affective rumination, individuals remain cognitively occupied with their work stressors in a way that is likely to impede recovery from work during the evening. Affective rumination is described as a way of thinking in which attention is drawn to feelings associated with negative aspects of work such as failure or negative events (Binnewies, Sonnentag, & Mojza, 2009b). Therefore, it appears that affective rumination hinders the recovery process by causing prolonged activation (Brosschot, Van Dijk, & Thayer, 2002) and by continuously drawing on both cognitive and emotional resources (Hobfoll, 1989). In contrast, problem-solving pondering draws mainly on cognitive resources while individuals engage in cognitive processes aimed at discovering solutions for work-related problems or at finding ways to improve their work-related performance. Because the processing of dysfunctional emotions does not play a prominent role in problem-solving pondering, it is less likely (vs. affective rumination) to cause prolonged activation and subsequent straining effects on the organism (Cropley & Zijlstra, 2011).

During non-work time, employees may engage in problem-solving pondering to manage their work-related problems and reduce their uncertainty about their work performance. According to Cropley and Zijlstra (2011), people may engage in problem-solving pondering because they enjoy dealing with work-related issues. During pondering, employees try to clarify problems, develop plans, generate solutions, or even picture a positive outlook about their job. These positive thinking processes are likely to promote positive affect because by engaging in them people experience a sense of achievement, competence, and proficiency. Such brief experiences of positive emotions have been shown to have energizing effects and to counteract fatigue by replenishing depleted resources (Ren, Hu, Zhang, & Huang, 2010; Tice, Baumeister, Shmueli, & Muraven, 2007). They also counteract the straining effects of negative emotions by returning individuals to a neutral physiological state (Fredrickson & Levenson, 1998; Fredrickson, Mancuso, Branigan, & Tugade, 2000), increasing

motivation related to cognitive performance (Erez & Isen, 2002), and facilitating creative processes of thinking (Isen, Daubman, & Nowicki, 1987). According to the self-regulation model of ruminative thought (Martin & Tesser, 1996), finding solutions acts as a goal attainment mechanism that prevents ruminative thinking. When the work-related problem is solved, the individual may benefit from the rest of off-work time by engaging in other resource-providing experiences such as mastery and relaxation.

In the current study, using a within-person design, we investigate whether daily fluctuations in work-related affective rumination and problem-solving pondering are dynamically related to the daily recovery from work during the evening. We hypothesize that:

Hypothesis 1: Affective rumination during the evening is negatively related to the state of being recovered at bedtime.

Hypothesis 2: Problem-solving pondering during the evening is positively related to the state of being recovered at bedtime.

The interaction effect of problem-solving pondering and self-regulation on recovery

Unlike affective rumination, problem-solving pondering is conceptualized as a goal-directed cognitive process by which individuals aim to reduce a discrepancy between the current state and the desired state. Through problem-solving pondering, individuals reduce this discrepancy by discovering and generating solutions to work-related problems. To do so, individuals should successfully undertake the three steps of problem-solving process: assessing the problem, evaluating possible solutions to the problem, and eventually deciding about which solution to choose (Nolen-Hoeksema, 1996). Therefore, in problem situations, individuals not only need to perform cognitive activities (e.g. activating existing knowledge or organizing new information), they need to set specific goals, plan, and then monitor their performance during the process of problem-solving (Carver & Scheier, 2011). Self-regulation is conceived as a cybernetic control process (Carver & Scheier, 1998) that facilitates the process of problem-solving directed to reduce a discrepancy between the individual's current state and a desired state. Self-regulation refers to cognitive and affective processes enabling individuals to guide their goal-directed activities over time and across changing circumstances (Karoly, 1993). These mainly conscious processes (Posner & Rothbart, 1998) aim to maintain goal-directed action by managing arousal (Blair & Ursache, 2011), controlling the allocation of attention to goal-relevant and goal-irrelevant information (Kanfer & Ackerman, 1989; Papias & Aarts, 2011), and modifying the experience and expression of emotions (Thompson, 1994).

Drawing on the conceptualization of Kanfer and Ackerman (1989), self-regulation influences the process of problem-solving in an adaptive manner via three cognitive and affective mechanisms: *self-monitoring*, *self-reactions*, and *self-evaluation*. Self-monitoring refers to the allocation of attention toward specific aspects of the behavior (i.e. thinking about a work-

related problem) and its consequences that have functional significance for goal attainment (i.e. discovering of a solution). Self-reactions involve self-satisfaction with performance and self-efficacy for goal attainment. Self-evaluation involves a comparison of the current state with a desired state, as well as checking the progression in reducing goal-performance discrepancy. Higher levels of self-monitoring imply that people are capable to guide, evaluate, and regulate their process of thinking and emotions to discover solutions to work-related problems. When people experience progress in their thinking process and discover solutions for their problems, they are likely to experience positive emotions related to their sense of achievement and self-efficacy for attaining work-related goals. Due to the higher levels of efficacy and satisfaction with the self (i.e. self-reactions), people high in self-regulation are likely to benefit more from this experienced progress than people low in self-regulation. Moreover, higher capacities of self-evaluation serves as a protective mechanism, preventing employees from using excessive amounts of resources in circumstances where pondering is not beneficial for goal attainment or not likely to lead to a solution.

Therefore, in the current study, we investigate how individual differences in trait self-regulation influence the strength of the relationship between daily fluctuations of problem-solving pondering and recovery from work during the evening. We hypothesize that:

Hypothesis 3: Trait level self-regulation moderates the relationship between problem-solving pondering during the evening and the state of being recovered at bedtime. More specifically, the positive relationship between problem-solving pondering during the evening and the state of being recovered at bedtime is stronger for employees higher in self-regulation and weaker for employees low in self-regulation.

Affective rumination, problem-solving pondering, and well-being, the mediating role of recovery

A number of cross-sectional and longitudinal studies have consistently shown that work-related affective rumination is negatively associated with well-being (Donahue et al., 2012; Firoozabadi et al., 2018; Hamesch et al., 2014; Querstret & Cropley, 2012). However, the relationship between problem-solving pondering and well-being has not been consistently shown. In a cross-sectional study, Querstret and Cropley (2012) found a negative relationship between problem-solving pondering and both acute and chronic fatigue. However, they did not draw a definitive conclusion for these results due to the identified suppression effect (Pandey & Elliott, 2010) of problem-solving pondering in their analysis. Moreover, comparing different profiles of recovery experiences, Bennett et al. (2016) concluded that lack of psychological detachment is less crucial for well-being specifically for employees who experience higher levels of problem-solving pondering. In contrast, two longitudinal studies found no significant effect of problem-solving pondering on well-being over time (Firoozabadi et al., 2018; Hamesch et al., 2014). Regarding the within-person research, Syrek et al. (2017) showed a positive relationship

between affective rumination and sleep impairment and a marginally negative relationship between problem-solving pondering and sleep impairment during the weekend.

Given existing literature, there is a lack of knowledge on the within-person relationships between the two types of work-related perseverative thinking and well-being. More specifically, there is a need to investigate the underlying dynamic processes by which these two experiences may have diverging effects on well-being in the short run. We propose the indirect effects of affective rumination and problem-solving pondering on well-being via the extent to which the two types of work-related perseverative thinking inhibit or facilitate the state of being recovered. In addition to the mediating role of recovery, taking into account the moderation effect of self-regulation on the relation between problem-solving pondering and recovery may explain the inconsistent previous findings concerning the relationship between problem-solving pondering and well-being.

According to a dynamic energetic approach of self-regulation (Baumeister, Muraven, & Tice, 2000), individuals' capacity for emotion regulation depends on their momentary available energetic resources. Accordingly, the two different types of work-related perseverative thinking during non-work time are related to subsequent well-being by the extent to which they influence the process of restoring energetic resources (i.e. recovery). The more a person restores energetic resources during the evening, the more he or she will experience a state of being recovered at bedtime. Based on this approach, engaging in affective rumination during the evening is likely to inhibit the replenishment of depleted resources and even drain remaining resources because it leads to prolonged psychophysiological activation. As a consequence of resource depletion (i.e. feeling fatigue), employees are less likely to regulate their dysfunctional feelings, which will lead to reduced well-being. In contrast, problem-solving pondering specifically for employees who are more likely to engage in constructive pondering (i.e. higher self-regulation) can facilitate the replenishment of depleted resources (i.e. feeling recovered) because it may lead to experienced progress in thinking and feelings of mastery. The restoration of energetic resources then promotes individuals' capacity to regulate emotions, which in turn increases well-being.

In the current study, we investigate the indirect link between daily variations in affective rumination and problem-solving pondering and well-being in the subsequent morning through the state of being recovered in the evening, while accounting for the moderating role of trait self-regulation on the pondering-recovery relationship. Specifically, we examine a partial mediation model (vs. a full mediation model) because the state of being recovered may not be the only mechanism that links the two types of work-related perseverative thinking during the evening and the subsequent morning. For example, affective rumination may also be negatively related to well-being through its negative relationship with sleep quality (Syrek et al., 2017). In addition, our model predicts the subsequent morning well-being above and beyond the contribution of well-being measured immediately after work of the prior day. In line with prior diary studies of recovery (e.g. Sonnentag et al., 2008; Sonnentag, Mojza,

Binnewies, & Scholl, 2008), we use affective states as the state and short-term indicators of well-being. Research has shown that affective states play an important role in employees' organizational behavior (e.g. Deluga & Masson, 2000; George & Zhou, 2007; Ilies, Scott, & Judge, 2006; Lyubomirsky, King, & Diener, 2005). Affective states have been demonstrated to consist of two distinctive and independent dimensions, namely positive affect and negative affect (Watson, 1988; Watson, Clark, & Tellegen, 1988). Positive affect refers to the state of high energy and full concentration. In contrast, negative affect is characterized by subjective distress and a variety of aversive mood states (Watson et al., 1988). Taking together, we hypothesize that:

Hypothesis 4: Affective rumination during the evening is indirectly related to impaired well-being ((a) lower positive affect and (b) higher negative affect) in the subsequent morning through its negative relationship with the state of being recovered at bedtime.

Hypothesis 5: The interaction between problem-solving pondering during the evening and trait self-regulation is indirectly related to improved well-being ((a) higher positive affect and (b) lower negative affect) in the subsequent morning via increase in the state of being recovered at bedtime. Namely, the positive relationship between problem-solving pondering and the state of being recovered is particularly strong for those higher (vs. lower) in trait self-regulation, and consequently, relates to higher well-being.

Figure 1 shows our conceptual model.

Method

Overview

We collected data by conducting a general survey and daily surveys over five consecutive working days. The general survey assessed demographic information and trait self-regulation. Participants were asked once to complete the general

survey before starting the daily diary surveys. Then over a period of five consecutive working days, participants responded to daily surveys at three measurement occasions per day. In the morning before going to work, we assessed momentary morning positive and negative affect as the indicators of morning well-being. After work and before leaving work, we assessed momentary state of being recovered, positive affect, and negative affect as daily control variables for predicting the state of being recovered at bedtime, positive affect, and negative affect in the subsequent morning, respectively. In the evening before going to bed, participants were asked to report work-related affective rumination and problem-solving pondering that they experienced during the respective evening and momentary state of being recovered.

Procedure and sample

Our participants were recruited from a range of Iranian organizations. To recruit study participants, we contacted the managers of nine different organizations, including the educational office and a faculty of a university, two centers of health and social welfare services, a counseling center of a large university, two high schools, and a couple of local branches of a bank. After the managers agreed with participation of their organization, a total of 320 employees received information packages including an invitation form with a participation code, a description of the goal of project as a study on recovery during evenings, and a general description of the data collection procedure. With the invitation form, we clarified the criteria that we only need those participants who have a full-time and primarily mentally demanding job (employees involved in teaching, planning, managing, administration, and research activities). They were informed about the anonymity and confidentiality of the data-collection and analysis process. Participants were offered to receive feedback about the related results after completion of the data collection as an incentive for participation. Participants were asked to email their willingness to participate in the study and provide an address where their survey packages could be

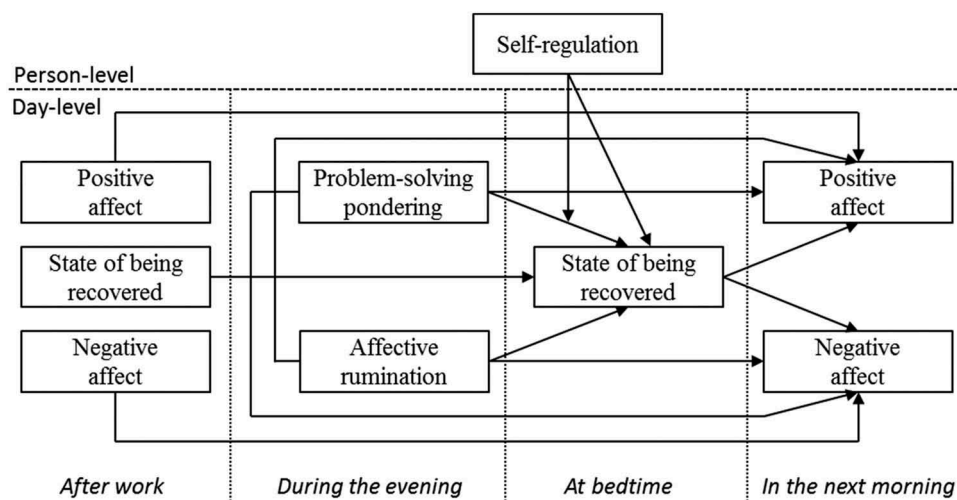


Figure 1. The study conceptual model.

delivered. In addition, each participant was asked to provide a cell phone number on a voluntary basis through which they received brief reminder messages for completing the diaries.

In total, 240 employees emailed their willingness to participate in the study. They received a paper-and-pencil general survey package (tagged with a participation code) by six assistants of the researchers who later collected the completed surveys. The paper-and-pencil daily survey packages were then delivered to 221 persons who completed the general surveys. To ensure that participants would not forget to complete the diaries at the designated times, brief reminder messages were sent on their cell phones. They were also asked to report the date and time of filling in the daily surveys. A total of 186 persons completed the daily surveys over five consecutive working days. We omitted the data from 15 participants due to missing data and failing to fill in the diaries at the scheduled times. Moreover, in line with our conceptual model predicting well-being in the morning from the daily variables of the prior day (Figure 1), the data collected in the morning of the first day and after work and bedtime of the fifth day were not included in our analysis. Therefore, our final sample consisted of 171 participants (response rate: 71%) with a total of 677 day-level data points. Our participants provided on average 3.9 (range, 3 to 4) day-level data points.

Of the 171 participants included in the analyses, 55% were females and 45% were males. The average age was 32.75 years ($SD = 5.67$), ranging from 21 to 54 years. The majority of the participants (82.5%) were married; approximately 76.6% of the participants lived with their spouse and 55% had children. The sample was fairly educated, ranging from Basic Diploma to PhD (7.6% basic diploma, 9.4% associate, 54.4% bachelor, 24.6% master, and 4% PhD). Participants' average tenure with their organizations was 7.54 years ($SD = 6.63$) ranging from 1 to 29 years. Participants held a variety of jobs (30.4% in health services, 38% in educational services, and 31.6% in social services). All participants worked full-time with an average weekly working time of 39.07 h.

Measures

Data were collected by conducting a general survey and five daily surveys. All items were in Persian. Items developed in English were translated into Persian by the first author and back-translated to English by two interpreters. Translation/back-translation procedure was used to ensure that conceptual consistency remained unchanged during the translation process.

General survey data

Self-regulation

We assessed trait self-regulation with a scale developed by Yeo and Frederiks (2011). The scale contains eight items measuring affective and cognitive aspects of self-regulation each with four items. Example items for affective and cognitive regulation were respectively: "I maintain control over my emotions" and "I pay close attention to the kinds of difficulties or problems I am facing." Participants were asked to respond on an 11-point scale, ranked from 0 (not at all) to 10 (very much). We ran a

set of confirmatory factor analyses to test whether the scale represents two distinct constructs. Compared to the one-factor model ($\chi^2(17) = 51.884, p < 0.001$; comparative fit index [CFI] = 0.97; Tucker-Lewis index [TLI] = 0.95; root-mean-square error of approximation [RMSEA] = 0.11; standardized root-mean-square residual [SRMR] = 0.04), the two-factor model ($\chi^2(16) = 49.874, p < 0.001$; CFI = 0.97; TLI = 0.95; RMSEA = 0.11; SRMR = 0.04) was not found to fit the observed data significantly better ($\Delta\chi^2(1) = 2.01, p = 0.15$). Therefore, we used data based on one-factor model representing affective and cognitive aspects of self-regulation. Cronbach's alpha was 0.76.

Daily survey data

State of being recovered

We assessed the momentary state of being recovered in the after work and the bedtime surveys with four adapted items from the scale developed by Sonnentag and Krueger (2006): "I feel mentally recovered," "I feel physically recovered," "I feel well-rested," and "I am full of new energy." On a seven-point Likert scale from 1 (totally disagree) to 7 (totally agree), the scale measures the degree to which an individual feels recovered. Cronbach's alpha values ranged from 0.84 to 0.87 over the after work measurements and from 0.85 to 0.88 over the bedtime measurements.

Affect

We measured positive and negative affect in the after work and the morning surveys with a shortened version of the positive and negative affect schedule (PANAS; Watson et al., 1988). We assessed positive affect with seven items ("active," "alert," "interested," "strong," "excited," "attentive," and "inspired"), and negative affect with six items ("irritable," "upset," "distressed," "nervous," "afraid," and "jittery"). Participants responded to all affective states measures on a five-point Likert scale from 0 (very slightly or not at all) to 4 (extremely). For positive affect, Cronbach's alpha values ranged from 0.88 to 0.91 over the after work measurements and from 0.89 to 0.92 over the morning measurements. For negative affect, Cronbach's alphas ranged from 0.89 to 0.93 over the after work measurements and from 0.83 to 0.88 over the morning measurements.

Given the hierarchical structure associated with the analysis of multilevel data, we ran a set of multilevel confirmatory factor analyses (MCFAs) suggested by Muthén (1994) to confirm whether the three study outcomes (i.e. the state of being recovered at bedtime, morning positive affect, and morning negative affect) represent distinct constructs. Compared to the one-factor model ($\chi^2(204) = 1254.534, p < 0.001$; CFI = 0.74; TLI = 0.69; RMSEA = 0.09; SRMR-*within* = 0.15, SRMR-*between* = 0.46), the three-factor model ($\chi^2(198) = 462.098, p < 0.001$; CFI = 0.93; TLI = 0.92; RMSEA = 0.04; SRMR-*within* = 0.04, SRMR-*between* = 0.08) resulted in a significantly better fit (Satorra-Bentler $\Delta\chi^2(6) = 806.056, p < 0.001$). Moreover, the three-factor model showed a better model fit than the best fitting two-factor model (Satorra-Bentler $\Delta\chi^2(4) = 178.319, p < 0.001$).

Work-related perseverative thinking

We measured affective rumination and problem-solving pondering in the bedtime survey with items adapted from the work-related rumination questionnaire (WRRQ; Cropley, Michalianou, Pravettoni, & Millward, 2012). The scale measured the two different types of work-related rumination, affective rumination and problem-solving pondering, each by five adapted items. The items were adapted to the day-level measuring affective rumination and problem-solving pondering experienced during the previous evening. Affective rumination and problem-solving pondering subscales included items such as, "During the evening, I was troubled by work-related issues" and "During the evening, I found solutions to my work-related problems," respectively. Items were responded by using a five-point Likert scale ranging from 1 (very seldom/never) to 5 (very often/always). Cronbach's alpha values ranged from 0.90 to 0.91 for affective rumination and from 0.86 to 0.88 for problem-solving pondering over all daily measurements.

To examine whether the measure represents the two distinct constructs, we conducted MCFAs. Although the one-factor model did not appear well-fitting ($\chi^2(70) = 688.983$, $p < 0.001$; CFI = 0.72; TLI = 0.64; RMSEA = 0.11; SRMR-*within* = 0.19, SRMR-*between* = 0.64), the two-factor model ($\chi^2(68) = 198.694$, $p < 0.001$; CFI = 0.94; TLI = 0.92; RMSEA = 0.05; SRMR-*within* = 0.05, SRMR-*between* = 0.07) fit the data significantly better (Satorra-Bentler $\Delta\chi^2(2) = 102.285$, $p < 0.001$).

Data analysis

There were two levels of data for each person: the person level (Level 2) and the day level (Level 1), with the day-level data nested within persons. Given this hierarchical data structure, we examined the hypotheses with multilevel structural equation modeling (MSEM; Preacher, Zhang, & Zyphur, 2011), using Mplus statistical software version 7 (Muthén & Muthén, 2012). We simultaneously tested all hypotheses by conducting a moderated multilevel mediation model (see Figure 1) suggested by Bauer, Preacher, and Gil (2006). To do so, a 1-1-1 mediation model is tested using predictor, mediator, and outcome variables all assessed on the day level, in which the strength of the indirect relationship between the day-level variables depends on a person-level variable. More specifically, our mediation analysis involved a cross-level moderation effect by examining a random intercept and slope model in which the relationship between day-level variables (i.e.

problem-solving pondering and the state of being recovered) was allowed to vary across persons (i.e. trait self-regulation). Accordingly, 95% confidence intervals for the indirect paths are calculated based on the Monte Carlo method (Preacher & Selig, 2012).

As Preacher, Zyphur, and Zhang (2010) discussed, estimating the mediation effect only in the within-person model results in a conflated estimation. This implies that between-person relationships may be detected as within-person relationships if only the within-person model is estimated. Preacher et al. (2010) suggested the unconfined multilevel model (UMM) approach as the solution to this conflation by which the same mediation relationships on the within-person and between-person level are simultaneously estimated. Within the MSEM analysis, all observed variances of Level-1 variables are implicitly divided into two latent parts; a within-person and a between-person component (Preacher et al., 2010). In the within-person part, between-person variation is removed by centering variables at the respective person mean (i.e. group mean centering) in such a manner that coefficients indicate within-person relationships between variables at Level 1. In the between-person part, variables are centered at the grand mean (i.e. grand mean centering), regardless of clustering, and thereby coefficients indicate between-person relationships between variables at Level 2.

Regarding the study hypotheses, we presented the results related to within-person paths (Table 2). However, the between-person results were additionally reported (see Footnote 1).

Results

Means, standard deviation, and both person-level and day-level correlations are displayed in Table 1. To examine the variability of outcome variables we calculated the intraclass correlations (ICC; Hoffman, 2007) based on an unconditional random coefficient models. The results showed that, for daily state of being recovered, morning positive affect, and morning negative affect, within-person variation was 52%, 49%, and 54%, respectively. These results showed that a substantial portion of the variance in outcome variables was attributed to within-person variation.

Test of hypotheses

Table 2 shows the results for the moderated multilevel mediation model examining all hypotheses. The results

Table 1. Mean, standard deviation, and correlation between study variables.

variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8
1 Affective rumination	1.98	0.83	-	0.40***	-0.17***	-0.10*	0.24***	-0.30***	-0.15*	0.17***
2 Problem-solving pondering	2.41	0.81	0.43***	-	-0.11*	0.007	0.04	-0.02	0.07	-0.09
3 State of being recovered after work	4.17	1.50	-0.46***	-0.04	-	0.48***	-0.34***	0.25***	-0.02	-0.03
4 Positive affect after work	2.04	0.67	-0.41***	-0.02	0.63***	-	-0.30***	0.15*	-0.06	-0.05
5 Negative affect after work	0.48	0.66	0.53***	0.34***	-0.29**	-0.20*	-	-0.21***	0.002	0.17*
6 State of being recovered at bedtime	4.05	1.54	-0.42***	0.05	0.95***	0.57***	-0.22**	-	0.18*	-0.21***
7 Next morning positive affect	2.29	0.68	-0.24*	0.16	0.42***	0.75***	-0.17	0.37***	-	-0.40***
8 Next morning negative affect	0.37	0.53	0.46***	0.32***	-0.21**	-0.13	0.94***	-0.11	-0.22**	-
9 Trait self-regulation	7.30	1.72	-0.07	0.07	0.20*	0.35***	-0.21**	0.13	0.25**	-0.16*

Correlations below the diagonal are person-level correlations ($N = 171$). Correlations above the diagonal are day-level correlations ($N = 676, 683$). * $p < 0.05$ (two-tailed). ** $p < 0.01$ (two-tailed). *** $p < 0.001$ (two-tailed).

related to the state of being recovered showed a positive but non-significant relationship between the person-level of self-regulation and the state of being recovered at bedtime. Moreover, as a control variable, the state of being recovered after work was positively related to the state of being recovered at bedtime. Regarding the core predictors of interest (Hypotheses 1 and 2), the results showed that affective rumination and problem-solving pondering were negatively and positively related to the state of being recovered at bedtime, respectively. The correlation coefficients (see Table 1) showed no significant correlation between problem-solving pondering and the state of being recovered at bedtime. However, problem-solving pondering was strongly correlated with affective rumination, which in turn was significantly correlated with the outcome variable. This pattern of correlation suggested that problem-solving pondering might act as a suppressor variable. According to Pandey and Elliott (2010), a suppressor variable is a predictor that is uncorrelated or weakly correlated with the outcome variable but is strongly correlated with other predictors that are correlated with the outcome variable. Hence, further analysis was needed to reveal whether problem-solving pondering meets the criteria of acting as a suppressor variable (Cohen, Cohen, West, & Aiken, 2003; Pandey & Elliott, 2010) in the model predicting the state of being recovered at bedtime.

We then tested for the suppressor effect by conducting additional analyses in which each variable of interest (i.e. affective rumination or problem-solving pondering) was separately included in the model. The results showed a significant relationship between affective rumination and the state of being recovered ($\beta = -0.562, p < 0.001$) whereas the relationship between problem-solving pondering and the state of being recovered was not found significant ($\beta = 0.043, p = 0.68$). Moreover, by having both affective rumination and problem-solving pondering as the predictors of the state of being recovered (see Table 2) two changes occurred: (a) the predicting power of affective rumination improved and (b) the effect of problem-solving pondering on the state of being recovered became significant. These results indicate that problem-solving pondering acted as a classic suppressor (Cohen et al., 2003; Pandey & Elliott, 2010) in our model. Therefore,

Hypothesis 1 was supported. However, in contrast to the finding provided by the initial analysis (see Table 2), these additional analyses of the suppression effect did not provide support for Hypothesis 2.

The model showed a significant cross-level interaction indicating that the trait level of self-regulation was positively related to the slopes of problem-solving pondering with the state of being recovered. To test the suppression effect of problem-solving pondering, affective rumination was removed from the model. The results showed that although problem-solving pondering was not significantly related to the state of being recovered ($\beta = 0.043, p = 0.68$), the cross-level interaction of problem-solving pondering and self-regulation remained significant ($\beta = 0.157, p < 0.001$). Furthermore, we examined the pattern of the interaction effect by conducting simple slope tests (Preacher, Curran, & Bauer, 2006) at one standard deviation above and below the mean of trait self-regulation. The analyses revealed a significant and positive simple slope ($\beta = 0.323, p < 0.001$) for employees high in trait self-regulation (+ 1 SD) and a significant and negative simple slope ($\beta = -0.267, p < 0.001$) for employees low in trait self-regulation (-1 SD). These findings provided support for Hypothesis 3 indicating that the positive relation between problem-solving pondering and the state of being recovered was stronger for employees high in trait self-regulation. However, contrary to our expectation, the pattern of this interaction effect (illustrated in Figure 2) indicated that the relation between problem-solving pondering and the state of being recovered even became significantly negative for employees low in trait self-regulation.

To conduct a more conservative test of Hypotheses 4 and 5, the model controlled the state of positive and negative affect after work for predicting positive and negative affect in the subsequent morning, respectively. Positive affect was negatively related to positive affect in the subsequent morning, whereas the relationship between negative affect after work and negative affect in the subsequent morning was not found to be significant. The model then provided evidence for the indirect relationships between affective rumination during the evening and the lower level of positive affect and the higher level of negative affect in the subsequent morning via its negative relationship with the state of being recovered at

Table 2. Moderated multilevel mediation model predicting morning affect from affective rumination, problem-solving pondering experienced during the evening and state of being recovered at bedtime.

Variable	State of being recovered			Positive affect			Negative affect		
	Estimate	SE	t	Estimate	SE	t	Estimate	SE	t
Outcome after work (control)	0.227	0.064	3.523***	-0.103	0.046	-2.220*	0.100	0.056	1.784
Affective rumination (AR)	-0.635	0.112	-5.677***	-0.149	0.053	-2.814**	0.112	0.038	2.922**
Problem-solving pondering (PS)	0.278	0.109	2.557*	0.116	0.052	2.212*	-0.103	0.041	-2.525*
General level of self-regulation (SR)	0.043	0.048	0.896						
Interaction effect: PS \times SR	0.112	0.042	2.692**						
State of being recovered (SBR)				0.057	0.021	2.726**	-0.044	0.016	-2.668**
Indirect effect: AR \rightarrow SBR \rightarrow morning affect				-0.036	0.016	-2.284*	0.028	0.013	2.223*
Indirect effect: PS \times SR \rightarrow SBR \rightarrow morning affect				0.006	0.003	2.076*	-0.005	0.002	-2.047*
Residual variance	0.820	0.118	6.924***	0.197	0.031	6.456***	0.097	0.018	5.530***

All paths were simultaneously tested in one model. The results are related to within-person paths (Hypotheses 1, 2, and 4) and a cross-level interaction (Hypotheses 3 and 5).¹ Outcomes after work were the state of being recovered after work to predict the state of being recovered at bedtime, positive affect after work to predict positive affect in the next morning, and negative affect after work to predict negative affect in the next morning. * $p < 0.05$ (two-tailed). ** $p < 0.01$ (two-tailed). *** $p < 0.001$ (two-tailed).

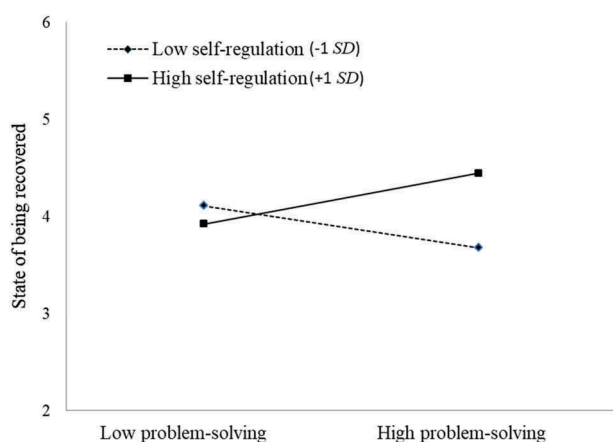


Figure 2. The interaction effect of problem-solving during the evening (PS) and self-regulation (SR) on the state of being recovered at bedtime.

bedtime (Indirect effect = -0.036 , 95% confidence interval [CI] = -0.068 to -0.009 for positive affect; Indirect effect = 0.028 , 95% CI = 0.008 to 0.052 for negative affect). Therefore, Hypothesis 4 was fully supported.

The results showed that the interaction between problem-solving pondering during the evening and trait self-regulation was significantly related to the two affect outcomes in the subsequent morning through the extent to which people feel recovered at bedtime (Indirect effect = 0.006 , 95% CI = 0.001 to 0.014 for positive affect; Indirect effect = -0.005 , 95% CI = -0.011 to -0.001 for negative affect). The data partly supported Hypothesis 5 because the relationship between problem-solving pondering and the state of being recovered was positive for employees high in trait self-regulation but negative for employees low in trait self-regulation (see Figure 2). These findings show that problem-solving pondering during the evening was indirectly (through a higher level of the state of being recovered at bedtime) related to the higher level of well-being in the subsequent morning for employees high in trait self-regulation. In contrast, problem-solving pondering during the evening was indirectly (through a lower level of the state of being recovered at bedtime) related to the lower level of well-being in the subsequent morning for employees low in trait self-regulation.

In addition, we compared the examined partial mediation model with the full mediation model in which the direct paths between the two variables of interest (i.e. affective rumination and problem-solving pondering) and the two affect outcomes in the subsequent morning were excluded. We conducted a model comparison test for nested models, as suggested by Finch and Bolin (2017, p. 68). The results showed that the partial mediation model ($\log\text{-likelihood} = -3283.874$; Akaike information criterion [AIC] = 6635.749 ; Bayesian information criterion [BIC] = 6789.350 ; scaling correction factor = 1.418 ; number of free parameters = 34) provides a significantly better fit to the data ($\Delta\chi^2(8) = 64.901$, $p < 0.001$) than the full mediation model ($\log\text{-likelihood} = -3315.319$; AIC = 6682.638 ; BIC = 6800.097 ; scaling correction factor = 1.556 ; number of free parameters = 26). These findings indicate a partial mediation effect of the state of being recovered at bedtime for Hypotheses 4 and 5.²

Discussion

The aim of this study was to examine how daily fluctuations in affective rumination and problem-solving pondering are related to evening recovery using a within-person design (Hypotheses 1 and 2). We also investigated whether the relationship between problem-solving pondering and evening recovery is more positive for employees high in trait self-regulation than for employees low in trait self-regulation (Hypotheses 3). Finally, we examined whether daily fluctuations in affective rumination and problem-solving pondering are related to well-being in the subsequent morning through the state of being recovered at bedtime, while the relationship between problem-solving pondering and evening recovery is moderated by trait self-regulation (Hypotheses 4 and 5). Results from a moderated multilevel mediation analysis provided support for Hypotheses 1, 3, 4, and 5 whereas Hypotheses 2 was not supported.

The results showed that the higher level of work-related affective rumination during the evening was negatively associated with the lower level of the state of being recovered at bedtime. This finding indicates that the experience of affective rumination during the evening inhibits the recovery process. This finding is in line with the past research that reported work-related rumination to be related to higher levels of physiological arousal and need for recovery (Cropley et al., 2013; Rydstedt et al., 2009). The model then showed that affective rumination during the evening was indirectly related to well-being in the subsequent morning through the extent in which the individual feels recovered at bedtime. This finding contributes to findings of previous research using between-person designs (Donahue et al., 2012; Firoozabadi et al., 2018; Hamesch et al., 2014; Querstret & Cropley, 2012) by showing the recovery process as a mechanism through which affective rumination is negatively related to psychological well-being.

Although the primary results showed that problem-solving pondering was positively related to the state of being recovered at bedtime, the additional analyses confirmed the classic suppression effect of problem-solving pondering in the models including affective rumination and problem-solving pondering both as the predictors of recovery. Given the results of the suppression test, the relationship between problem-solving pondering and evening recovery was not significant when affective rumination was excluded from the model. This finding is in line with a previous cross-sectional study (Querstret & Cropley, 2012) that showed that problem-solving pondering acts as a suppressor variable to negatively predict both acute and chronic fatigue. One explanation might be that, apart from a positive effect of problem solving on recovery, it may also spill over into affective rumination which may negatively affect recovery. Only when this second effect is controlled for, we observe the positive effect of problem-solving pondering on recovery. Our findings shed light on the assumption provided by Nolen-Hoeksema (1996) indicating that, although in both problem-solving and rumination, thoughts are directed to reduce goal discrepancies, they are differentiated from each other in terms of whether

progression in the thoughts occurs over a reasonable period of time. According to Nolen-Hoeksema (1996), problem-solving is conceptualized as the process of thinking directed at resolving current or future problems by which some progression in the thoughts occurs over a reasonable period of time. If engaging repeatedly in problem-solving does not lead to any progression toward choice of a solution over a reasonable period of time, affective rumination may occur.

The results related to the cross-level interaction showed that problem-solving pondering was significantly related to the state of being recovered at bedtime by taking into account the moderating role of trait self-regulation. This result was in line with our expectation that problem-solving pondering is more likely to facilitate recovery from work during the evening for employees higher in trait self-regulation. According to Karoly (1993), individuals high in self-regulation are more capable to guide their goal-directed activities to reduce the discrepancy between the current state and a desired state. Therefore, they are more likely to experience problem-solving pondering as a process of thinking that probably often results in solutions to work-related problems. Drawing on the self-regulation model (Martin & Tesser, 1996), finding a solution acts as a goal attainment mechanism by which the ruminative thinking will be stopped and the individual feels a sense of achievement. In addition, the results of the simple slope tests showed that the relationship between problem-solving pondering and the state of being recovered was even negative for employees low in self-regulation ($-1 SD$). This finding also provides additional support for Nolen-Hoeksema's (1996) assumption indicating that individuals are more likely to switch to affective rumination when they do not experience a progressive and productive process of problem-solving over a limited time.

This study showed that problem-solving pondering during the evening was indirectly related to well-being in the subsequent morning via the state of being recovered at bedtime in such a way that this indirect effect was positive for employees high in trait self-regulation and conversely negative for employees low in trait self-regulation. However, for employees low in trait self-regulation ($-1 SD$), the interpretation of the indirect effect was different regarding their different pattern of relationship between problem-solving pondering and recovery. Therefore, specifically for employees low in trait self-regulation, one may conclude that problem-solving pondering during the evening was indirectly related to the lower level of well-being in the subsequent morning via its inhibiting effects on recovery from work. These findings can explain the inconsistent findings of previous research concerning the relationship between problem-solving pondering and well-being (Bennett et al., 2016; Firoozabadi et al., 2018; Hamesch et al., 2014; Querstret & Cropley, 2012; Syrek et al., 2017).

Our study extended the recovery and occupational health literature by showing the day-level effects of the two different experiences of being mentally engaged with work-related issues on the recovery process and well-being. Moreover, it extended the literature of work-related perseverative thinking by addressing self-regulation as an individual factor that determines the facilitating or inhibiting role of problem-solving pondering on the recovery process. This

suggests that problem-solving pondering is not a risk factor for insufficient recovery and impaired well-being if employees are high in trait self-regulation. On the contrary, problem-solving pondering is a risk factor for insufficient recovery and impaired well-being if employees are low in trait self-regulation. Drawing on CATS theory (Ursin & Eriksen, 2004, 2010), perseverative thinking is less likely to cause prolonged activation if it is associated with positive outcome expectancies in which the process of thinking is expected to handle the situation with positive results. In contrast, it leads to prolonged activation if it is associated with negative outcome expectancies in which the process of thinking is not expected to handle the situation. Our findings are also in line with studies that found recovery as a crucial mechanism by which job stressors translate into poor well-being (e.g. Sonnentag, Binnewies, & Mojza, 2010; Sonnentag, Kuttler, & Fritz, 2010; Sonnentag & Zijlstra, 2006; Syrek & Antoni, 2014; Syrek et al., 2017).

In addition, the comparison of findings between the two levels of analysis showed some differences. These different findings support the assumption of emergent processes in multilevel research (Bliese & Jex, 2002) indicating that individual characteristics may differ in meaning and function differently across the within- and between-person levels of analysis. Therefore, researchers should draw conclusions by taking into consideration the level of results (i.e. within-person fluctuations or between-person differences).

Study limitations, directions for future research, and practical implications

This study has several limitations. First, we collected the data with self-report measures which may raise concerns about common method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). However, the longitudinal design, with measurement assessed at different time points, reduces the effects of common method bias. Second, our path-modeling approach to examine the hypotheses did not allow us to draw causal conclusions. Therefore, we avoided the use of causal language. However, because of the diary nature of our study with multiple waves in which we controlled for the initial level of outcomes variables after work as well as testing for reverse causation, causal conclusions were more trustworthy to be drawn. Third, in accordance with our theoretical framework, we assessed the state of being recovered at the same time with work-related rumination as the reported experiences in the previous time-period. Therefore, we could not rule out the momentary influences of the state of being recovered on the ratings of the different types of work-related rumination. Fourth, the data were collected using paper-and-pencil, and therefore, we did not have an indication of the day and time that participants filled in the diaries. However, to ensure compliance with the measurement timing of the study design, participants received reminders on their cell phones and were asked to report the date and time of filling the diary survey. Fifth, although the measures that we used to assess affective rumination and problem-solving pondering have been used in previous studies, they have not yet been

conceptually validated. Future research is needed to improve and validate these measures.

We recommend future research to investigate the underlying psychophysiological mechanisms of the two different types of work-related perseverative thinking using experimental designs and psychophysiological measures. For instance, a study may investigate whether affective rumination and problem-solving pondering differently affect endocrinological and cardiovascular indicators of prolonged activation (Brosschot et al., 2005). In the current study, self-regulation was found as a between-person variable that positively influences the effect of problem-solving pondering on recovery from work. Future research can investigate other between-person or even within-person factors that may play a determining role in the occurrence of a problem-solving pondering that facilitates the recovery process. In this paper, we discussed that problem-solving pondering may facilitate the recovery process by causing positive emotions that replenish depleted resources. However, this is still a speculative suggestion and future research examining this mediation role of positive emotions is required. Moreover, well-controlled intervention studies are needed to demonstrate the causality relationships between different types of work-related perseverative thinking, recovery, and well-being.

Based on the findings of the current study, organizations are recommended to improve their employees' ability to recover from work during off-work time. It seems important to improve the employees' knowledge of recovery, especially regarding the different types of being mentally engaged with work-related issues during off-work time. Organizations are recommended to screen their high-ruminating employees who are more vulnerable to burnout (Firoozabadi et al., 2018). These employees may then be treated with cognitive interventions such as cognitive behavior therapy and mindfulness-based techniques (Querstret, Cropley, & Fife-Schaw, 2017; Querstret, Cropley, Kruger, & Heron, 2016) that help them to disengage from affective rumination. Moreover, training problem-solving skills may help these employees to act as more successful problem solvers and shift them away from ruminative thinking (Watkins & Baracaia, 2002) if they deal mentally with work-related problems during the time of recovery. However, further research is needed to adapt and investigate psychological intervention approaches on overcoming work-related rumination.

Notes

1. The results related to the between-person level of analysis provided support for Hypothesis 1 ($\beta = -0.906, p < 0.001$) indicating that employees who reported higher levels of affective rumination experienced lower levels of recovery at bedtime. The positive relationship between problem-solving pondering and recovery was not significant ($\beta = 0.174, p = 0.42$). Therefore, Hypothesis 2 was not supported at the between-person level of analysis. Furthermore, the level in which employees experienced the state of being recovered at bedtime was positively associated with morning positive affect ($\beta = 0.125, p < 0.05$). However, the relationship between the state of being recovered at bedtime and morning negative affect was not significant ($\beta = 0.034, p = 0.31$). Finally, the results related to the between-person indirect relationships provided support only for

Hypothesis 4a ($\beta = -0.114, p < 0.05$) indicating that recovery mediated the relationship between affective rumination and morning positive affect.

2. The suppressor effect examination showed that problem-solving pondering acts as a classic suppressor to predict the two morning affect outcomes. Unlike the results presented by Table 2, the suppression test showed no significant direct relationships between problem-solving pondering during the evening and positive affect ($\beta = 0.054, p = 0.28$) and negative affect ($\beta = -0.058, p = 0.11$) in the subsequent morning. Nevertheless, given this suppression effect of problem-solving pondering, the comparison test for nested models showed that the partial mediation model fits the data better than the full mediation model ($\Delta\chi^2(4) = 25.011, p < 0.001$) for Hypothesis 5

Disclosure statement

No potential conflict of interest was reported by the authors.

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