

Should you switch off or stay engaged?

Citation for published version (APA):

Firoozabadi, A. (2019). *Should you switch off or stay engaged? the consequences of thinking about work outside work for well-being and job performance* (9789463239691 ed.). [Doctoral Thesis, Maastricht University]. Gildeprint Drukkerijen. <https://doi.org/10.26481/dis.20191211af>

Document status and date:

Published: 01/01/2019

DOI:

[10.26481/dis.20191211af](https://doi.org/10.26481/dis.20191211af)

Document Version:

Publisher's PDF, also known as Version of record

Please check the document version of this publication:

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
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- The final published version features the final layout of the paper including the volume, issue and page numbers.

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SHOULD YOU SWITCH OFF OR STAY ENGAGED?

The consequences of thinking about work
outside work for well-being and job
performance

Abbas Firoozabadi

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Cover design by: Mojtaba Firoozabadi | ISTA design office

Printed by: Gildeprint | www.gildeprint.nl | The Netherlands

ISBN 9789463239691

NUR 771

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SHOULD YOU SWITCH OFF OR STAY ENGAGED?

The consequences of thinking about work outside
work for well-being and job performance

DISSERTATION

To obtain the degree of Doctor at Maastrich University,
On the authority of the Rector Magnificus, Prof. dr. Rianne M. Letschert,
In accordance with the decision of the Board of Deans,
To be defended in public
On Wednesday 11 December 2019, at 10:00 hours

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CHAPTER 1

General introduction

Introduction

Work-related stress and burnout are since quite some time known as major concerns that have a negative influence on employees' well-being and organizations' effectiveness (Maslach, Schaufeli, & Leiter, 2001; Nixon, Mazzola, Bauer, Krueger, & Spector, 2011; Demerouti, Mostert, & Bakker, 2010). Burnout has been recognized as a cause of general health impairment, increased absenteeism and job turnover, decreased commitment to work, and decreased organizational productivity (Carod-Artal & Vázquez-Cabrera, 2013). Several studies (e.g. Rotenstein et al., 2018; Vercambre, Brosselin, Gilbert, Nerrière, & Kovess-Masféty, 2009; Embriaco, Papazian, Kentish-Barnes, Pochard, & Azoulay, 2007) have shown a high prevalence (30% to 70%) of burnout for employees in western and industrialized countries. Compared to western countries, people in developing countries, where 75% of the world's labor force work, have been even more at risk of burnout and impaired health. This higher risk can be attributed to factors such as globalization of the economy, increasing changes in the nature of work, less job security, less knowledge about occupational health and job stress prevention strategies, and a lack of occupational health services (Houtman, Jettinghoff, & Cedillo, 2007).

Research on the causes of burnout has primarily focused on job characteristics (e.g. work demands, time pressure, and work control), in order to study how they may contribute to burnout and impaired well-being. However, the way that people experience their non-work time (i.e. recovery in the evening or the weekend) has been also recognized to be crucial for employees' well-being (Sonnentag & Zijlstra, 2006). In a study with a sample of industrial employees, Kivimäki et al. (2006) found that insufficient recovery constituted a high risk factor for cardiovascular disease mortality in the following 25 years.

Research has shown that psychological detachment is an essential recovery experience that is highly beneficial for well-being and job performance (Sonnentag & Fritz, 2015; Sonnentag, 2012). Psychological detachment is defined as the sense of switching off mentally from work-related issues during off-job time (Etzion, Eden, & Lapidot, 1998). People may experience lack of psychological detachment during their off-job time because they engage in perseverative thinking about their work-related issues (Brosschot, Gerin, & Thayer, 2006; Brosschot, Pieper & Thayer, 2005). Perseverative thinking concerns the experience of repeated, pervasive, and prolonged activation due to

being mentally occupied with work-related issues. Perseverative thinking has been conceptualized as a mechanism by which work-related stress is translated into impaired well-being (Brosschot et al., 2005; Berset, Elfering, Lüthy, Lüthi & Semmer, 2011).

Cropley and Zijlstra (2011) proposed two fundamentally different types of work-related perseverative thinking, which they labeled ‘affective rumination’ and ‘problem-solving pondering’. Affective rumination is described as perseverative cognitive processes in which thoughts are mainly directed to dysfunctional emotions associated with work-related issues. Problem-solving pondering refers to perseverative cognitive processes in which thoughts are directed to finding solutions to work-related problems or to reflect on work-related processes in order to improve performance. It has been proposed that these two types of work-related perseverative thinking may have different effects on the recovery process and consequently on well-being and job performance.

Up to now, there have been a few studies (e.g. Querstret & Cropley 2012; Hamesch, Cropley, & Lang, 2014; Syrek, Weigelt, Peifer, & Antoni, 2017; Bennett, Gabriel, Calderwood, Dahling, & Trougakos, 2016; Kinnunen et al., 2017) that focused directly on the relationships between these two types of work-related perseverative thinking and well-being. These studies have shown that affective rumination is detrimental to well-being, whereas the effects of problem-solving pondering on well-being have not been consistent, indicating positive or non-significant effects. Nevertheless, the related knowledge needs to be extended by considering the remaining questions. The main goal of this dissertation is to investigate the effect of recovery from work on well-being and job performance with a central focus on these two types of work-related perseverative thinking.

This dissertation aims to extend the literature in five directions. First, research needs to consider the accumulative effects of affective rumination and problem-solving pondering on well-being in the long run. Therefore, I investigate how these two types of perseverative thinking impact changes in well-being outcomes over a period of one year. Second, to date, the relationships between the two types of perseverative thinking and job performance-related outcomes have not been tested. Therefore, I aim to investigate how different types of perseverative thinking contribute to job performance-related outcomes. Third, the previous studies on perseverative thinking have mainly focused on between-person effects. However, perseverative thinking may differ not only between persons but may also fluctuate within persons over time; an individual’s level of

affective rumination and problem-solving pondering may differ across working days or across weekends. Therefore, conducting diary studies, I aim to provide insight into the short-term dynamics of the relationships between the different types of perseverative thinking and outcomes such as recovery, well-being, and job performance on a time-to-time basis. Fourth, although the previous studies have shown that the two experiences of being mentally engaged with work-related issues lead to different consequences, the dynamic mechanisms by which these two experiences may operate differently on the organism have not been studied. Addressing this gap in the literature, this dissertation investigates the underlying dynamic psychological mechanisms through which affective rumination and problem-solving pondering may have diverging effects on well-being and job performance. Finally, research is needed to shed light on the previous inconsistent findings concerning the relationship between problem-solving pondering and well-being (Kinnunen et al., 2017; Bennett et al., 2016; Syrek et al., 2017; Hamesch et al., 2014; Querstret & Cropley, 2012). In order to shed light on these inconsistent findings, I propose that problem-solving pondering may not be beneficial for everyone. I suggest trait self-regulation (Zijlstra, Cropley, & Rydstedt, 2014; Carver & Scheier, 1998) as an individual factor that influences people's ability to generate solutions to work-related problems and may thereby determine the effect of problem-solving pondering on recovery from work.

Before drawing the outlines of this thesis, I will first put the concept of recovery in a theoretical perspective by presenting three theories that can explain how the quality of recovery during non-work time is an important determinant for employees' well-being and job performance. In order to place this project in perspective, I will then present a general history of research on the topic of recovery by clarifying the methods and strategies that researchers have used to study the effect of recovery on well-being and job performance. After that, I will focus on the conceptualization of affective rumination and problem-solving pondering as two different types of work-related perseverative thinking that employees may experience during their recovery time. I will also present a history of empirical research on the topic of work-related perseverative thinking by reviewing a number of key studies. This then helps us to show what we still need to know and how this research can contribute to the existing knowledge of the link between recovery, well-being, and job performance. Finally, I will end this chapter by a presentation of my research questions and an outlook of the following chapters.

Recovery: a theoretical perspective

This dissertation aims to investigate the effects of affective rumination and problem-solving pondering on well-being and job performance by considering how these two experiences during non-work time impede or facilitate the recovery process. Therefore, in order to explain how experiencing these two types of perseverative thinking during non-work time influence the recovery process, the concept of recovery from work should firstly be conceptualized. To do so, I conceptualize the concept of recovery from work by drawing on three key theoretical perspectives. These theories provide a dynamic conceptualization that can then explain the effects of affective rumination and problem-solving pondering on employees' well-being and job performance.

Effort-recovery theory (Meijman & Mulder, 1998): According to this theory, people actively decide to mobilize their resources to meet work-related demands and to accomplish work-related tasks (i.e. work procedure). Due to this expenditure of effort during working time, short-term psycho-physiological load reactions occur. According to Meijman and Mulder (1998), these load reactions are reversible adaptive responses that may lead to work-related products. Therefore, these short-term load reactions will not cause impaired well-being if employees can sufficiently recover after working time (see Figure 1.1). Accordingly, recovery occurs during non-work time when a range of physical, cognitive, or emotional job demands and work stressors no longer draw upon individuals' resources. By disengagement from job demands and work-related stressors, psycho-physiological load reactions can be reversed and individuals revert to the pre-demand state of functioning. Recovery correspondingly refers to the process by which employees are no longer confronted with work-related demands and their psycho-physiological system is rebalanced. In contrast, inadequate physical or mental release of job demands or work-related stressors (i.e. lack of recovery) continuously drains an individual's energetic resources and prolongs psycho-physiological load reactions. Lack of recovery inhibits daily functioning and thereby requires additional effort expenditure (Hockey, 1993) in order to accomplish work-related tasks and maintain a satisfactory level of performance. This higher expenditure of effort in turn prolongs and even intensifies psycho-physiological load reactions and a greater need for recovery (Sluiter, van der Beek, & Frings-Dresen, 1999). The accumulative process of prolonged load reactions may then have negative consequences on well-being and job performance over time. Figure 1.1 presents the effort-recovery model.

Building on the effort-recovery theory, I argue that by ruminating affectively about work-related issues during non-work time, job stressors remain mentally present. Therefore, affective rumination is likely to cause prolonged psycho-physiological activation which inhibits the recovery process and has straining effects on the organism. In contrast, problem-solving pondering may not be detrimental for the recovery process because it is likely to cause only short lasting psycho-physiological activations while individuals engage in cognitive processes aimed at discovering solutions for work-related problems or at finding ways to improve their work-related performance (Cropley & Zijlstra, 2011).

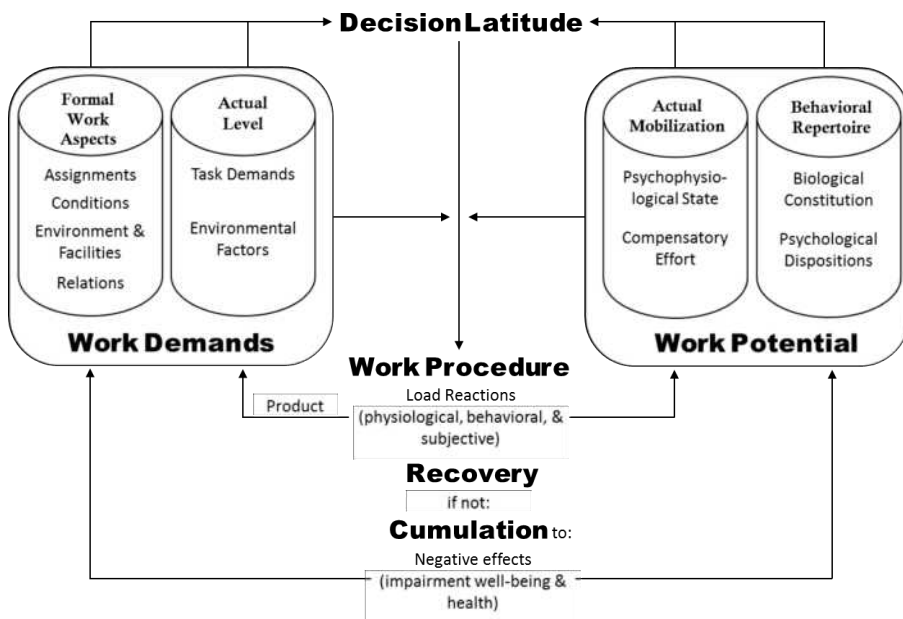


Figure 1.1: The effort-recovery model (Meijman & Mulder, 1998)

Conservation of resources theory (Hobfoll, 1989): This theory assumes that individuals strive to obtain, maintain, and protect their resources. Resources are defined as “objects, personal characteristics, conditions, or energies that are valued by the individual or that serve as a means for attainment of these objects, personal characteristics, conditions, or energies” (Hobfoll, 1989, p. 516). Under circumstances in which individuals’ resources are threatened or lost, strain develops and individuals’ need for recovery increases. According to this theory, recovery occurs when individuals experience their non-work time as an opportunity to conserve their remaining energetic resources or to replenish their depleted ones. By adopting successful recovery strategies (i.e. successful

adaptation), individuals' resource pools are again replenished which, in turn, prevents acute and chronic depletion and increases the likelihood of success in later actions. In contrast, due to a continuous incomplete recovery (i.e. unsuccessful adaptation), a prolonged failure to replenish depleted resource exacerbates the chronic or acute loss circumstances that leads to resource loss cycles and resource depletion (Hobfoll, 2001; 2002). Resource depletion then causes long-term negative consequences on well-being (e.g. Burnout) and job performance (e.g. less productivity) (Hobfoll & Shirom, 2001; Wright & Cropanzano, 1998; Westman & Eden, 1997; Lee & Ashforth, 1996). Figure 1.2 presents the conservation of resources theory.

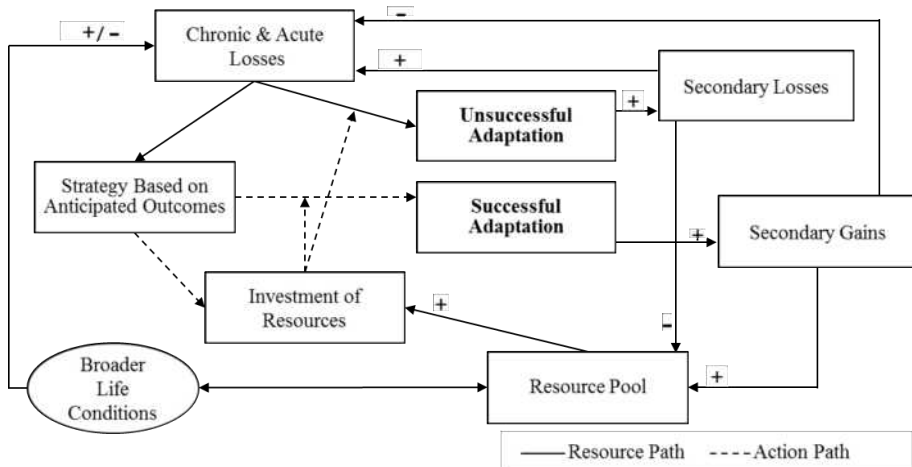


Figure 1.2: The conservation of resources theory (Hobfoll, 2001)

Based on the conservation of resources theory, I argue that affective rumination hinders recovery from work as it sustains the effortful process of engaging with dysfunctional emotions and thereby continuously draws on both cognitive and emotional resources. In contrast, engaging with dysfunctional emotions does not play a prominent role in problem-solving pondering. Therefore, it is less likely (vs. affective rumination) to drain emotional resources and cause straining effects on the organism. Moreover, problem-solving pondering is likely to act as a resource-providing experience by producing positive affect. It is likely to promote positive affect by engaging in thinking processes through which people experience a sense of achievement, competence, and proficiency.

Control theory (Carver & Scheier, 1981, 1998): Control theory is based on cybernetics which concern the science of negative feedback loops involved in the control and regulation of values within a human system (Carver & Scheier, 1998; Vancouver & Day, 2005; Carver & Scheier, 2011). This function of feedback loops is called negative because it serves the purpose of negating a discrepancy between a sensed value and a reference value. The theory considers individuals not as passive receptors of information; instead, they are considered to play an active role in continuously monitoring, evaluating and acting on discrepancies between the perceived and the desired states of an organism.

Drawing on control theory, the recovery process is considered as a down-regulation process by which the level of psycho-physiological activation (i.e. arousal), which has been increased during working time, is adjusted to the optimal psycho-physiological activation of resting time (Zijlstra et al., 2014). After working time, people are no longer confronted with job demands and therefore their need for effort expenditure is reduced. Hence, they need to decrease their level of activation in order to not only maintain their current level of resources but also to rebuild depleted resources. A discrepancy occurs between the sensed level of psycho-physiological activation as the input function and the optimal psycho-physiological activation of resting time as the reference value. As long as the discrepancy exists, a downward self-regulation process (i.e. recovery) continues to reduce the discrepancy until a desired state of activation is achieved. Therefore, people may engage in a variety of either passive or active experiences labeled as psycho-physiological unwinding strategies or output functions in a cybernetics-system perspective. These experiences (e.g. psychological detachment) contribute to recovery by causing a reduction in psycho-physiological activation.

According to this model, insufficient recovery occurs if people fail to reduce appropriately their enhanced level of psycho-physiological activation after working time (Zijlstra et al., 2014). The model conceptualizes the second feedback path as a gradual process of change in the reference value that may occur if the output functions (i.e. recovery experiences) consistently fail to reduce the discrepancy. By the gradual change in the reference value over time, discrepancy decreases and people experience a level of activation during their non-working time as high as their activation during their working time. The prolonged psycho-physiological activation during non-work time may then cause impaired well-being by draining energetic resources over time.

Based on control theory, I argue that affective rumination counteracts psycho-physiological unwinding strategies during non-work time. Thereby it inhibits the down-regulation process of recovery, which is aimed at achieving the optimal psycho-physiological activation during resting time. Moreover, it may even increase the level of psycho-physiological activation during non-work time while individuals engage with thinking about their dysfunctional emotions. Unlike affective rumination, problem-solving pondering is conceptualized as a goal-directed cognitive process by which individuals aim to manage their work-related problems and reduce their uncertainty about their work performance. Therefore, although pondering about work-related issues may cause short-lasting psycho-physiological activation, it is likely to facilitate the down-regulation process of recovery when individuals experience positive affect in reaction to discovering and generating solutions to work-related problems.

Taking all these theories into account, recovery refers to the process by which employees are no longer confronted with work-related demands and thus provides the possibility to replenish their depleted resources and to rebalance the suboptimal systems.

Recovery: a research perspective

In order to place this research in the recovery perspective, below I present a general history of research on the topic of recovery by clarifying the methods and strategies that researchers have used to study the effect of recovery on well-being and job performance. This historical background shows the previous and current state of research on the topic of recovery in the work and organizational field. It also shows how the current research can contribute to the existing knowledge of the link between recovery, well-being and job performance.

Initial research on recovery considered how different types of off-job activities during non-work time may facilitate or inhibit the recovery process (e.g. Sonnentag, 2001; Sonnentag & Natter, 2004; Fritz & Sonnentag, 2005; Sonnentag & Bayer, 2005; Rook & Zijlstra, 2006; Sonnentag & Zijlstra, 2006; Fritz & Sonnentag, 2006). During non-work time, individuals are involved in two main categories of off-job activities namely resource-providing activities and resource-consuming activities (Demerouti, Bakker, Geurts, & Taris, 2009).

Resource-providing activities refer to activities that have the potential to enhance recovery and include activities such as low effort activities, physical

activities, and social activities. These activities were assumed to facilitate the recovery process through: (a) rebuilding energetic resources that have been diminished during working time (Demerouti et al., 2009), (b) enhancing human resources such as vigor, self-efficacy, and positive mood (ten Brummelhuis & Bakker, 2012; Fritz & Sonnentag, 2005), (c) terminating the psycho-physiological stress response (Guerts & Sonnentag, 2006), (d) detaching mentally from work-related stressors (Brosschot et al, 2005), (e) placing demands other than those related to work-related issues on a person, and (f) drawing on different resources than those needed for accomplishing work-related tasks (Rook & Zijlstra, 2006; Winwood, Bakker, & Winefield, 2007).

Resource-consuming activities refer to activities that inhibit the recovery process and include activities such as work-related activities (e.g., working overtime, administrative tasks) and daily non-work hassles (e.g. more than usual housework, household chores, interpersonal conflicts, or sudden problems). These activities were assumed to inhibit the recovery process through (a) causing and prolonging high levels of the psycho-physiological stress response and thereby further depleting individuals' resources (Demerouti et al., 2009; Zijlstra & Cropley, 2006), (b) triggering a greater likelihood of affective rumination about work-related issues, and (c) restricting the time of recovery.

Although empirical research focused on off-job activities provided evidence to support the importance of recovery periods for the recovery process and well-being, it has not provided consistent evidence to support this distinction for off-job activities. For instance, some studies (e.g. Sonnentag & Zijlstra, 2006; Sonnentag, 2001) showed that engaging with social activities during non-work time is positively associated with well-being. In contrast, some studies found a non-significant association (Rook & Zijlstra, 2006; Sonnentag & Bayer, 2005; de Bloom et al, 2011) or even a negative association (e.g. Sonnentag & Natter, 2004) for the link between social activities and well-being.

There are two reasons to explain these inconsistent findings. First specific types of off-job activities might not be equally beneficial for people with different types of job demands. For example, people with a mentally demanding job may be more likely to benefit from physical off-job activities, whereas people with a physically demanding job may be more likely to benefit from mentally challenging off-job activities. Therefore, depending on the nature of job demands people might have different preferences for how to spend their non-work time. The degree to which that an off-job activity matches the individual's preference seems

important to determine the benefits of such activity on his/her recovery process and well-being.

Second, it is not the type of off-job activity per se which is important for the recovery process and well-being; it is rather the subjective experience associated with each off-job activity. In a study by Van Hooff, Geurts, Beckers, and Kompier (2011), it was found that the extent to which an employee experiences off-job activities as pleasant during an evening is related to the higher level of vigor and lower level of fatigue at the subsequent bedtime. Therefore, the degree to which people benefit from off-job activities is likely to depend on the degree to which they experience pleasure and control during their engagement with those activities. For instance, the greater social control and pleasure that individuals experience with their social activities, the higher levels of well-being they experience afterwards.

In order to achieve a more comprehensive insight on the effect of off-job activities on well-being, research then considered the psychological mechanisms by which different types of off-job activities may have differential contributions to the recovery process and well-being (Sonnetag & Fritz, 2007; Thoits, 2011). In a between-person study Ragsdale, Beehr, Grebner, and Han (2011) found that recovery experiences such as psychological detachment, relaxation, and control mediate the relationship between off-job activities and recovery outcomes. In a within-person study, ten Brummelhuis and Bakker (2012) showed that resource-providing off-job activities (i.e. social, low-effort, and physical activities) are related to higher levels of recovery through increased psychological detachment and relaxation. In contrast, resource-consuming off-job activities (i.e. work-related, household, and childcare activities) are related to lower levels of recovery through diminished psychological detachment and relaxation. According to Sonnetag and Fritz (2007), subjective recovery experiences are underlying mechanisms that contribute to the recovery process during non-work time. They conceptualized four recovery experiences namely relaxation, control, mastery, and psychological detachment experiences.

Relaxation refers to a subjective experience associated with low physical and mental activation and high positive affective states. Relaxation acts as a mechanism that is likely to facilitate the recovery process and prevent impaired well-being by terminating the prolonged activation caused by job stressors. Control experience has potentially facilitating effects on the recovery process through increasing a feeling of self-efficacy and competence and causing positive

affective states. Mastery experiences are associated with activities directed by individuals' interests and values. These experiences are likely to enhance recovery by causing positive feeling of achievement, competence, and proficiency. Psychological detachment refers to individuals' sense of unwinding from work-related demands. The experience of detachment leads to recovery because individuals' resources are no longer drained by mentally experience of work-related demands during non-work time. A large body of research using within- and between-person designs provided empirical evidence for the positive effect of these off-job experiences on the recovery process and on well-being (e.g. Sonnentag & Fritz, 2007; Fritz, Sonnentag, Spector, & McInroe, 2010; Fritz, Yankelevich, Zarubin, & Barger, 2010; Rogsdale et al., 2011; Sonnentag, Binnewies, & Mojza, 2008; Sonnentag, Mojza, Binnewies, & Scholl, 2008; Sonnentag, Kuttler, & Fritz, 2010; Sonnentag and Bayer, 2005).

Research has shown that in particular psychological detachment is an essential recovery experience that is highly beneficial for well-being and job performance (Sonnentag & Fritz, 2015; Sonnentag, 2012). People may experience lack of psychological detachment during their off-job time when they engage in perseverative thinking by experiencing repeated, pervasive, and prolonged activation due to being mentally occupied with their work-related issues (Demerouti, Bakker, Sonnentag, & Fullagar, 2012; Brosschot et al, 2006; Brosschot et al, 2005). According to Cropley and Zijlstra's (2011) conceptualization, people can experience two fundamentally different types of work-related perseverative thinking during their non-work time: affective rumination and problem-solving pondering. Accordingly, mentally engaging with work-related issues during non-work time does not necessary inhibit the recovery process as this depends on the type of work-related perseverative thinking. It has been proposed that these two types of work-related perseverative thinking may have different effects on the recovery process and consequently on well-being and job performance. Therefore, to gain a comprehensive understanding of the recovery process, research needs to consider how these two types of perseverative thinking influence the recovery process.

Two types of perseverative thinking: affective rumination versus 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 (Brosschot et al., 2006). It includes cognitions that are

focused not only on the past but also on the anticipation of negative events in the future. Scholars (e.g. Flaxman, Ménard, Bond, & Kinman, 2012; Brosschot et al., 2005; Brosschot et al., 2006; Brosschot, van Dijk, & Thayer, 2002) conceptualized perseverative thinking as the core cognitive-emotional process involved in worry and rumination about stressors that negatively influence psychological and physical health by triggering stress reactions.

According to Brosschot et al. (2005), perseverative thinking acts as a mechanism that enhances sustained activation through which psychological stressors are translated into health impairments and job performance inefficiencies in the long run. Thinking about work-related issues during their non-work time may lead to prolonged mental representation of job stressors that, in turn, drains further energetic resources. As a consequence of prolonged physiological activation (Brosschot, Verkuil, & Thayer, 2010), employees' health is negatively influenced in the long run. Moreover, this leads to less available energetic resources to invest in the job, leading to a further decrease in job performance. To explain how perseverative thinking causes prolonged stress reactions, Brosschot et al. (2006) suggest a vicious circle in which the experience of uncontrollability of stressors triggers perseverative thinking. Perseverative thinking then prolongs and exacerbates the experience of uncontrollability, which in turn increases perseverative thinking. However, perseverative thinking that is not associated with prolonged worrying (i.e. less uncontrollability) is less likely to prolong stress reactions and impair well-being (Brosschot et al., 2010).

Cropley and Zijlstra (2011) distinguished between two fundamentally different types of work-related perseverative thinking that people experience in the work context, namely affective rumination and problem-solving pondering. They state that these two types of perseverative thinking have different effects on the recovery process and well-being because of their differential impact on psycho-physiological activation. According to Cropley and Zijlstra (2011), affective rumination prolongs psycho-physiological activation and straining effects on the organism because it leads to prolonged exposure to dysfunctional emotions associated with work-related issues. In contrast, problem-solving pondering is less likely to cause prolonged psycho-physiological activation and it may only lead to a short lasting activation. Moreover, it is likely to act as a resource-providing experience by producing positive affect when employees experience progress in thinking (e.g., discovering a solution) or feel a sense of mastery and control.

According to the Cognitive Activation Theory of Stress (CATS: Ursin & Eriksen, 2004; Ursin & Eriksen, 2010), the degree to which stressors cause psycho-physiological activation depends on the type of associated response outcome expectancies. Response outcome expectancies refer to individuals' estimates about the outcomes of their given responses. Response outcome expectancies are described as negative or positive depending on whether the produced response is expected to lead to negative or positive results, respectively. Negative outcome expectancies are likely to cause sustained activation especially when individuals do not experience progress in thinking about the problem. The sustained activation will then become intense when individuals continue to endorse the negative outcome expectancy by engaging in rumination (Eriksen, Murison, Pensgaard, & Ursin, 2005). Hopelessness (i.e. when individuals meet negative results) and helplessness (i.e. when individuals respond inefficiently) are known as two negative response outcome expectancies that cause health impairment through sustained activation and their straining effects on the organism (Ursin & Eriksen, 2004; Meurs & Perrewe, 2011).

Building on this theoretical framework, affective rumination causes prolonged activation because it is more likely to be associated with negative outcome expectancies for solving problems. This means that individuals expect that their available responses lead to negative results and they are not able to solve the problem and cope successfully with the situation. Affective rumination will then exacerbate these negative expectancies over time and increase the perceived experience of uncontrollability. On the contrary, problem-solving pondering is more likely to be associated with positive outcome expectancies in which individuals believe that they are able to handle the situation with positive results. Although individuals still experience a short-lasting activation, this level of activation will be reduced once individuals perceive progress in thinking. Finding a solution and feeling a sense of control are both known as adequate ways of reducing psycho-physiological activation (Ursin & Eriksen, 2004).

Research on affective rumination and problem-solving pondering

Previous research on perseverative thinking has mainly been conducted in the field of clinical psychology and focused predominantly on the emotional aspect of rumination (i.e. affective rumination). Up to now, few studies investigated how work-related affective rumination and problem-solving pondering influence recovery and well-being.

There are a set of studies that have only focused on perseverative thinking without an explicit distinction between affective rumination and problem-solving pondering. In a longitudinal study, Rydstedt, Cropley, Devereux, and Michalianou (2009) examined to what extent workers' trait rumination can predict their psycho-physiological activation and need for recovery measured after four years. They use the average saliva cortisol secretion measured over seven consecutive days including five evenings of a working week and two evenings of the following weekend as the indicator of psycho-endocrinological response. The results showed that trait rumination is positively related to higher levels of evening saliva cortisol secretion and need for recovery after four years. Cropley, Rydstedt, Devereux, and Middleton (2015) found that teachers scoring high on work-related rumination during a mid-week evening showed higher levels of cortisol secretion at bedtime, compared with teachers scoring low on rumination. In a study with a sample of professional coaches, Donahue et al. (2012) found that high levels of work-related rumination are associated with high levels of exhaustion. By using a longitudinal design in study with a sample of nurses, Donahue et al. (2012) found consistent findings indicating a positive relationship between work-related rumination and exhaustion after three months.

A limited number of studies has examined the effect of affective rumination and problem-solving on recovery and well-being. In a cross-sectional study, Querstret and Cropley (2012) found that high levels of affective rumination were associated with high levels of acute and chronic fatigue. In contrast, they found that high levels of problem-solving pondering were associated with lower levels of acute and chronic fatigue. However, they did not draw a definitive conclusion about these results due to the identified suppression effect (Pandey & Elliott, 2010) of problem-solving pondering in their analysis. In another study, Hamesch et al. (2014) using a sample of dental students, found that higher levels of work-related affective rumination were positively associated with higher levels of depressive symptoms measured after six months. However, the relation between problem-solving pondering and depression was not found significant. A two-year longitudinal study by Kinnunen et al. (2017) showed that people with higher levels of affective rumination are more likely to experience impaired well-being (i.e. higher exhaustion, greater sleep problems, and lower work engagement) across time. They also found that the pattern of engaging in one of two types of perseverative thinking remained stable across two years.

Recently researchers suggested it is not about the individual experiences, but it is the specific combination of these experiences (i.e. profiles) that impact

well-being. Bennett et al. (2016) in their research considered the effect of different profiles of recovery experiences (i.e., psychological detachment, relaxation, mastery, control, and problem-solving pondering) on well-being instead of distinct recovery experiences. They found that the lack of psychological detachment is less crucial for well-being (i.e., higher work engagement, lower emotional exhaustion and somatic complaints) if employees experience higher levels of problem-solving pondering. They also concluded that since problem-solving pondering causes higher levels of engagement, it is more likely to cause emotional exhaustion and somatic complaints if it is not conjointly performed with other recovery experiences.

The previous studies on the two types of perseverative thinking have mainly focused on between-person differences. However, the study of within-person fluctuations is important because it provides insight into the short-term dynamics of the relationships between different types of perseverative thinking and outcomes such as recovery, well-being, and job performance on a time-to-time basis. Syrek et al. (2017) conducted a study to examine differential indirect links between unfinished tasks as work-related stressors and sleep impairment through affective rumination versus problem-solving pondering. Using weekly surveys across twelve weeks, the results at within-person level 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. They also found that affective rumination positively mediates the relationship between unfinished tasks and sleep impairment. However, the mediation effect of problem-solving pondering was not significant.

Summary and central research questions

Research has shown insufficient recovery as a high risk factor for impaired well-being and inadequate job-performance. Moreover, psychological detachment can be seen as an essential recovery experience that is highly beneficial for well-being and job performance. People may experience low psychological detachment during their non-work time when engaging in perseverative thinking. Perseverative thinking is defined as repeated, pervasive, and prolonged activation of mentally occupation with their work-related issues. Although perseverative thinking has been conceptualized as a mechanism by which work-related stressors are translated into impaired well-being, this might not always be true as it depends on the type of perseverative thinking.

Cropley and Zijlstra (2011) proposed two fundamentally different types of work-related perseverative thinking namely affective rumination and problem-solving pondering. Affective rumination is described as perseverative cognitive processes in which thoughts are mainly directed to dysfunctional emotions associated with work-related issues. Problem-solving pondering refers to perseverative cognitive processes in which thoughts are directed to possible solutions to work-related problems in order to progress toward choice of a solution or reevaluate work-related performance in order to consider how it can be improved. It has been proposed that compared to affective rumination that impedes the recovery process by prolonging psycho-physiological activation and draining emotional resources, problem-solving pondering is less likely to cause prolonged psycho-physiological activation and may even act as a resource-providing experience by facilitating progression towards solving problems.

As the review of the literature showed there have been a few studies that examined the relationship between these two types of work-related perseverative thinking and well-being. Nevertheless, the related literature can be extended in several ways.

First, although using a cross-lag design, a study by Hamesch et al. (2014) and a recent study by Kinnunen et al. (2017) considered the time-lagged effects of the two types of perseverative thinking on well-being, little is known about their accumulative effects on well-being in the long run. Therefore, research needs to consider the accumulative effects of affective rumination and problem and problem-solving pondering on well-being. Particularly in the long run, affective rumination may result in cumulative effects on well-being by chronically depleting resources over time (Frese & Zapf, 1988; Sluiter, Frings-Dresen, van der Beek, & Meijman, 2001), whereas problem-solving pondering may reduce cumulative effects on well-being by producing psychological resources over time (Fredrickson & Joiner, 2002).

Second, research (e.g. Fritz & Sonnentag, 2005, 2006) has shown that the quality of recovery during non-work time is crucial factor for employees' job performance. Higher quality of recovery is characterized with higher levels of energetic resources that employees need to meet situational demands of work and successfully accomplish work-related tasks (Wickens & Hollands, 2000; Beal, Weiss, Barros, & MacDermid, 2005). Moreover, due to diverging pattern of drawing on emotion regulatory resources, affective rumination and problem-solving pondering may have different influences on the recovery process. Up to

now, there has been no study examining the consequences of affective rumination and problem-solving pondering on job performance-related outcomes. Therefore, there is a need to investigate how different types of perseverative thinking contribute to job performance-related outcomes.

Third, the previous studies on perseverative thinking have mainly focused on between-person effects. However, perseverative thinking may differ not only between persons but may also fluctuate within persons over time. According to Xanthopoulou, Bakker, and Ilies (2012), a significant amount of variance in core indicators of employees' well-being and job performance may be attributed to within-person fluctuations. Considering these within-person fluctuations then provides insights into the dynamic patterns of relationships between the study variables. Therefore, research is needed to investigate the short-term dynamic patterns of the relationships between the two types of perseverative thinking and outcome variables such as recovery, well-being, and job performance on a time-to-time basis.

Fourth, the previous research on this topic has shown that the two experiences of being mentally engaged with work-related issues lead to different health consequences. However, knowledge on the dynamic mechanisms underlying these effects is still missing. Therefore, the literature can be extended by investigating the underlying dynamic mechanisms through which affective rumination and problem-solving pondering may have diverging effects on well-being and job performance. Increased insight in these mechanisms can improve the theoretical conceptualization of affective rumination and problem-solving pondering and develop interventions to prevent the detrimental effects of work-related perseverative thinking.

Fifth, previous research showed inconsistent findings concerning the relationship between problem-solving pondering and well-being (Kinnunen et al., 2017; Bennett et al., 2016; Syrek et al., 2017; Hamesch et al., 2014; Querstret & Cropley, 2012). This signifies that there may be potential moderators at play. I propose that problem-solving pondering may not be beneficial for everyone as it may depend on the extent to which employees experience progress in thinking or experience positive affect by discovering a solution. I suggest trait self-regulation as an individual factor that may influence people's ability to generate solutions to work-related problems and thereby the effect of problem-solving pondering on recovery from work.

To summarize, this dissertation contributes to three central research questions considering the effects of the two types of work-related perseverative thinking on recovery, well-being, and job performance.

Research question 1: What are the consequences of work-related affective rumination and problem-solving pondering on well-being and job-performance?

Research question 2: Through what underlying dynamic processes do work-related affective rumination and problem-solving pondering have differential consequences on well-being and job-performance?

Research question 3: How is the consequence of work-related problem-solving pondering on recovery from work influenced by individual differences in trait self-regulation?

Dissertation outline

The main goal of this dissertation is examining the effect of recovery on well-being and job performance by a central focus on the two types of work-related perseverative thinking namely affective rumination and problem-solving pondering. In order to answer the research questions, I carried out three longitudinal field studies with different time intervals using diary data.

In **Chapter 2**, I present the findings of a longitudinal three-wave study with a time lag of six months between each wave. This study examined how the experience of affective rumination and problem-solving pondering during evenings cause changes in two psychological impaired well-being outcomes over one year period. I conducted a diary survey over five consecutive working days to measure the levels of affective rumination and problem-solving pondering that employees experience during evenings of working week. Moreover, to fully capture both work-related and general factors of well-being, I distinguished between exhaustion and general mental health complaints as two impaired well-being outcomes in the long run. Using a latent growth curve modeling analysis provided the possibility to investigate within-person changes in impaired well-being outcomes over time as well as between-subject differences in such changes. This chapter provides empirical evidence for Research question 1.

In **Chapter 3**, I present the findings of a diary study over five consecutive working days. This study examined, using a within-person design, how fluctuations in work-related affective rumination and problem-solving pondering during the evening are related to recovery and well-being. Using a moderated multilevel mediation approach provided the possibility to examine the moderating role of trait self-regulation on the relationship between problem-solving during the evening and the state of being recovered at bedtime. This statistical approach also gave the possibility to test 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. This chapter is aimed to provide empirical findings concerning Research questions 1, 2, and 3.

Chapter 4 focuses on the indirect relationships between the experience of affective rumination and problem-solving pondering during the weekend and job performance-related outcomes that employees experience during the subsequent working week through emotion-regulation strength. Drawing on the dynamic models of energetic resources, I hypothesized that the two types of work-related perseverative thinking have different consequences on two job performance-related outcomes (i.e. effort expenditure and task performance) via their differential draining effects on individuals' emotion regulatory resources. I conducted a week-level study over a period of six consecutive weeks in which participants responded to weekly web-based surveys at the beginning and at the end of working week. Using a multilevel approach, my study provided a complete understanding of the dynamic nature of all proposed paths at a within-person level as well as the individual differences of those paths at the between-person level. This chapter thus provides empirical findings examining Research questions 1 and 2.

Finally, **Chapter 5** provides an overview of the main findings of my research and a general discussion shedding light on the research questions. I discuss then theoretical, methodological, and practical implications and provide suggestions for future research.

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CHAPTER 2

Should you switch off or stay engaged? The consequences of thinking about work on the trajectory of psychological well-being over time

This chapter is based on: Firoozabadi, A., Uitdewilligen, S., & Zijlstra, F. R. H. (2018). Should you switch off or stay engaged? The consequences of thinking about work on the trajectory of psychological well-being over time. *Journal of Occupational Health Psychology*, 23, 278–288. <http://dx.doi.org/10.1037/ocp0000068>

Abstract

This study examined how two different ways of being mentally engaged with work-related issues during evenings (affective rumination and problem-solving pondering) cause changes in psychological well-being over one year period. We conducted a three-wave longitudinal study with a time lag of six months between each wave. At the first measurement moment, participants filled out a survey over five consecutive working days assessing work-related affective rumination and problem-solving pondering during evenings. Exhaustion and health complaints were assessed at the first measurement moment as well as after six and after 12 months. The three waves of data obtained from a total of 123 participants with full-time and primarily mentally demanding jobs were analyzed using latent growth curve modeling (LGM). The results showed that affective rumination is a significant predictor of increase in exhaustion over time. Problem-solving pondering was not found to be a significant predictor of change in psychological well-being over time. These findings demonstrate that work-related rumination during evenings may lead to health problems over time depending on the type of rumination. It suggests that unlike affective rumination, problem-solving pondering during evenings has no influence on psychological well-being over time.

Keywords: psychological well-being, exhaustion, recovery, work-related rumination, problem-solving

Introduction

Previous research consistently shows that repeated insufficient recovery from work results in resource depletion and impairs employees' well-being especially over extended periods of time (Rook & Zijlstra, 2006; Sonnentag & Zijlstra, 2006; Hobfoll & Shirom, 2001).

Psychological detachment as an essential recovery experience has been reported to be beneficial for well-being both in the short and long run (e.g. Sonnentag, Kuttler, & Fritz, 2010; Sonnentag, Binnewies, & Mojza, 2010; Sonnentag & Bayer, 2005). Psychological detachment has been defined as the sense of being away from work situations and the ability to switch off mentally from work (Etzion, Eden, & Lapidot, 1998; Sonnentag & Bayer, 2005). The lack of psychological detachment during off-job time implies to be mentally occupied with work stressors by thinking about work-related issues. The repeated or chronic activation of the cognitive representation of stressors is defined as perseverative cognition (Brosschot, Pieper & Thayer, 2005). According to Brosschot, Gerin, and Thayer (2006), perseverative cognition acts as the core feature of rumination that links stress exposure to impaired health.

Cropley and Zijlstra (2011) proposed two different types of work-related rumination labeled affective rumination and problem-solving pondering. Affective rumination is described as the experience of intrusive, pervasive and recurrent thoughts, in which attention is mainly directed to feelings related to work problems. Problem-solving pondering is described as prolonged thinking about possible solutions to a problem in order to progress toward choice of a solution (Pravettoni, Cropley, Leotta, & Bagnara, 2007). Cropley and Zijlstra (2011) proposed that these two qualities of work-related rumination may have different effects on the recovery process due to their diverging effects on psycho-physiological arousal.

There are only a few studies that examined the relationship between these two types of work-related rumination and well-being (e.g. Querstret & Cropley 2012; Hamesch, Cropley, & Lang, 2014; Syrek, Weigelt, Peifer, & Antoni, 2016). Although, these studies indeed suggest differential relationships between affective rumination and problem solving on well-being, little is still known about their long-term health consequences. Particularly in the long run, affective rumination may result in cumulative effects on well-being by chronically depleting resources over time (Frese & Zapf, 1988; Sluiter, Frings-Dresen, Van

Der Beek, & Meijman, 2001), whereas problem-solving pondering may reduce cumulative effects on well-being by producing psychological resources over time (Fredrickson & Joiner, 2002). Therefore, in this study, we investigate how the two different ways of being mentally engaged with work-related issues during evenings influence the trajectory of well-being over a one year period.

Our study makes several contributions to the recovery literature. First, it extends the recovery literature by examining the long-term accumulative effects of recovery during evenings of the working week on well-being. Second, in contrast to previous research, the present study examines the idea that the lack of detachment is not necessarily a threatening factor for well-being, depending on the type of work-related rumination. Finally, to fully capture both work-related and general factors of well-being, we include two long-term well-being outcomes: exhaustion and general mental health complaints. According to Warr (1987), when investigating employees' well-being in the long run, a distinction should be drawn between 'context-specific' and 'context-free' mental health. Context-specific mental health refers explicitly to job-related mental health such as exhaustion. In contrast, context-free mental health is a more global construct that is not tied to a specific context and reflects the general status of well-being. Therefore, our study contributes to occupational health literature by differentiating between these two well-being outcomes.

Work-related affective rumination vs. problem-solving pondering

Rumination is conceptualized as "a class of conscious thoughts that revolve around a common instrumental theme and that recur in the absence of immediate environmental demands requiring the thoughts" (Martin, & Tesser, 1996, p. 7). Croyley and Zijlstra (2011) argued that people may engage in qualitatively different types of work-related rumination, namely affective rumination and problem-solving pondering. They state that affective rumination and problem-solving pondering have different effects on the recovery process because of their differential impact on psycho-physiological arousal. Whereas, affective rumination causes prolonged psycho-physiological activation that has straining effects on the organism, problem-solving pondering may only lead to a short lasting psycho-physiological activation (Croyley & Zijlstra, 2011). To develop a conceptualization of different effects of affective rumination and problem-solving pondering on prolonged activation and well-being, we draw on the Cognitive Activation Theory of Stress (CATS: Ursin & Eriksen, 2004).

CATS (Ursin & Eriksen, 2004) is a comprehensive theory of stress that proposes that dealing with stressors leads to varying degrees of psychophysiological arousal depending on the response outcome expectancies. Response outcome expectancies are defined as individuals' estimates about the outcomes of their given responses. CATS distinguishes between negative and positive outcome expectancies depending on whether the produced response is expected to handle the situation with negative or positive results, respectively. Accordingly, negative outcome expectancies lead to sustained arousal especially when individuals do not see a solution to the problem. This heightened arousal will be sustained until the reason for the arousal has been eliminated. Moreover, sustained arousal occurs when one continues to endorse the negative outcome expectancy by rumination (Eriksen, Murison, Penggaard, & Ursin, 2005). According to CATS, hopelessness and helplessness are two negative response outcome expectancies that occur when there is no successful coping. Hopelessness occurs when individuals learn that their responses have led to negative results. Helplessness occurs when individuals perceive that their responses have not been effective in avoiding the aversive stimulus. It is assumed that both states threaten health through sustained arousal that has straining effects on the organism (Ursin & Eriksen, 2004; Meurs & Perrewe, 2011). Based on CATS, affective rumination leads to prolonged activation because there are negative outcome expectancies for solving problems and coping with the situation. Rumination exacerbates these negative expectancies over time and increases the perceived lack of control. When individuals establish the expectancy that they are not able to cope with the situation for instance by finding a solution or avoiding aversive thoughts, hopelessness and helplessness may occur. Cognitive models of clinical psychology conceptualized helplessness and hopelessness as the mechanisms by which anxiety and depression occur (Waikar & Craske, 1997; Henkel, Bussfeld, Möller, & Hegerl, 2002; Pryce et al., 2011; Vollmayr & Gass, 2013).

CATS defines coping as positive response outcome expectancies in which individuals believe that they are able to handle the situation with positive results (Ursin & Eriksen, 2010). Although individuals still experience a short-lasting activation or phasic arousal when handling a difficult or unfinished task, this level of arousal will be reduced as soon as a solution is found or a positive result achieved. Based on CATS, in terms of dealing with stressors, problem-solving pondering can function as a form of coping in which individuals think about work-related issues with positive outcome expectancies. Therefore, they 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 arousal (Ursin & Eriksen, 2004).

Work-related affective rumination and psychological well-being

Work-related affective rumination during evenings is likely to lead to a decrease in well-being in the long run for several reasons. When people ruminate affectively about work, they generally think repetitively about negative aspects such as failure or negative events (Binnewies, Sonnentag, & Mojza, 2009). Because in this way job stressors remain mentally present, it leads to prolonged activation (Brosschot et al., 2005). As a result, prolonged activation causes impaired well-being as it draws on individuals' resources during recovery time (Brosschot, van Dijk, & Thayer, 2002). In addition, ruminating about the negative aspects of work is associated with increased negative affect (Thomsen et al., 2004, Thomsen, Mehlsen, Christensen, & Zachariae, 2003) which influences well-being negatively in the long run (Finch, Baranik, Liu, & West, 2012, Mayne, 1999). Furthermore, according to Brosschot et al. (2006), affective rumination has a negative effect on health not only by prolonging the effects of a stressor but also by increasing its degree of uncontrollability. In fact, effortful thinking without finding a cognitive gain or solution results in prolonged experience of uncontrollability. Prolonged experience of uncontrollability is likely to lead to a decrease in well-being via causing impaired cognitive functioning such as the lack of attentional control (von Hecker & Sedek, 1999; Bukowski, Asanowicz, Marzecová, & Lupiáñez, 2015). It can also lead to health impairment by causing learned helplessness (Seligman, 1975) when there is no reduction of the initial uncertainty despite the individual's continuous cognitive effort (Sedek & Kofta, 1990; Kofta, 1993). Finally, affective rumination may affect health over a long time via its negative effects on health-related behavior. Previous studies showed that people engaging in much rumination have poorer health behaviors such as smoking, drinking, physical inactivity and sleep disturbance (Thomsen et al, 2004; Cropley, Dijk, & Stanley, 2006). Especially in the long run, these negative behaviors may lead to impaired well-being.

Previous research on rumination has mainly been conducted in the field of clinical psychology and focused predominantly on the emotional aspect of rumination. These studies showed that rumination is associated with a variety of psychological states such as anxiety (Mellings & Alden, 2000), depression and negative affect (Lyubomirsky, Caldwell, & Nolen-Hoeksema, 1998; Thomsen et al., 2003), anger (Hogan & Linden, 2004), physiological and somatic symptoms

(Brosschot et al., 2006), and poor sleep quality (Thomsen et al., 2003). Up to now, few studies investigated how work-related rumination influences well-being. In a cross-sectional study, Querstret and Cropley (2012) found that high levels of affective rumination were associated with high levels of acute and chronic fatigue. Another study by Donahue et al. (2012) found a positive relationship between work-related rumination and exhaustion reported by professional coaches. By using a longitudinal design of study on nurses, Donahue et al. (2012) reported the same results, indicating a positive relationship between work-related rumination and exhaustion after three months. In another study, Hamesch et al. (2014) found that in a sample of dental students, work-related affective rumination was positively related to depression measured after six months. In the present study we go beyond looking at the delayed effects of rumination by investigating whether the extent to which people experience affective rumination during evenings is related to the slope of psychological well-being over a one year period. We hypothesize that:

Hypothesis 1: The experience of work-related affective rumination during evenings is positively related to the rate of change in exhaustion (a) and health complaints (b) over time.

Work-related problem-solving pondering and psychological well-being

In contrast to affective rumination, problem-solving pondering during evenings may have long term positive effects on well-being for several reasons. Although problem-solving pondering during recovery time draws on individual's cognitive resources, it is likely to act as a resource-providing experience by producing positive affect. People may experience positive affect when they ponder about interesting work-related issues or positive aspects of work. Moreover, problem-solving pondering may result in the discovery of solutions that causes positive affect. Therefore, problem-solving pondering may improve well-being by producing positive affect (Seo, Barrett, & Bartunek, 2004). Especially in the long run, according to the broaden-and-build theory of positive emotions (Fredrickson, 1998), momentary experiences of positive emotions can trigger upward spirals towards well-being over time by building psychological resources (Fredrickson & Joiner, 2002). Furthermore, according to the self-regulation model of ruminative thought (Martin & Tesser, 1996), finding a solution as a goal attainment mechanism stops ruminative thinking processes. Then individuals have more time to engage in recovery experiences. Taking together, the

experience of problem-solving pondering during off-job time may benefit individuals' well-being because it reduces the effect of work-related stressors and enhances their resources to deal with future stressors.

A few studies have addressed the effects of problem-solving pondering on well-being. In a cross-sectional study by Querstret and Cropley (2012), problem-solving pondering was associated with lower levels of acute and chronic fatigue. However, a longitudinal study using a student sample (Hamesch et al., 2014) did not find any significant effect of problem-solving pondering on depression. In the current study, we examine how the experience of problem-solving pondering during evenings influences the slope of psychological well-being over a one year period. We hypothesize that:

Hypothesis 2: The experience of work-related problem-solving pondering during evenings is negatively related to the rate of change in exhaustion (a) and health complaints (b) over time.

The research model is presented in Figure 2.1.

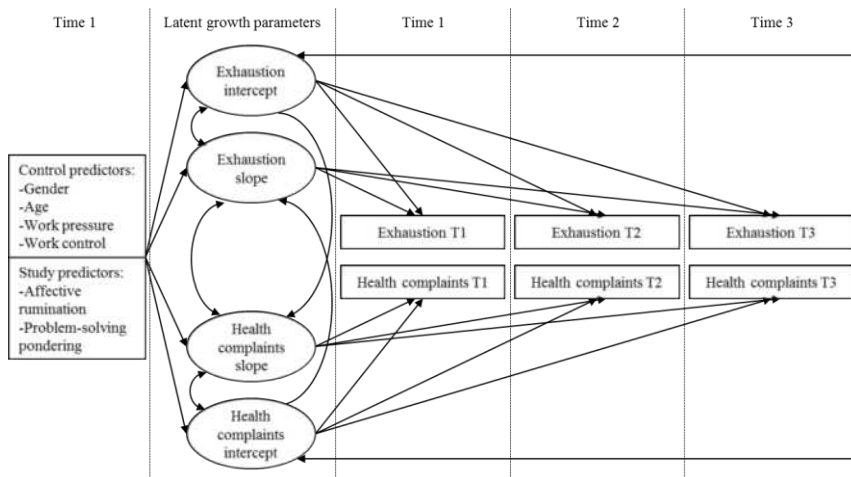


Figure 2.1. The conditional bivariate latent growth model of psychological well-being over time.

Method

Procedure and sample

To test the hypotheses, we conducted a three-wave study with a time lag of six months between each wave. However, due to local circumstances the time window in which surveys could be filled in varied from one week earlier to one week later than the exact six months. At Time 1, participants were asked to fill in a general survey and five separate daily surveys administered over the working week. The general survey was used to collect demographic information and access control variables and outcome variables. The daily survey assessed evening-level measures of work-related affective rumination and problem-solving pondering. Schlotz, Hellhammer, Schulz, and Stone (2004) demonstrated that individuals show higher levels of cortisol awakening response during working days compared with weekend days. This difference in cortisol awakening response is attributed to person-levels of work-related rumination. Therefore, the present study focuses only on rumination that people specifically experience during evenings of the working week. To capture this rumination, we conducted a diary study for a whole 5-day week. Moreover, we used the daily measurement because in this way participants would not have to remember over longer time periods to what extent they engaged in affective rumination or problem-solving pondering during evenings. We asked participants to complete the daily survey over a period of five consecutive working days before going to bed. To make sure that participants would not forget to complete the diary in the evening, brief reminder messages were sent on their cell phones. We used the average of five the Time 1 evening measures of work-related affective rumination and problem-solving pondering. At Time 2 and 3 participants were asked again to complete the general survey questionnaire measuring outcome variables.

Participants were recruited from a range of Iranian organizations, including two centers of health and social welfare services, a counseling center of a large university, the educational office and a faculty of a university, two high schools, and a couple of local branches of a bank. We sent a letter to the head of the organizations who informed their employees about the goal of the study as well as the daily and longitudinal nature of the surveys. In the letter we emphasized the anonymity and confidentiality of the data-collection and analysis process. The sample criteria were that each participant must work in a full-time and primarily mentally demanding job. Participants were offered to receive feedback about their results after completion of the data collection as an incentive

for participation. Of the 240 distributed paper-and-pencil survey packages at Time 1, a total of 186 persons responded to the general and daily questionnaires. The group of participants, who had completed the Time 1 survey, received the second and third surveys, 6 months (Time 2) and then 12 months (Time 3) after the first measurement. At Time 2 and 3 participants were asked to fill out only the questionnaires measuring health complaints and exhaustion. 156 and 138 questionnaires were filled out and returned at Time 2 and Time 3, respectively. Seven participants were omitted owing to reported substantially negative events (e.g. death of a close relative or friend, starting a new job) over the one year study period. We also omitted the data from eight participants who responded to daily surveys over less than three working days. Hence, the data from a final sample of 123 participants were analyzed. Attrition analyses revealed that employees with higher levels of health complaints ($t(184) = -2.22, p < .05$) at Time 1 were more likely to drop out from the study. However, there was no significant difference between dropouts and non-dropouts with respect to exhaustion ($t(184) = -1.68, p = .09$), affective rumination ($t(184) = -.91, p = .36$), and problem-solving pondering ($t(184) = -1.27, p = .21$), making it unlikely that attrition would have confounded the results (Goodman & Blum, 1996).

The final panel group ($N = 123$) consisted of 61 female and 62 male employees working in different types of job (26% in health services, 45% in educational services and 29% in social services). The majority of the participants (84%) were married. At Time 1 age ranged from 21 to 54 years ($M = 32.85; SD = 5.82$). They were educated in a range of degrees from Basic Diploma to PhD (10% basic diploma, 9% associate, 50% bachelor, 25% master, and 6% PhD).

Measures

Data were collected by conducting general and daily surveys. All items were in Persian. Items developed in English were translated into Persian by the first author and translated back to English by two interpreters to ensure conceptual consistency. Cronbach's alphas for all scales are displayed in Table 2.1.

Exhaustion. We assessed exhaustion with the related subscale of Oldenburg Burnout Inventory (OLBI; Demerouti, Mostert, & Bakker, 2010; Demerouti, Bakker, Nachreiner, & Schaufeli, 2001). The subscale of exhaustion consists of 8 items (e.g., "During my work, I often felt emotionally drained") scored on a 4-point scale ranging from 1 (strongly disagree) to 4 (strongly agree).

Scores were coded in such a way that higher scores indicate more exhaustion during the past few weeks.

Health complaints. To measure health complaints, we used the 12-item General Health Questionnaire (GHQ-12; Goldberg & Williams, 1988). GHQ-12 consists of 12 items that each one assesses the severity of a mental problem over the past few weeks (e.g., “I felt constantly under strain”) on a 4-point scale from 0 (not at all) to 3 (much more than usual). Scores were coded such that higher scores indicate worse mental health.

Work-related rumination. We measured two different type of work-related rumination including affective rumination and problem-solving pondering each by five adapted items of The Work-Related Rumination Questionnaire (WRRQ; Cropley, Michalianou, Pravettoni, & Millward, 2012). Affective rumination and problem-solving pondering subscales included items such as, “During evening, I was irritated by work issues” and “During 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).

To test whether these two ruminative experiences represented distinct constructs, we ran a set of confirmatory factor analyses. Compared to the one-factor model ($\chi^2(30) = 162.983, p < 0.001$; CFI = .80; TLI = .71; RMSEA = .19; SRMR = .16), the two-factor model ($\chi^2(29) = 41.701, p = .06$; CFI = .98; TLI = .97; RMSEA = .06; SRMR = .05) was found to fit the observed data at Day 1 significantly better ($\Delta\chi^2(1) = 121.282, p < .001$). The two-factor model was also the best fit to the data at Day 2, 3, 4, and 5.

To achieve the person-level of affective rumination and problem-solving pondering, we aggregated and averaged the five daily evening measures of them. In order to justify the aggregations and average across the five daily measurements, we estimated the two forms of the intraclass correlation coefficient: the ICC1 and ICC2 (Bliese, 2000, 2013). ICC1s’ results revealed that 68% and 64% of variance, respectively, in affective rumination and problem-solving pondering lying between persons. Moreover, the ICC2s’ values of .91 and .89 were found for affective rumination and problem-solving pondering, respectively. These estimates indicate that individuals can significantly (Bliese, 2013) be reliably differentiated in terms of the averages of affective rumination and problem-solving pondering.

Job situation control variables. Work pressure was assessed using 13-item work pressure subscale of Tilburg Work Pressure Questionnaire (T-WPQ; Roe & Zijlstra, 2000). Participants were asked to indicate the extent to which they agreed with each item (e.g., “During my work I feel urged or hurried”) on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Participants with higher scores experienced greater work pressure. Work control was measured using the Job Control Questionnaire developed by Greenberger, Strasser, Cummings, and Dunham (1989). The job control questionnaire consists of 16 items about task control, organization control, and resource control (e.g., “How much influence do you have over the amount of work you do?”). The items were rated on a 5-point Likert scale ranging from 1 (very little) to 5 (very much), with higher scores reflecting greater job control.

Analytical model

The research hypotheses were examined using latent growth curve modeling (LGM; Duncan, Duncan, Strycker, Li, & Alpert, 1999; Kaplan, 2000). As a structural equation modeling approach to the analysis of longitudinal data, LGM is used to investigate within-person changes in outcome variables over time as well as between-subject differences in such changes (Muthén & Khoo, 1998). To do so, LGM estimates two latent growth curve parameters of outcome variables; the initial level (i.e., intercept) and the rate of change over time (i.e., slope). LGM then provides the possibility to examine the interactions between these two latent growth parameters, as well as their between-person differences across a set of predictors (Willett & Sayer, 1994).

The analyses were conducted using Mplus statistical software version 7 (Muthén & Muthén, 2012) and model fit was evaluated using five indicators: the Chi-square goodness of fit test; the comparative fit index (CFI; Bentler, 1990); the Tucker-Lewis index (TLI; also known as the non-normed fit index; Tucker & Lewis, 1973); the root mean square error of approximation (RMSEA; Steiger, 1990); and the standardized root mean square residual (SRMR; Hu & Bentler, 1999).

To analysis the data, we started with an unconditional univariate growth model of each outcome variable, by which we examined how exhaustion and general mental health changed over the one year period of study. Then, we tested the unconditional bivariate growth model (McArdle, 1988), suggested for the multivariate situation in which more than one growth model are simultaneously

estimated at the level of the random slopes (Willett & Sayer, 1994). This allowed us to examine how changes in the two study outcome variables are associated with each other over time. Finally, we tested the conditional bivariate growth model. This model included gender, age, work pressure, and work control as the control variables. We also entered affective rumination and problem-solving pondering about work-related issues during evenings as the core predictors of four latent growth factors, as displayed in Figure 2.1.

Results

Table 2.1 presents the means, standard deviations, Cronbach's alphas, and correlations for all predictors and Time 1, Time2, and Time3 measures of exhaustion and general health complaints. The mean levels of both exhaustion and health complaints show an increasing trajectory over time. In addition exhaustion and health complaints are positively correlated both within and across waves of measurements.

Table 2.1*Mean, standard deviation, and correlations for the study variables*

Variable	<i>M</i>	<i>SD</i>	<i>α</i>	1	2	3	4	5	6	7	8	9	10	11
1. Gender	0.48	0.50		-										
2. Age	32.85	5.80		-.12	-									
3. Time 1 exhaustion	2.26	0.48	.80	.22*	-.12	-								
4. Time 2 exhaustion	2.34	0.52	.87	.25**	-.09	.61**	-							
5. Time 3 exhaustion	2.41	0.45	.75	.33**	-.03	.32**	.36**	-						
6. Time 1 health complaints	0.81	0.37	.79	.16	-.16	.57**	.43**	.31*	-					
7. Time 2 health complaints	0.91	0.49	.86	.25**	-.13	.37**	.69**	.37**	.52**	-				
8. Time 3 health complaints	0.97	0.46	.85	.27**	.08	.17	.23**	.65**	.22*	.33**	-			
9. Work pressure	2.74	0.67	.79	.12	-.07	.49**	.44**	.29**	.33**	.33**	.21*	-		
10. Work control	3.10	0.62	.87	-.12	.20*	-.19*	-.12	-.23*	-.25**	-.05	-.02	.02	-	
11. Affective rumination	1.92	0.66	.87	.09	.09	.15	.25**	.31**	.28**	.27**	.30**	.35**	-.05	-
12. Problem-solving pondering	2.33	0.69	.90	-.04	.005	-.09	-.08	.03	-.03	-.02	.08	.20*	.11	.35**

*Note. Cronbach's alphas for variables measured daily are mean internal consistencies averaged over all measurement days. All correlations are at the person-level ($N=123$). Gender (male = 0, female = 1). * $p < .05$ (two-tailed). ** $p < .01$ (two-tailed)

Testing the unconditional univariate growth model of psychological well-being over time

Before conducting the latent growth models, the factorial invariance (Chan, 1998) was tested with a longitudinal covariance structure model. To do so, we compared a model with the factor loading freely estimated to a model with the factor loading constrained for each outcome construct separately. No significant chi-square difference statistic was found between the two models for either exhaustion ($\Delta\chi^2(2) = 1.424, p = .491$) or health complaints ($\Delta\chi^2(2) = 4.711, p < .095$). These findings indicate that the both constructs are factorially invariant across time.

The first step in the latent growth model analysis was to examine how exhaustion and health complaints changed over the three waves of measurements. The linear latent growth model of exhaustion was found to fit the observed data quite well $\chi^2(1) = .016, p = .89$ with the acceptable fit indices of CFI = 1.0., TLI = 1.0. RMSEA = .00 [.00; .108], and SRMR = .003. Statistically, a value of .95 or greater on the CFI and TLI, .06 or lower on the RMSEA, and .08 or lower on the SRMR, indicate an acceptable model fit (Hu & Bentler, 1999). Moreover, the linear model of exhaustion resulted in significant mean intercept ($M_i = 2.26, p < .001$) and slope ($M_s = .078, p < .01$). These estimates indicate that the average score of exhaustion at time 1 was 2.26 (the intercept), and there was a significant and steady increase in exhaustion, on average, by .078 (the slope) over the subsequent twelve months. The variances for the intercept and slope were $V_i = .241, p < .001$ and $V_s = .05, p < .01$, respectively, indicating significant variation across individuals in terms of initial status of exhaustion and its rate of change over time. In addition there was a significant negative correlation ($r = -.78, p < .001$) between the intercept and slope of exhaustion, indicating that lower initial values were associated with higher rates of change in exhaustion over time.

The linear latent growth model of health complaints was then tested. The model produced an acceptable Chi-square test statistic, $\chi^2(1) = .245, p = .62$, and fit indices, CFI = 1.0., TLI = 1.0., RMSEA = .00 [.00; .189], and SRMR = .012, indicating a very good fit to the data. This linear growth model showed significant means of intercept ($M_i = .81, p < .001$) and slope ($M_s = .084, p < .001$), indicating that on average over all participants health complaints showed a systematic increase over time. Further, there was significant variance in both intercept ($V_i = .147, p < .01$) and slope ($V_s = .044, p < .01$), indicating there was substantial

individual variability about the initial level of health complaints and its rate of change over time. Finally, the correlation between the intercept and slope was found significant ($r = -.67, p < .001$), indicating that lower initial levels of health complaints were associated with steeper increases over time.

Additional test revealed no significant quadratic trend in the slope for both exhaustion and health complaints.

Testing the unconditional bivariate growth model of psychological well-being over time

The second step of analysis was evaluating the interrelations between exhaustion and health complaints growth models. A bivariate latent growth model was estimated to examine how the initial statuses and increasing trajectories of exhaustion and health complaints were associated. The bivariate growth model yielded a Chi-square statistic of $\chi^2 (7) = 4.569, p = .60$ and fit indices, CFI = 1.0., TLI = 1.0., RMSEA = .00 [.00; .10], and SRMR = .043, indicating a significant acceptable model. The results of the bivariate model showed that the initial levels of the two outcomes were significantly positively correlated ($r = .60, p < .001$). This means that high initial levels of exhaustion were associated with high initial levels of health complaints. The rate of change in the two health outcomes was also significantly and positively correlated ($r = .68, p < .001$). This indicates that an individual's growth trajectory on exhaustion was very similar to that same individual's growth trajectory on health complaints. In other words, changes in exhaustion were significantly correlated with changes in health complaints. Furthermore, there were significant correlations between the intercept of exhaustion and the slope of health complaints ($r = -.29, p < .05$), and also between the intercept of health complaints and the slope of exhaustion ($r = -.31, p < .01$). These findings indicate that higher initial levels of one health outcome were negatively associated with lower rates of change in another health outcome over time.

Testing the conditional bivariate growth model of psychological well-being over time

In the final step of the analysis, covariates were simultaneously included in the bivariate model to evaluate their effects on the four latent growth factors of exhaustion and health complaints. The findings are presented in Table 2.2. The

model produced a good fit to the data ($\chi^2 (18) = 14.829, p = .67$ and fit indices, CFI = 1.0, TLI = 1.0, RMSEA = .00 [.00; .065], and SRMR = .032).

As Table 2.2 shows, gender was only significantly related to the slope of health complaints ($\beta = .23, p < .05$) suggesting that compared to males, females experienced a steeper increase in health problems over time. Age was significantly related to neither intercepts nor slopes of both health outcomes. Work pressure was significantly related to both intercept ($\beta = .54, p < .001$) and slope ($\beta = -.35, p < .01$) of exhaustion. These findings indicate that although subjects with higher levels of work pressure reported higher initial levels of exhaustion, they experienced flatter trajectories of exhaustion over time. Work pressure was also significantly related to the intercept of health complaints ($\beta = .28, p < .01$), indicating that individuals with higher levels of work pressure reported higher initial levels of health complaints. Work control was found to be significantly related to the intercept of health complaints ($\beta = -.21, p < .05$), suggesting that employees who reported higher levels of work control experienced lower initial levels of health complaints.

Table 2.2 also shows the results related to the two experiences of work-related rumination. The relationship between affective rumination and the initial level of exhaustion was not found significant. However, there was a significant relationship between the experience of work-related affective rumination during evenings and the initial level of health complaints ($\beta = .22, p < .05$). This indicates that individuals who experienced higher levels of affective rumination during evenings reported higher initial levels of health complaints. The results also showed that affective rumination was significantly associated to the rate of increasing change in exhaustion ($\beta = .23, p < .05$) over time. This finding indicates that people who experienced higher levels of work-related affective rumination during the time of recovery in evenings showed a steeper trajectory of growth in exhaustion over time (Figure 2.2). Hypothesis 1a was then supported. Nevertheless, the results showed that affective rumination during evenings was not a significant predictor of the slope of health complaints over time. Therefore, Hypothesis 1b was not supported.

Table 2.2

Conditional bivariate growth model of psychological well-being with covariates

Variable	exhaustion		Health complaints	
	Intercept	Slope	Intercept	Slope
Gender	0.12 (1.43)	0.13 (1.27)	0.06 (0.68)	0.23* (2.24)
Age	-0.03 (-0.35)	0.06 (0.63)	-0.12 (-1.45)	0.18 (1.61)
Work pressure	0.54*** (5.71)	-0.35** (-2.95)	0.28** (2.75)	-0.11 (-0.84)
Work control	-0.17 (-1.73)	0.005 (0.04)	-0.21* (-2.84)	0.19 (1.77)
Affective rumination	0.01 (0.12)	0.23* (2.15)	0.22* (2.16)	0.07 (0.61)
Problem-solving pondering	-0.19* (-2.50)	0.13 (1.19)	-0.14 (-1.54)	0.09 (0.92)

*Note. All effects are presented using standardized parameter estimates. * $p < .05$ (two-tailed). ** $p < .01$ (two-tailed). *** $p < .001$ (two-tailed). Number in parenthesis is the ratio of the parameter estimate to standard error. Gender (male = 0, female = 1). $N = 123$.

The results related to the work-related problem solving pondering during evenings showed a negative and significant relation with the intercept of exhaustion ($\beta = -.19, p < .05$), and a negative but non-significant relation with the intercept of health complaints ($\beta = -.14, p = .12$). This finding indicates that individuals who experienced higher levels of problem-solving pondering during evenings reported lower initial levels of exhaustion. Furthermore, problem solving pondering was not found as the significant predictor of either slope of health outcomes. Therefore Hypothesis 2 was not supported.

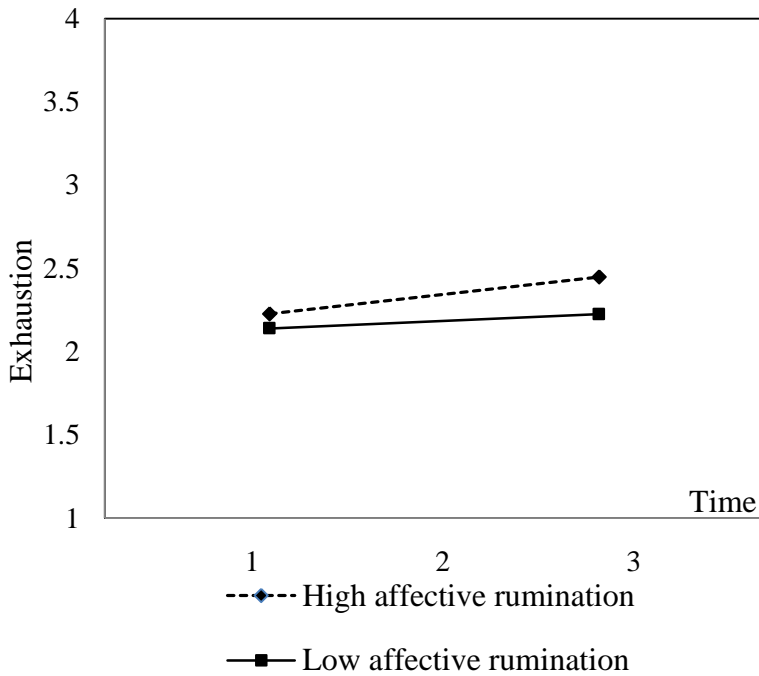


Figure 2.2. Growth trajectories of exhaustion over time at different levels of work-related affective rumination during evenings

Discussion

In this 3-wave longitudinal study, we investigated how the experience of work-related affective rumination and problem-solving pondering during evenings influence employees' well-being over time. Latent growth curve modeling (LGM) was used to examine the hypotheses. We hypothesized that the experience of work-related affective rumination during evenings is positively related to the growth rate of change in exhaustion and health complaints over time (Hypothesis 1). In contrast, we expected that the experience of work-related problem-solving pondering during evenings is negatively related to the growth rate of change in exhaustion and health complaints over time (Hypothesis 2). Hypothesis 1 was partially supported and Hypothesis 2 was not supported.

The conditional bivariate growth model of psychological well-being showed that work-related affective rumination was positively associated with the initial level of health complaints. This finding indicates that employees who

experienced lower levels of mental health reported simultaneously higher levels of affective rumination. From the clinical point of view, the current finding replicates findings from previous cross-sectional studies (e.g. Hughes, Alloy, & Cogswell, 2008; for a review, see Thomsen, 2006), demonstrating that intrusive and negative rumination is associated with depression and anxiety symptoms. However, the positive relation between affective rumination and the initial level of exhaustion was not significant. This results stands in contrast to findings of previous cross-sectional studies (e.g. Querstret & Cropley, 2012; Donahue et al., 2012). One potential explanation for this result is that people generally have resources to deal with affective rumination for a limited period of time; however, affective rumination leads to exhaustion by drawing on resources over a period of time (Sonnentag, Binnewies at al., 2010). Moreover, work-related problem-solving pondering showed a negative relation with the intercept of exhaustion. This finding is consistent with findings of a cross-sectional study (Querstret & Cropley, 2012) that showed participants reporting higher levels of problem-solving pondering reported simultaneously lower levels of work-related fatigue. A possible explanation for this effect is that because engaging in problem solving pondering requires mental energy, individuals with low energy levels are less likely to engage in problem solving pondering. Demerouti and her colleagues (2010) found that exhaustion is negatively related to vigor. Vigor is characterized by high levels of energy and willingness to invest effort (Schaufeli & Bakker, 2004). Accordingly, employees with lower levels of exhaustion are more likely to engage in problem-solving pondering.

Our results showed that work-related affective rumination during evenings was a significant predictor of increase in exhaustion across a period of 12 months. This finding is in line with a past research that found a positive relationship between affective rumination and exhaustion after three months (Donahue et al., 2012). This finding extends the recovery literature by showing how the insufficient recovery during evenings influences well-being over time. According to Cropley and Zijlstra (2011), affective rumination leads to prolonged activation because it draws not only on cognitive resources but also on emotional resources. Therefore, as the consequence of prolonged activation and draining of emotional resources, exhaustion occurs (Sonntag, Binnewies at al., 2010). However, our study showed that affective rumination was not a significant predictor of change in general mental health over time. This result was in contrast to a prior study (Hamesch et al., 2014) that found that affective rumination was positively associated with depressive mood that individuals reported after six months. These findings suggest that work-related affective rumination only

impairs work-specific mental health over time. A possible explanation is that whereas exhaustion is mainly affected by work-related factors, impairment of general mental health may also be caused and modified by other life conditions, such as illness, economic circumstances and the family situation. Therefore, these findings also contribute to the psychological health literature by demonstrating that “work-specific” and “context-free” mental health are two distinct constructs (Warr, 1987), as their patterns of associations with work-related affective rumination were different.

Our results did not show a significant relationship between problem-solving pondering during evenings and changes in either indicator of psychological well-being over time. This finding is also in line with past research (Hamesch et al., 2014) suggesting that problem-solving pondering is less detrimental to well-being than affective rumination. According to Nolen-Hoeksema (1996), the key feature in determining the effectiveness of problem-solving is whether progression in thoughts occurs over a reasonable period of time. Therefore, although it is assumed that problem-solving facilitates the recovery process by causing positive affect and increasing the likelihood that solutions are found; it may conversely impede the recovery process when employees continuously think about their work problems without any progression in finding solutions. Future research is needed to investigate circumstances under which problem-solving pondering facilitates or conversely impedes the recovery process during non-work time.

These findings are consistent with the assumption that the two types of work-related rumination may operate differently on recovery process and in turn have different effects on well-being (Cropley & Zijlstra, 2011). This suggests that in contrast to affective rumination, problem-solving pondering during evenings is not a risk factor for impaired well-being in the long-run. According to Brosschot et al. (2005), rumination leads to prolonged activation as a risk factor of health problems by maintaining an active cognitive representation of individuals’ job stressors. However, this study showed that it is not necessarily being mentally engaged with job-stressors per se that causes prolonged activation during off-job time. Drawing on CATS theory (Ursin & Eriksen, 2004; Ursin & Eriksen, 2010), dealing with job-stressors causes prolonged activation only when individuals experience negative outcome expectancies. Affective rumination is likely to be associated with negative outcome expectancies in which individuals believe that their responses are not expected to handle the situation and they may even lead to negative results. In contrast, problem-solving pondering does not lead to

prolonged activation because it is likely to be associated with positive outcome expectancies in which individuals believe that their responses are expected to handle the situation with positive results.

As an additional finding, our results showed a significant increase in impaired well-being over time. According to Schaufeli, Leiter, and Maslach (2009), people in developing countries are more likely to become exhausted because of rapid changes in modern working life such as increasing demands of learning new skills, the need to adopt new types of work, pressure of higher quality of work, and time pressure. Moreover, the results of bivariate growth model showed a positive correlation between the rate of change in exhaustion and health complaints over time. This finding contributes to the previous literature investigating the link between mental health and exhaustion (e.g. Demerouti et al., 2010; Maslach, Schaufeli, & Leiter, 2001) by indicating that changes in exhaustion and mental health are associated with each other over time. Our results show that an individual's growth trajectory on health complaints is similar to his or her corresponding growth trajectory on exhaustion across the same period of time. It is possible that there is a causal relationship between the changes in exhaustion and general mental health over time. This would mean that changes in "work-specific" and "context-free" mental health (Warr, 1987) affect each other across time. According to the compensatory control model (Hockey 1993, 1997), in the case of feeling exhaustion, individuals may be exposed to subsequent work demands in a suboptimal state. Therefore, they need to invest compensatory effort to deal with those demands and perform adequately at work. As a consequence, the prolonged compensatory effort results in physiological and psychological costs on health. Conversely, mental health impairment may cause exhaustion. For instance, employees with higher levels of mental health cope with job stressors more effectively and consequently are less likely to experience exhaustion (Maslach et al., 2001; Jenkins & Maslach 1994).

Strengths and limitations

Our study has several strengths. First, conducting latent growth curve modeling permitted us to study how the different types of work-related rumination predict trajectories of health outcomes over time. Second, employing a diary design allowed us to assess the level of work-related rumination that people experience particularly during evenings of the working week. Third, including two outcomes of exhaustion and mental health complaints as 'work-specific' and 'context-free' mental health respectively, provided a comprehensive model of employees' well-

being. Fourth, by controlling for work pressure and work control, we examined how far the reported work-related rumination during evenings explained changes in health outcomes over time.

As with any study, there are several limitations that should be addressed and considered prior to the interpretation of the findings. First, this research involved only employees who work in a primarily mentally demanding environment; therefore, the generalizability of the findings to industrial workers who has been assumed to experience a different quality of rumination (Pravettoni et al., 2007) is restricted. Second, we used paper-and-pencil surveys to collect data that did not provide us an indication of the day and time that participants filled in the diaries. In this study, we decided to use paper-and-pencil surveys in order not to restrict the sample to only those who had Internet access especially in the hours before going to bed. Third, all data were gathered by self-report measures; therefore common method bias may have accounted for the findings. However, the longitudinal design of our research reduced the effects of common method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Fourth, in the present study we had a final sample size of 123 participants. Although, a sample size greater than 100 has been suggested as sufficient to reliably estimate linear growth models (Curran, Obeidat, & Losardo, 2010; Fan & Fan, 2005), the power of the latent growth modeling will be enhanced by increasing the sample size (Zhang & Wang, 2009). Furthermore, we had the minimum number of measurement points. Although, growth models typically require at least three repeated measures per individual, it has been documented that the number of measurements plays an important role in the estimation and statistical power of the model (Curran et al., 2010; Zhang & Wang, 2009). In fact, the power of the latent growth modeling increases with a larger numbers of measurement occasions. However, as an exception, Fan and Fan (2005) showed that the number of repeated measures in detecting linear growth had no effect on the statistical power of the latent growth modeling.

Practical implications and directions for future research

For many people, work nowadays is primarily mentally demanding rather than physically demanding. Moreover, due to advances in communication technologies, the experience of unwinding from work during the time of recovery has become more difficult. Based on the results of this study, organizations are recommended to provide adequate conditions facilitating the recovery process. To do so, it is important not only to facilitate employees in overcoming obstacles

to establish detachment but also to enhance their problem-solving skills. According to Nolen-Hoeksema (1996), a successful problem-solving generally occurs in three steps, namely, assessing the problem, evaluating possible solutions to the problem, and finally deciding about which solution to choose. It seems that training skills related to each of these steps may help employees to act as more successful problem solvers during non-work time.

We recommend future research to study the mechanisms by which affective rumination and problem-solving pondering lead to different levels of psycho-physiological arousal. For instance, from the cognitive point of view discussed by CATS theory, being mentally engaged with job stressors causes prolonged activation only when individuals experience negative outcome expectancies. Therefore, a study may investigate the different response outcome expectancies that people experience in affective rumination compared to problem-solving pondering. It is also recommended to examine the cumulative effects of work-related rumination on well-being over time. In addition, because this study showed that only affective rumination leads to impaired well-being, one may be interested in developing and testing interventions to help employees who ruminate affectively about work-related issues.

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The background of the page features a light gray silhouette of a human head in profile, facing right. Inside the head, several gears of various sizes are arranged in a complex, interconnected pattern, symbolizing cognitive processes, problem-solving, and the mechanics of the mind.

CHAPTER 3

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

This chapter is based on: Firoozabadi, A., Uitdewilligen, S., & Zijlstra, F. R. H. (2018). 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. *European Journal of Work and Organizational Psychology*, 27, 629–641. <https://doi.org/10.1080/1359432X.2018.1505720>

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, while 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.

Keywords: work-related rumination, problem-solving, recovery, psychological well-being, self-regulation

Introduction

For many people, work nowadays is primarily mentally demanding. Moreover, advances in communication technologies have created a more diffuse boundary between work and non-work time (Perlow, 2012). Therefore, employees are more likely to be mentally exposed to work-related issues and stressors during their non-work time (Park, Fritz, & Jex, 2011). This prevents psychological detachment, which is a crucial aspect of the recovery process (Sonnetag & 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 non-work time (Etzion, Eden, & Lapidot, 1998). A substantial body of empirical research has shown that lack of detachment from work during non-work time impedes the recovery process and causes impaired well-being (see Sonnetag & 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 non-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 reevaluate work-related performance in order 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 psycho-physiological activation (Brosschot, Pieper, & Thayer, 2005). Affective rumination impedes the recovery process because it activates prolonged psycho-physiological reactions and draws on individuals' emotional resources. In contrast, problem-solving pondering is less likely to cause prolonged psycho-physiological activation and may even act as a resource-providing experience (Fritz & Sonnetag, 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 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 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). This study thus 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; Syrek, Weigelt,

Peifer, & Antoni, 2017; Firoozabadi et al., 2018; Hamesch et al., 2014; Querstret & Cropley, 2012). 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 psycho-physiological 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 psycho-physiological activation, we draw on the Cognitive Activation Theory of Stress (CATS: Ursin & Eriksen, 2004; Ursin & Eriksen, 2010). According to CATS, the key feature in determining the degree to which psycho-physiological 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 psycho-physiological 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, and the amount of resources that are replenished, employees experience different levels of being recovered after non-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 (Sonnentag & Krueger, 2006; Binnewies, Sonnentag, & Mojza, 2009a).

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 non-work time facilitates the recovery process (Sonnentag, Binnewies, & Mojza, 2008; Binnewies, Sonnentag, & Mojza, 2010; Sonnentag & Bayer, 2005). 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 non-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, 2015) 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 higher 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 in order 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 (Tice, Baumeister, Shmueli, & Muraven, 2007; Ren, Hu, Zhang, & Huang, 2010). 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 non-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 (Papies & Aarts, 2011; Kanfer & Ackerman, 1989), and modifying the experience and expression of emotions (Thompson, 1994).

Drawing on Kanfer and Ackerman's (1989) conceptualization, self-regulation influences the process of problem-solving in an adaptive way 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 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 (Firoozabadi et al., 2018; Hamesch et al., 2014; Querstret & Cropley, 2012; Donahue et al., 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 psycho-physiological 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, Binnewies 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., George & Zhou, 2007; Ilies, Scott, & Judge, 2006; Deluga & Masson, 2000; 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 3.1 shows our conceptual model.

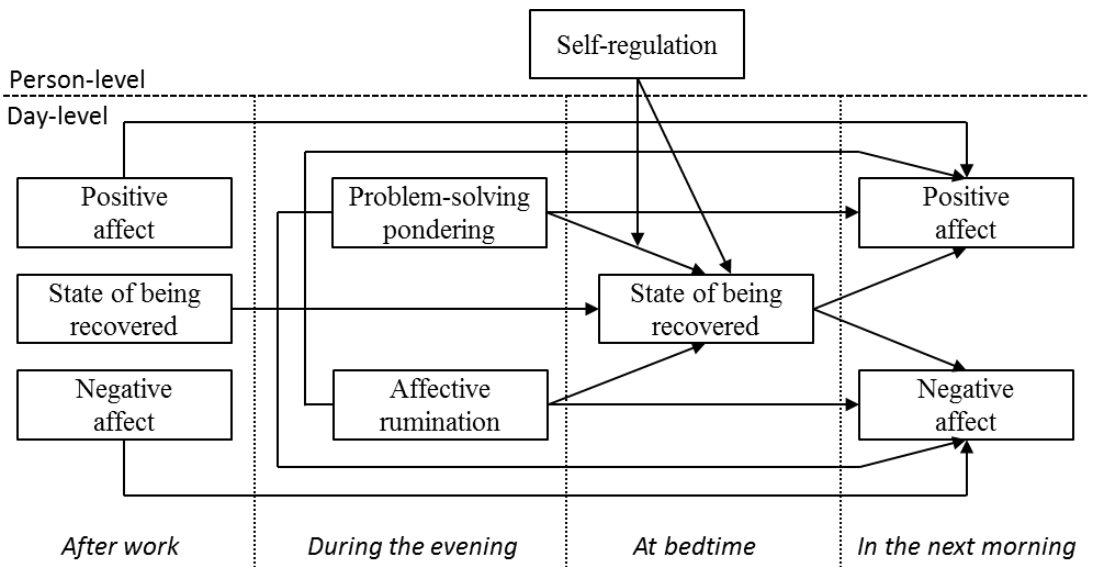


Figure 3.1. The study conceptual model

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 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 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 afterward collected the completed surveys. The paper-and-pencil daily survey packages were then delivered to 221 persons who completed the general surveys. To make sure 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 3.1), the data collected in the morning of the first day and also 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 totally 677 day-level data points. Our participants provided on average 3.9 (range of 3 to 4) day-level data points.

Of the 171 participants included in analyses, 55 percent were female and 45 percent were male. 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; about 76.6 percent of the participants lived with their spouse; and 55 percent 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 translated back 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 8 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] = .97; Tucker-Lewis index [TLI] = .95; root-mean-square error of approximation [RMSEA] = .11; standardized root-mean-square residual [SRMR] = .04), the two-factor model ($\chi^2(16) = 49.874, p < 0.001$; CFI = .97; TLI = .95; RMSEA = .11; SRMR = .04) was not found to fit the observed data significantly better ($\Delta\chi^2(1) = 2.01, p = .15$). Therefore, we used data based on one-factor model representing affective and cognitive aspects of self-regulation. Cronbach’s alpha was .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,” “I am full of new energy.” On a 7-point Likert scale from 1 (totally disagree) to 7 (totally agree), the scale measures the degree to which an individual feels recovered. Cronbach’s alphas ranged from .84 to .87 over the after work measurements and from .85 to .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”, “jittery”). Participants responded to all affective states measures on a 5-point Likert scale from 0 (very slightly or not at all) to 4 (extremely). For positive affect, Cronbach’s alphas ranged from .88 to .91 over the after work measurements and from .89 to .92 over the morning measurements.

For negative affect, Cronbach's alphas ranged from .89 to .93 over the after work measurements and from .83 to .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 that 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 = .74; TLI = .69; RMSEA = .09; SRMR-*within* = .15, SRMR-*between* = .46), the three-factor model ($\chi^2 (198) = 462.098, p < 0.001$; CFI = .93; TLI = .92; RMSEA = .04; SRMR-*within* = .04, SRMR-*between* = .08) resulted in a significantly better fit (Satorra-Bentler $\Delta\chi^2 (6) = 806.056, p < .001$). Moreover, the three-factor model showed a better model fit than the best fitting two-factor model (Satorra-Bentler $\Delta\chi^2 (4) = 178.319, p < .001$).

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 alphas ranged from .90 to .91 for affective rumination and from .86 to .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 = .72; TLI = .64; RMSEA = .11; SRMR-*within* = .19, SRMR-*between* = .64), the two-factor model ($\chi^2 (68) = 198.694, p < 0.001$; CFI = .94; TLI = .92; RMSEA = .05; SRMR-*within* = .05, SRMR-*between* = .07) fit the data significantly better (Satorra-Bentler $\Delta\chi^2 (2) = 102.285, p < .001$).

Data analysis

There were two levels of data for each person: the person level (Level 2) and the day level (Level 1), with 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 3.1) 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 means 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 unconfated 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 way 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 3.2). 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 3.1. In order 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.

Table 3.1

Mean, standard deviation, and correlation between study variables

Variable	M	SD	1	2	3	4	5	6	7	8
1 Affective rumination	1.98	.83	-	.40***	-.17***	-.10*	.24***	-.30***	-.15*	.17***
2 Problem-solving pondering	2.41	.81	.43***	-	-.11*	.007	.04	-.02	.07	-.09
3 State of being recovered after work	4.17	1.50	-.46***	-.04	-	.48***	-.34***	.25***	-.02	-.03
4 Positive affect after work	2.04	.67	-.41***	-.02	.63***	-	-.30***	.15*	-.06	-.05
5 Negative affect after work	.48	.66	.53***	.34***	-.29**	-.20*	-	-.21***	.002	.17*
6 State of being recovered at bedtime	4.05	1.54	-.42***	.05	.95***	.57***	-.22**	-	.18*	-.21***
7 Next morning positive affect	2.29	.68	-.24*	.16	.42***	.75***	-.17	.37***	-	-.40***
8 Next morning negative affect	.37	.53	.46***	.32***	-.21**	-.13	.94***	-.11	-.22**	-
9 Trait self-regulation	7.30	1.72	-.07	.07	.20*	.35***	-.21**	.13	.25**	-.16*

*Note: Correlations below the diagonal are person-level correlations (N=171). Correlations above the diagonal are day-level correlations (N=676, 683). * $p < .05$ (two-tailed). ** $p < .01$ (two-tailed). *** $p < .001$ (two-tailed).

Test of hypotheses

Table 3.2 shows the results for the moderated multilevel mediation model examining all hypotheses. The results 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 & 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 3.1) 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 that whether problem-solving pondering meets the criteria of acting as a suppressor variable (Pandey & Elliott, 2010; Cohen, Cohen, West, & Aiken, 2003) 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 ($\beta = -.562, p < .001$) whereas the relationship between problem-solving pondering and the state of being recovered was not found significant ($\beta = .043, p = .68$). Moreover, by having both affective rumination and problem-solving pondering as the predictors of the state of being recovered (see Table 3.2) 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 (Pandey & Elliott, 2010; Cohen et al., 2003) in our Model. Therefore, Hypothesis 1 was supported. However, in contrast to the finding provided by the initial analysis (see Table 3.2), 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 ($\beta = .043, p = .68$), the cross-level interaction of problem-solving pondering and self-regulation remained significant ($\beta = .157, p < .001$). 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 ($\beta = .323, p < .001$) for employees high in trait self-regulation (+1 *SD*) and a significant and negative simple slope ($\beta = -.267, p < .001$) 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 3.2) 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.

Table 3.2

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)	.227	.064	3.523***	-.103	.046	-2.220*	.100	.056	1.784
Affective rumination (AR)	-.635	.112	-5.677***	-.149	.053	-2.814**	.112	.038	2.922**
Problem-solving pondering (PS)	.278	.109	2.557*	.116	.052	2.212*	-.103	.041	-2.525*
General level of self-regulation (SR)	.043	.048	.896						
Interaction effect: PS × SR	.112	.042	2.692**						
State of being recovered (SBR)				.057	.021	2.726*	-.044	.016	-2.668**
Indirect effect: AR → SBR → morning affect				-.036	.016	-2.284*	.028	.013	2.223*
Indirect effect: PS × SR → SBR → morning affect				.006	.003	2.076*	-.005	.002	-2.047*
Residual variance	.820	.118	6.924***	.197	.031	6.456***	.097	.018	5.530***

*Note: All paths were simultaneously tested in one model. The results are related to within-person paths (Hypotheses 1, 2, & 4) and a cross-level interaction (Hypothesis 3 & 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 < .05 (two-tailed). **p < .01 (two-tailed). ***p < .001 (two-tailed).

¹ The results related to the between-person level of analysis provided support for Hypothesis 1 ($\beta = -.906, p < .001$) 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 ($\beta = .174, p = .42$). 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 ($\beta = .125, p < .05$). However, the relationship between the state of being recovered at bedtime and morning negative affect was not significant ($\beta = .034, p = .31$). Finally, the results related to the between-person indirect relationships provided support only for Hypothesis 4a ($\beta = -.114, p < .05$) indicating that recovery mediated the relationship between affective rumination and morning positive affect.

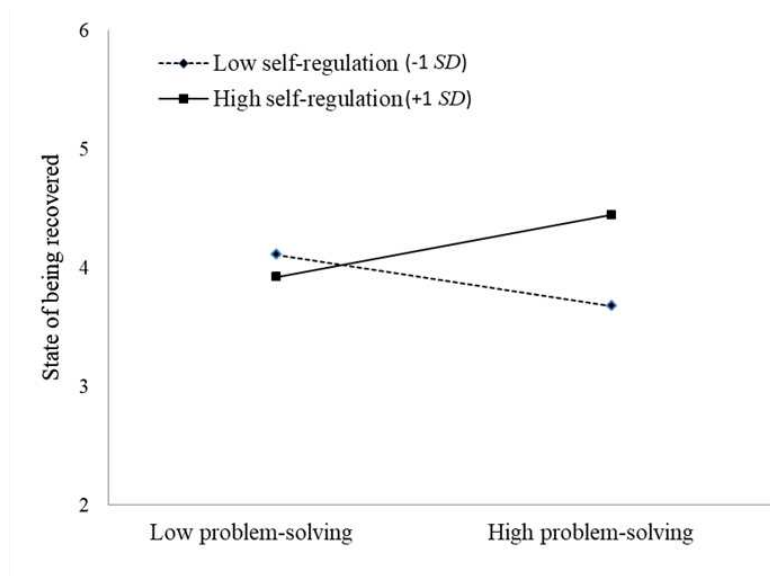


Figure 3.2. The interaction effect of problem-solving during the evening (PS) and self-regulation (SR) on the state of being recovered at bedtime

In order 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 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 bedtime (Indirect effect = $-.036$, 95% confidence interval [CI] = $-.068$ to $-.009$ for positive affect; Indirect effect = $.028$, 95% CI = $.008$ to $.052$ 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 = $.006$, 95% CI = $.001$ to $.014$ for positive affect; Indirect effect = $-.005$, 95% CI = $-.011$ to $-.001$ for negative affect).

The data partly supported Hypothesis 5, since 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 3.2). 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.

Additionally, 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-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 ($\Delta\chi^2(8) = 64.901, p < .001$) than the full mediation model (*log-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 Hypothesis 4 and 5.²

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 3.2, the suppression test showed no significant direct relationships between problem-solving pondering during the evening and positive affect ($\beta = .054, p = .28$) and negative affect ($\beta = -.058, p = .11$) 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 ($\Delta\chi^2(4) = 25.011, p < .001$) for Hypothesis 5.

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 & 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 & 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 past research that reported work-related rumination to be related to higher levels of physiological arousal and need for recovery (Rydstedt et al., 2009; Cropley et al., 2015). 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 (Firoozabadi et al., 2018; Hamesch et al., 2014; Querstret & Cropley, 2012; Donahue et al., 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 found 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. Additionally, 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; Syrek et al., 2017; Hamesch et al., 2014; Querstret & Cropley, 2012).

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; Ursin & Eriksen, 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., Syrek et al., 2017; Syrek & Antony, 2014; Sonnentag, Binnewies, & Mojza, 2010; Sonnentag, Kuttler, & Fritz, 2010; Sonnentag & Zijlstra, 2006).

Additionally, 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, in order to ensure compliance with the measurement timing of the study design, participants received reminders on their cell phones and they 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 psycho-physiological mechanisms of the two different types of work-related perseverative thinking using experimental designs and psycho-physiological 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 in order 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 non-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 non-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.

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CHAPTER 4

Week-level dynamics and person-level differences of the relation between work-related perseverative thinking and job performance-related outcomes, the mediating role of emotion regulation capability

This chapter is based on: Firoozabadi, A., Uitdewilligen, S., & Zijlstra, F. R. H. (under review). Week-level dynamics and person-level differences of the relation between work-related perseverative thinking and job performance-related outcomes, the mediating role of emotion regulation capability.

Abstract

In this study, we investigated how two types of work-related perseverative thinking (i.e. affective rumination and problem-solving pondering) during the weekend are related to two job performance-related outcomes (i.e. effort expenditure and task performance) through their relationships with emotion-regulation capability during the subsequent working week. Participants responded to weekly web-based surveys at the beginning (i.e. on Mondays) and at the end (i.e. on Fridays) of six consecutive working weeks. The data (N = 107; 490-568 week-level data points) were then analyzed using multilevel structural equation modeling at the within- and between-person levels. The results revealed that affective rumination negatively related to emotion-regulation capability only at the within-person level, whereas problem-solving pondering positively related to emotion regulation capability only at the between-person level. Emotion regulation capability mediated the relationships between affective rumination and the two performance-related outcomes only at the within-person level. However, the mediating role of emotion regulation capability was significant on the relationship between problem-solving pondering and task performance only at the between-person level. These findings provide empirical evidence to support the core assumption indicating that affective rumination is more likely to draw on emotion regulatory resources and thus to have straining effects on the organism than problem-solving pondering.

Keywords: weekend recovery, work-related rumination, problem-solving, emotion regulation, job performance

Introduction

Previous research has shown that sufficient recovery during non-work time is crucial for individuals' work-related performance (e.g. Binnewies, Sonnentag, & Mojza, 2009a; Binnewies, Sonnentag, & Mojza, 2009b; Binnewies, Sonnentag, & Mojza, 2010; Fritz & Sonnentag, 2006; Fritz & Sonnentag, 2005). Recovery occurs when individuals experience their off-job time as an opportunity to replenish and improve their lost or threatened energetic resources (Hobfoll, 1989). Although the extent to which employees disengage mentally from work-related issues during non-work time has been shown as an important determinant of an effective recovery (Sonnentag, 2012; Sonnentag & Fritz, 2015), engaging with work-related thoughts does not always impede the recovery process (Firoozabadi, Uitdewilligen, & Zijlstra, 2018a).

Work-related perseverative thinking is defined as the recurrent, pervasive and prolonged cognitions revolving around work-related content. Cropley and Zijlstra (2011) differentiated between two fundamentally different experiences of work-related perseverative thinking, labeled affective rumination and problem-solving pondering. Affective rumination refers to cognitive processes in which individuals' thoughts are mainly directed to negative emotions associated with work-related problems. In contrast, problem-solving pondering refers to cognitive processes in which individuals' thoughts are directed towards discovering solutions to work-related problems or to reevaluating work-related performance in order to improve functioning. A number of within-person and between-person studies has shown that affective rumination is detrimental to individuals' recovery and well-being, whereas problem-solving pondering has been found beneficial or at least neutral (Firoozabadi et al., 2018a; Firoozabadi, Uitdewilligen, & Zijlstra, 2018b; Kinnunen et al., 2017; Syrek, Weigelt, Peifer, & Antoni, 2016; Hamesch, Cropley, & Lang, 2014; Querstret & Cropley 2012). Nevertheless, to date, the relationships between these two types of work-related perseverative thinking and job performance-related outcomes have not been tested.

This study examines a model considering emotion regulation capability as a dynamic mechanism through which affective rumination and problem-solving pondering are differentially related to job performance-related outcomes (i.e. effort expenditure and task performance). Emotion regulation capability refers to the degree by which individuals carry out motivational processes to maintain or modify the experience and expression of their feelings in order to maintain their goal-directed actions (Gross, 2008). Considering the mediating role of emotion

regulation capability may then provide empirical evidence to examine a key and dynamic theoretical assumption indicating that affective rumination and problem-solving pondering have different influences on the organism due to their diverging pattern of drawing on emotion regulatory resources. Whereas affective rumination seems to drain emotion regulatory resources by focusing on dysfunctional feelings, problem-solving pondering may enhance such resources by generating positive affect resulting from solving problems or discovering ways to improve performance (Cropley & Zijlstra, 2011). Given the conservation of resources theory (Hobfoll, 1989), the extent to which individuals can regulate their emotions in an optimal way depends on their momentary levels of energetic activation (i.e. feeling energized). Therefore, one mechanism that seems to be differentially impacted by the two types of work-related perseverative thinking is the employees' capability to regulate their emotions. Emotion regulation is characterized as an important and adaptive executive function of the self by which employees conserve their resources, avoid exhaustive depletion, and thereby maintain an optimal performance (Hockey, 1997).

To summarize, this study extends the work-related rumination and recovery literature in three ways. First, our study provides support for the key theoretical assumption that affective rumination and problem-solving pondering have differential draining effects on emotion-regulatory resources. The study then examines the mediating role of emotion regulation capability as a mechanism through which the two types of work-related perseverative thinking are related to job performance-related outcomes. Second, in contrast to most previous studies on preservative cognition, our study focuses on recovery during the weekend. Compared to evenings, weekends can be described as a longer non-work time that allows employees to recover from the strain caused by work-related demands during the previous working week. It can also be seen as an opportunity to discontinue the cumulative effects of insufficient recovery (Rook & Zijlstra, 2006; Kivimäki et al, 2006) by compensating the insufficient recovery during the previous working week. Previous studies showed that recovery during the weekend is essential for well-being and performance during the subsequent working week (e.g. Fritz & Sonnentag, 2005; Binnewies et al., 2010). Third, job performance has been known as a central construct in the field of organizational behavior that varies at the within-person level as well as at the between-person level (Yoe & Neal, 2004; Campbell, Gasser, & Oswald, 1996; Ployhart & Hakel, 1998). Individuals' subjective experiences of recovery may vary across different weekends. Therefore, the week-level fluctuations of each type of perseverative thinking can be then considered as a variable that may dynamically explain the

weekly fluctuations of an employee's job-related functioning. On the other hand, the way that people experience recovery in weekends can be considered as personal characteristics. Therefore, considering the between-person variations of two types of perseverative thinking in weekends may explain individual differences in confronting work demands and accomplishing work-related tasks. Conducting a weekly diary study over a period of six consecutive weeks and using a multilevel approach thus provide the possibility to examine not only week-level dynamics but also person-level differences of these relationships. This approach provides then a more comprehensive picture of all proposed paths at two analytical levels: the within- and between-person levels.

Strength model of emotion regulation

The strength model of emotion regulation proposes that people's capability to regulate their emotions depends primarily on their available levels of resources. Because this central role of resources in human strength models (Quinn, Spreitzer, & Lam, 2012), we first clarify the concept of resources in the field of organizational behavior. Hobfoll (1989, 2002) defined the concept of human resources expansively as "entities that are valued in their own right or that are valued because they serve as means to the achievement of valued resources". More specifically, energetic resources are recognized as internal human resources that enable individuals to organize their understanding of a situation, to confront their challenges and stressors, and to implement their coping processes (Hobfoll, 2002).

Considering energetic resources, two human energy aspects should be identified: physical energy and energetic activation (Quinn et al., 2012). Physical energy is conceptualized as the potential capacity to do or to think powered by body glucose or adenosine triphosphate (ATP). Physical energy is a maximum available energy that individuals might invest in their goal-directed activities. However, this amount of energy is limited and consumable and individuals should allocate these resources in a parsimonious way in order to prevent depletion (Brown, 1999; Quinn et al., 2012). Energetic activation is the degree to which people feel energized in certain circumstances or about specific activities. It is conceptualized as the capability to invest mental effort (Zijlstra, Cropley, & Rydstedt, 2014; Zijlstra, 1993, 1996) with an optimal allocation of energetic resources (Kahneman, 1973) and the willingness to perform given goal-related activities. People experience this subjective feeling of energy as vigor, vitality, enthusiasm, and other positive feelings (Quinn et al., 2012). Given this

clarification, despite the positive relationship between physical energy and energetic activation, people may experience a low energetic activation for engaging in an activity even though they still have enough potential physical energy. Moreover, feeling energized may lead to higher energetic activation (i.e. resources) for future activities by broadening individuals' thought and action repertoires and improving their domain-specific performance.

Accordingly, proposing different types of resources (e.g. emotional or cognitive) is not accurate. It is instead proposed that people only experience different levels of energetic activation for different types of activities such as emotional or cognitive activities. Their allocation of energy to carry out each type of activity then depends on the extent to which they experience energetic activation for that type of activity. Accordingly, the extent to which people may involve appropriately in an emotional activity (i.e. emotional capability) depends not only on the amount of their available physical energy but more specifically on the degree to which they may experience energetic activation for that emotional activity at a given time. We take this conceptualization into account in order to describe emotion regulation capability by drawing on the conservation of resources (CoR) theory (Hobfoll, 1989).

According to CoR theory, engaging in self-regulatory processes draws on energetic resources. The CoR theory defined energy as a type of subjective intrinsic resources known as vigor that resembles individuals' capability to engage in physical, cognitive and emotional activities (Hobfoll & Shirom, 2001). This definition of energy is more closely aligned to energetic activation than to physical energy (Quinn et al., 2012). Because a sufficient amount of energetic activation is crucial for an optimal functioning, lack of such resources can be considered as a reason for individuals' failure to regulate their dysfunctional emotions. Building on CoR theory, on the one hand, emotion regulation can be considered as a function that is negatively influenced by the extent to which individuals extended their energetic resources on prior similar functions. This means people who have already been engaged with dysfunctional emotional activities are less likely to properly regulate their feelings in the subsequent emotional activities because they might feel less energetic activation for such emotional activities. In this case, they experience a sense of disability to achieve high levels of activation for being engaged properly in emotional activities. They may even feel tense (or negative) activation (Watson, Wiese, Vaidya, & Tellegen, 1999) that drains further energetic resources. On the contrary, emotion regulation can be positively influenced by the previous emotional processes if such processes lead to increased

energetic activation. On the other hand, emotion regulation may act as a mechanism by which individuals manage and conserve their remaining resources or replenish their depleted ones for subsequent exertions. The extent to which they modify their negative feelings or generate positive feelings during their working time helps them to maintain or replenish such resources and perform their work-related tasks successfully.

Two different types of work-related perseverative thinking and emotion regulation capability

According to Cropley and Zijlstra (2011), employees may experience work-related perseverative thinking in two different ways: affective rumination and problem-solving pondering. They proposed that these two types of perseverative thinking may have different effects on the recovery process and well-being because of their differential straining effects on the organism. Although affective rumination causes sustained psycho-physiological activation causing insufficient recovery, problem-solving pondering may facilitate the recovery process by providing positive affect even it leads to a short-term psycho-physiological activation.

Empirical research has shown that affective rumination is detrimental to individuals' recovery and well-being, whereas problem-solving pondering has been found beneficial (Firoozabadi et al., 2018a; Kinnunen et al., 2017; Bennett, Gabriel, Calderwood, Dahling, & Trougakos, 2016; Syrek et al., 2016) or at least neutral (Firoozabadi et al., 2018b; Hamesch et al., 2014; Querstret & Cropley, 2012). Using a within-person design of study, Firoozabadi et al. (2018a) investigated how these two experiences of perseverative thinking influence the recovery process during the evening. They found that although the experience of affective rumination inhibited the recovery process, the experience of problem-solving pondering had facilitating effects on the recovery process for employees high on self-regulation. Another within-person study by Syrek et al. (2017) showed a positive relationship between affective rumination and sleep impairment and a negative relationship between problem-solving pondering and sleep impairment during the weekend. Regarding the between-person research, a longitudinal study (Firoozabadi et al., 2018b) showed that employees who experienced higher levels of affective rumination during evenings of working days reported higher increases in exhaustion across a period of 12 months. However, the extent to which employees experienced problem-solving pondering did not predict changes in exhaustion over time.

Although the previous studies have shown that the two experiences of being mentally engaged with work-related issues lead to different consequences, the dynamic mechanism by which these two experiences may operate differently on the organism has not been studied. During affective rumination, individuals' attention is directed to dysfunctional feelings associated with work-related problems (Cropley & Zijlstra, 2011). Affective rumination can be then conceptualized as a prolonged struggling process with intrusive thoughts that is likely to cause tense activation that in turn drains emotion regulatory resources (i.e. energetic activation). Because these resources are limited and crucial for individuals' optimal functioning, the more resources are expended, the less effectively the organism functions in regulating dysfunctional emotions. In contrast, problem-solving pondering is less likely to draw on such resources and it may even cause positive affect (Firoozabadi et al., 2018a) by producing new insights and solutions to work-related problems or providing a promising outlook to improve job performance. Higher levels of positive affect then act as emotion regulatory resources that counteract the depleting effect of individuals' functions and increase their capability to regulate the subsequent dysfunctional emotions (Ren, Hu, Zhang, & Huang, 2010; Miley & Spinella, 2006). In the current study, we investigate how experiencing affective rumination and problem-solving pondering during weekends are related to (a) the weekly within-person fluctuations of emotion regulation capability (within-person level) and (b) the individual differences in emotion regulation capability (between-person level) during working weeks. We hypothesize that:

Hypothesis 1: Affective rumination during the weekend is negatively related to emotion regulation capability during the subsequent working week at the within-person level (a) and the between-person level (b).

Hypothesis 2: Problem-solving pondering during the weekend is positively related to emotion regulation capability during the subsequent working week at the within-person level (a) and the between-person level (b).

Emotion regulation capability as a mediator of the link of affective rumination and problem-solving pondering with job performance-related outcomes

Job performance as a dynamic multidimensional construct is defined as work-related behaviors that directly and indirectly support the achievement of organizational goals (Motowidlo, Borman, & Schmit, 1997). In the current study,

we focus on two job performance outcomes, namely, effort expenditure and task performance. Effort expenditure is conceptualized as the amount of effort that an individual needs to spend in order to accomplish the work-related tasks (Hockey, 1993). Task performance refers to activities that contribute to organizational performance by fulfilling the prescribed job requirements (Williams & Anderson, 1991; Campbell, 1990).

Employees' performance during an episode of work is influenced by the degree to which they can mobilize and invest their energetic resources to meet situational demands of work and successfully accomplish work-related tasks (Beal, Weiss, Barros, & MacDermid, 2005; Wickens & Hollands, 2000). From a dynamic view of resource allocation (Hockey, 1997; Hockey, Wastell, & Sauer, 1998; Kahneman, 1973), the amount of individuals' available energetic resources determines their effort expenditure required for maintaining an optimal level of performance. The availability of sufficient energetic resources enhances job performance at two ways. First, it facilitates the resource allocation mechanism to work-related tasks (Beal et al., 2005; Wickens & Hollands, 2000) and thereby leads to an easier and better task accomplishment. Second, it helps individuals to withstand stressful situations and facilitates their goal attainment in the face of job stressors. Moreover, individuals do not need to spend compensatory effort to accomplish their work-related tasks because they perceive the sufficient energetic resources to meet work-related requirements. On the contrary, lack of such energetic resources may cause a compensatory control mechanism (Kahneman, 1973; Hockey, 1997) through which individuals perceive exerting additional effort to carry out required tasks. As such, although individuals may even maintain their performance at a desired level, they perceive their task accomplishment as more effortful accompanied by increased level of tense activation (Watson et al., 1999) and straining effects (Hockey, 1997; van Hooff, Geurts, Kompier, & Taris, 2007). Alternatively, employees may overcome the lack of resources by performing their work-related tasks at lower levels than required standards or skipping some of them, without exertion of compensatory effort. As such, although individuals do not perceive exerting additional effort to accomplish required tasks, their level of task performance declines.

Empirical studies at both the within- and between-person levels showed that emotion-regulation is positively related to performance (e.g. Yeo & Frederiks, 2011; Goldberg & Grandey, 2007; Beal, Trougakos, Weiss, & Green, 2006; Keith & Frese, 2005). With higher levels of emotion regulation capability, employees are more likely to conserve or replenish their diminished resources which in turn

results in higher job performance. More specifically, a successful process of emotion-regulation during working time results in reducing dysfunctional negative emotions and thereby prevents the prolonged expenditure of resources (i.e. tense activation) and further depletion of resources (Beal et al. 2006). Empirical studies showed that the experience of negative emotions impairs job performance (e.g. Rispens & Demerouti; 2016; Beal et al., 2006). Moreover, the higher capacity of emotion regulation may produce positive emotions which have energizing effects (Thayer, 1989) and hence help individuals to replenish their depleted resources. Experimental studies also showed that inducing positive emotions facilitates the replenishment of resources depleted by a prior activity and counteracts the effect of resource depletion (Ren et al., 2010).

As argued earlier, the process of emotion regulation requires resources that might have been drained due to prior exertions of (failed) self-regulatory activities or, conversely, may have been generated due to prior self-regulatory successes. Taking a dynamic approach, we examine whether the two types of work-related perseverative thinking during the weekend are related differentially to job performance-related outcomes during the subsequent working week due to their diverging effects on emotion regulation capability at the within-person level. We also examine whether the person-level experiences of affective rumination and problem-solving pondering are related to individual differences in job performance-related outcomes through their level of emotion regulation capability at the between-person level. We hypothesize that:

Hypothesis 3: Affective rumination during the weekend is indirectly related to higher effort expenditure during the subsequent working week through its negative relationship with weekly emotion regulation capability at work at the within-person level (a) and the between-person level (b).

Hypothesis 4: Affective rumination during the weekend is indirectly related to lower task performance during the subsequent working week through its negative relationship with weekly emotion regulation capability at work at the within-person level (a) and the between-person level (b).

Hypothesis 5: Problem-solving pondering during the weekend is indirectly related to lower effort expenditure during the subsequent working week through its positive relationship with weekly emotion regulation capability at work in the within-person level (a) and the between-person level (b).

Hypothesis 6: Problem-solving pondering during the weekend is indirectly related to higher task performance during the subsequent working week through its positive relationship with weekly emotion regulation capability at work in the within-person level (a) and the between-person level (b).

Figure 4.1 shows our conceptual model.

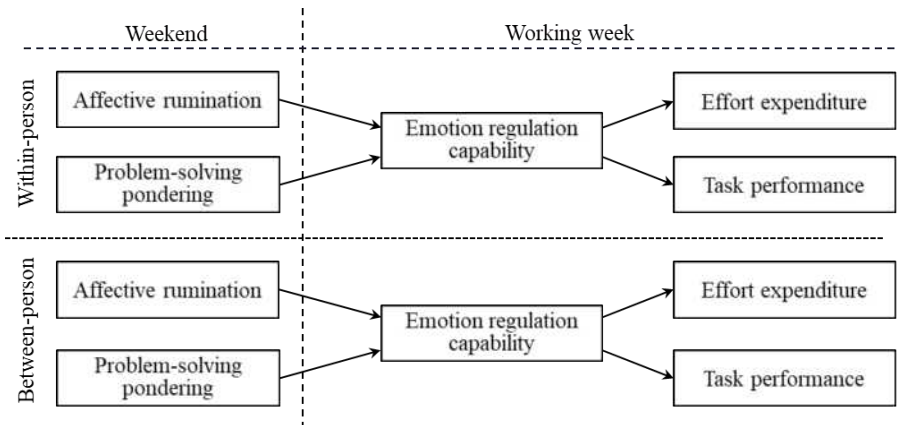


Figure 4.1. The hypothesized model

Method

Sample and procedure

A convenience sample was recruited in Germany using a variety of strategies such as the snowballing technique, the direct invitation of employees at their workplaces, and personal contacts. To qualify for the study, we only recruited employees who worked in a primarily mentally demanding job with a regular and non-shift work schedule, and who were able to complete the weekly Internet-based surveys. A total of 179 employees, who expressed their interest to participate in the study, received an e-mail providing a description of the goal of the project as research on “weekend recovery from work and job performance” and emphasizing the confidentiality of responses and analysis processes. Moreover, they were informed about the weekly procedure of the Internet-based data collection and offered to receive feedback about the related results after completion of the data collection as an incentive for their participation.

Participants were asked to complete a short online questionnaire containing demographic questions one week before starting the weekly diary surveys. Participants then responded to six weekly surveys at the beginning of the working week usually on Monday morning and six weekly surveys at the end of working week usually on Friday afternoon during six consecutive working weeks. They received an e-mail providing a link to fill in online surveys at each weekly measurement occasion. In cases where participants finished the working week on Thursday, they received the link on Thursday afternoon. All Internet-based surveys were designed in user-friendly formats in which participants could select the appropriate format with their available devices (smartphone or tablet and computer) in each measurement occasion. The survey at the beginning of the working week could be responded for a period of time between 6:00 a.m. until 10:30 a.m. In addition, responding to the survey at the end of the working week was allowed only for the period of time between 1:30 p.m. until 09:30 p.m.

Of the 147 volunteers, a total of 131 persons completed the general survey and then 115 of them filled in the weekly surveys. Because of missing data and technical problems with the online data collection, the data of 8 participants were excluded from analyses. Therefore, the final sample consisted of 107 participants (response rate: 73%) with weekly survey data from 490 weeks. Totally, participants responded to the weekly surveys on average on 4.6 weeks (range: 3-6 weeks). Out of the final sample of 107 employees, 51% were female and 49% were male. On average, participants were 38.61 years old ($SD = 12.79$, ranging from 20 to 66 years), and had 14.72 years of job tenure ($SD = 13.32$, ranging from 1 to 48 years). About 37.4% of participants were married, 34.6% had children, and 72% lived with someone else such as a spouse or partner, children, and parents. Participants came from a broad range of jobs, including administrative staff (21.8%), commercial clerks (18%), consultants (15.8%), managers (15.7%), health care professionals (11.3%), engineers (5.3%), teachers (5.3%), journalists (3%), researchers (2.3%), and technicians (1.5%). A majority of participants worked full-time with an average working time of 41.89 h per week ($SD = 8.16$).

Measures

Data were collected through a general survey assessing demographic variables, six weekly surveys at the beginning of the working week, and six weekly surveys at the end of the working week. In the survey at the beginning of the working week, we assessed work-related perseverative thinking, the amount of

hassles and the quality of sleep that they experienced during the past weekend. In the survey at the end of the working week, we measured weekly emotion regulation capability, effort expenditure, task performance, work pressure, and work control. All items were administered in German. Items developed in English were translated into German by using the translation/back-translation method. To do so, the measures were translated into German by three native German interpreters and were then translated back into English by three other interpreters.

Work-related perseverative thinking. Work-related affective rumination and problem-solving pondering during the weekend were measured retrospectively, each with five items from The Work-Related Rumination Questionnaire (WRRQ; Cropley, Michalianou, Pravettoni, & Millward, 2012). Items were adapted to assess affective rumination and problem-solving pondering experienced during the previous weekend. Sample items for affective rumination and problem-solving pondering were “During the weekend, I was irritated by thinking about work-related issues” and “During the weekend, I thought about how I can improve my work-related performance”, respectively. Items were responded by using a five-point Likert scale ranging from 1 (very seldom/never) to 5 (very often/always). Cronbach’s alphas ranged from .90 to .93 for affective rumination and from .81 to .86 for problem-solving pondering over six weekly measurements.

Given the hierarchical structure associated with the analysis of multilevel data, we conducted multilevel confirmatory factor analyses (MCFAs) suggested by Muthén (1994) to investigate whether the measure represents the two distinct constructs. The results showed that compared to the one-factor model ($\chi^2(70) = 356.208, p < 0.001$; CFI = .85; TLI = .80; RMSEA = .08; SRMR-*within* = .07, SRMR-*between* = .15), the two-factor model ($\chi^2(68) = 170.734, p < 0.001$; CFI = .94; TLI = .93; RMSEA = .05; SRMR-*within* = .04, SRMR-*between* = .07) fits the data significantly better (Satorra-Bentler $\Delta\chi^2(2) = 357.873, p < .001$).

Work-related emotion regulation capability. We measured work-related emotion regulation capability with four adapted items of the emotional repair scale which is a subscale of the Trait Meta-Mood Scale (TMMS; Salovey, Mayer, Goldman, Turvey, & Palfai, 1995). The scale measures the individuals’ capability to regulate their emotional states. Items were adapted to measure emotion regulation capability that employees experienced during the previous working week. The four items were as follows: “During this working week, when I was not feeling optimally, I mostly had an optimistic outlook,” “During this working week,

no matter how badly I was feeling, I tried to think about pleasant things,” “During this working week, when I was in a bad mood, I tried to calm myself down,” “During this working week, when I was not feeling optimally, I usually let myself feel that way” (reverse coded). Participants rated the extent to which they agree on a seven-point Likert scale ranging from 1 means “strongly disagree” to 7 means “strongly agree”. Scores were coded such that higher scores indicate more ability to regulate unpleasant emotions. Cronbach’s alphas ranged from .60 to .76 over the six measurements.

Perceived effort expenditure. Effort expenditure during the working week was measured with three items from the scale developed by Binnewies et al. (2009a). On a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree), the scale measures the degree to which an individual expends effort to accomplish work-related tasks. We adapted the scale to refer to the past working week (e.g., “During this working week, I had to expend a lot of effort in order to accomplish my tasks”). For effort expenditure, Cronbach’s alphas ranged from .77 to .87 over the six weekly measurements.

Perceived task performance. We measured the weekly level of task performance with seven adapted items of in-role behavior subscale from the performance scale developed by Williams & Anderson (1991). Participants were asked to rate the extent to which they agree on a seven-point Likert scale ranging from 1 means “strongly disagree” to 7 means “strongly agree”. A sample item was “During this working week, I adequately completed my assigned duties”. For this measure, Cronbach’s alphas ranged from .80 to .86 over the six weekly measurements.

We conducted MCFAs to confirm that study outcome measures (i.e. work-related emotion regulation capability, effort expenditure, and task performance) represented the three distinct constructs. The results showed that compared to the one-factor model ($\chi^2(154) = 1124.161, p < 0.001$; CFI = .45; TLI = .35; RMSEA = .11; SRMR-*within* = .11, SRMR-*between* = .16), the three-factor model ($\chi^2(148) = 276.881, p < 0.001$; CFI = .93; TLI = .91; RMSEA = .04; SRMR-*within* = .06, SRMR-*between* = .13) resulted in a significantly better fit (Satorra-Bentler $\Delta\chi^2(6) = 536.257, p < .001$). Moreover, the three-factor model showed a better model fit than the best fitting two-factor model (Satorra-Bentler $\Delta\chi^2(4) = 51.242, p < .001$).

Control variables. Control variables included sleep quality and non-work hassles that individuals experienced during the weekend, and work pressure and work control that they experienced during the working week.

Sleep quality. We assessed sleep quality during the weekend with a single item from the Pittsburgh Sleep Quality Index (PSQI; (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). The item was “how would you rate your sleep quality during the (Friday, Saturday, or Sunday) night?” Participants were asked to rate separately the sleep quality for each of the three nights of the weekend on a seven-point Likert scale from 1 (very bad) to 7 (very good). Finally, we averaged these three measures of sleep quality to achieve the sleep quality experienced during the whole weekend.

Non-work hassles. We asked participants to score non-work hassles experienced during the weekend by a single question that provides examples of some common hassles. The question was “During the last weekend, to what extent did you experience hassles? (e.g., domestic issues, argument with family or others, car trouble, etc.). The item was responded by using an eleven-point Likert scale ranging from 0 (not at all) to 10 (very much).

Work pressure. Work pressure was assessed with four adapted items of Tilburg Work Pressure Questionnaire (T-WPQ; Roe & Zijlstra, 2000). Participants were asked to indicate the extent to which they agreed with each item (e.g., “During this working week, my work was too demanding”) on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Work control. We measured work control by four adapted items of the Job Control Questionnaire developed by Greenberger, Strasser, Cummings, and Dunham (1989). The items (e.g., “During this working week, how much influence did you have over the variety of tasks you performed?”) were responded on a 5-point Likert scale ranging from 1 (very little) to 5 (very much).

Data analysis

Considering the hierarchical data structure in which week-level data (Level 1) were nested within person-level data (Level 2), we analyzed data with multilevel structural equation modeling (MSEM) approach (Preacher, Zhang & Zyphur, 2011; Preacher, Zyphur, & Zhang, 2010) using Mplus statistical software version 7 (Muthén & Muthén, 2012). According to Tofighi and Thoemmes

(2014), MSEM approach provides the possibility to conduct multilevel analysis by which structural relationships between variables are examined at both levels of analysis including within-person and between-person. To do so, MSEM decomposes predictor, mediator, and outcome variables measured on the week-level into two uncorrelated latent variable parts (within-person and between-person) instead of being treated as observed variables used in conventional multilevel regression modeling (Muthén & Muthén, 2012). In within-person part, variables are centered at the respective person mean by which between-person variation is removed and thereby coefficients indicate pure within-person relationships between variables at Level 1. In contrast, the between-person part of analysis provides coefficients indicating pure between-person relationships between variables at Level 2. Therefore, Using MSEM, we estimate all hypotheses-related paths at both levels of analysis: within-person and between-person. To examine the mediation hypotheses, 95% confidence intervals are calculated based on the Monte Carlo method (Preacher & Selig, 2012). Additionally, we examine whether a contextual effect exists (Lüdtke et al., 2008; Enders & Tofighi, 2007) indicating that independent effects (i.e., coefficients) at the two levels of analysis are statistically different from one another. For instance, it may show if the association between affective rumination and emotion self-regulation capability is stronger at the within-person than at the between-person level of analysis or vice versa.

Results

Table 4.1 displays means, standard deviation, and both week-level and person-level correlations. Before testing our hypotheses, we conducted a preliminary analysis of intraclass correlations (ICC1) based on an unconditional random coefficient model to examine the variability of outcome variables (Hoffman, 2007; Hox, 2002). The results indicated that for work-related emotion regulation capability, perceived effort expenditure, and perceived task performance, 53%, 65%, and 48% of variances were within-person variation, while 47%, 35%, and 52% of variances were between persons, respectively. These results suggest that multilevel modeling framework can be used to explain both state and trait variations in these three outcome variables.

Table 4.1

Mean, standard deviation, and correlation between study variables

Variable	M	SD	1	2	3	4	5	6	7	8	9
Weekend											
1 Affective rumination	1.85	.88	-	.57	.15	-.14	.11	-.07	-.18	.08	.01
2 Problem-solving pondering	1.92	.77	.75	-	.05	-.09	.17	-.10	-.13	.15	.01
3 Hassles	2.18	2.38	.43	.29	-	-.19	-.08	.05	.07	-.05	.05
4 Sleep quality	4.87	1.05	-.21	-.07	-.30	-	-.03	.04	-.04	-.07	.02
Working week											
5 Work pressure	2.70	.89	.53	.53	.27	-.17	-	-.38	-.20	.53	-.01
6 Work control	3.58	.79	-.29	-.17	-.23	.15	-.37	-	.17	-.21	.07
7 Emotion regulation capability	4.74	.88	-.12	.15	-.29	.41	-.12	.25	-	-.25	.23
8 Effort expenditure	2.78	.87	.48	.35	.29	-.21	.74	-.45	-.30	-	-.17
9 Task performance	5.67	.78	-.40	-.16	-.33	.30	-.36	.26	.52	-.50	-

*Note: for week-level variables, Cronbach's alphas are mean reliabilities averaged over all measurement days. Correlations below the diagonal are person-level correlations ($N = 107$) with correlations $r \geq .23$ being significant at $p < .05$, $r \geq .30$ being significant at $p < .01$, and $r \geq .40$ being significant at $p < .001$. Correlation above the diagonal are week-level correlations ($N = 490-568$) with correlations $r \geq .09$ being significant at $p < .05$, $r \geq .13$ being significant at $p < .01$, and $r \geq .17$ being significant at $p < .001$.

All hypotheses were simultaneously tested in one model using a multilevel structural equation modeling analysis. The results were displayed in Table 4.2. Regarding emotion regulation capability as the outcome variable, the model investigated whether the extent to which employees experience affective rumination and problem-solving pondering during the weekend are related to emotion regulation that they experience during the subsequent working week. These relationships were examined at the two levels of within-person and between-person after controlling for hassles and sleep quality experienced during the weekend, and work pressure and work control reported at the end of the working week.

Table 4.2

Multilevel mediation model predicting performance-related outcomes from affective rumination, problem-solving pondering and emotional regulation capability

Variable	ERC			Effort expenditure			Task performance		
	Estimate	SE	<i>t</i>	Estimate	SE	<i>t</i>	Estimate	SE	<i>t</i>
Level 1: Within-person									
Has	.022	.013	1.708	-.004	.014	-.292	.009	.014	.697
SQ	-.046	.045	-1.028	-.056	.037	-1.488	.033	.040	.829
WP	-.136	.064	-2.138*	.558	.066	8.490***	.049	.057	.855
WC	.118	.068	1.734	.011	.073	.149	.055	.066	.835
AR	-.201	.062	-3.216**	-.053	.066	-.807	.039	.059	.660
PS	-.003	.073	-.039	.095	.077	1.234	.015	.064	.230
ERC				-.173	.049	-3.542***	.214	.069	3.121**
IND1 _w : AR → ERC → JPO				.035	.015	2.363*	-.043	.020	-2.102*
IND2 _w : PS → ERC → JPO				.000	.013	.039	-.001	.016	-.039
Residual	.357	.044	8.098***	.349	.028	12.434***	.276	.032	8.623***
Level 2: Between-person									
Intercept	2.797	.835	3.351**	2.401	.683	3.517***	4.445	.778	5.709***
Has	-.075	.056	-1.327	.001	.051	.028	-.023	.057	-.409
SQ	.251	.097	2.591*	.012	.079	.156	.024	.086	.282
WP	-.088	.166	-.530	.528	.103	5.35***	-.177	.130	-1.359
WC	.140	.135	1.038	-.136	.085	-1.597	-.005	.110	-.045
AR	-.215	.150	-1.433	.127	.099	1.283	-.273	.144	-1.891
PS	.531	.192	2.771**	-.122	.149	-.819	.161	.172	.932
ERC				-.133	.116	-1.147	.389	.121	3.221**
IND1 _b : AR → ERC → JPO				.029	.031	.920	-.084	.067	-1.253
IND2 _b : PS → ERC → JPO				-.070	.063	-1.110	.207	.099	2.095*
Residual	.235	.050	4.673***	.099	.029	3.403**	.188	.043	4.406***
Contextual effect: Level 1 vs. Level 2									
AR	-.015	.181	-.081	.180	.133	1.360	-.312	.177	-1.756
PS	.534	.229	2.336*	-.216	.186	-1.163	.146	.200	.730
ERC → JPO				.040	.135	.300	.175	.146	1.202
IND1 _w vs. IND1 _b				-.006	.038	-.163	-.041	.074	-.553
IND2 _w vs. IND2 _b				-.071	.067	-1.063	.207	.104	1.993*

*Note: All paths were simultaneously examined in one model. Has = weekend hassles, SQ = weekend sleep quality, WP = work pressure, WC = work control, AR = affective rumination, PS = problem-solving pondering, ERC = emotion regulation capability, JPO = job performance outcome (effort expenditure or task performance), IND = indirect effect. * $p < .05$ (two-tailed). ** $p < .01$ (two-tailed). *** $p < .001$ (two-tailed).

The results show that the experience of hassles during the weekend is not a significant predictor of emotion regulation capability during the working week at either the within-person or between-person level of analysis. Sleep quality during the weekend is significantly related to emotion regulation capability during the subsequent working week only at the between-person level, indicating that employees who experience better sleep quality during the weekend are more likely to experience higher levels of emotion regulation capability during the subsequent working week. The negative relationship between work pressure and emotion regulation capability is found significant only at the within-person level. This result indicates that the weekly fluctuations in work pressure are negatively associated with the level of emotion regulation capability at the respective working week. The results related to the positive link between work control and emotion regulation capability are not significant at both levels of analysis.

The negative relationship between work-related affective rumination and emotion regulation capability is significant only at the within-person level. This finding indicates that if an employee experiences a higher level of affective rumination during the weekend, he or she will experience a lower level of emotional regulation capability during the subsequent working week. Therefore, the data provides support only for Hypothesis 1a, while Hypothesis 1b is rejected. The relationship between work-related problem-solving pondering and emotion regulation capability is significant only at the between-person level. This finding suggests that employees who experience higher levels of problem-solving during the weekend are more likely to experience higher levels of emotion regulation capability during the subsequent working week. Hypothesis 2b is thus supported, whereas Hypothesis 2a is rejected. In addition, the results of the contextual effects analysis reveal that the relationship between affective rumination and emotion regulation capability is not significantly different between the within- and between-person levels of analysis. However, the relationship between problem-solving pondering and emotion regulation capability is significantly stronger at the between-person level compared with the relationship at the within-person level.

The results related to the two job performance-related outcomes show that neither hassles nor sleep quality reported during the weekends is significantly related to effort expenditure and task performance experienced during the subsequent working week at both levels of analysis. There is a significant relation between work pressure and effort expenditure at both levels of analysis. These results indicate that the more work pressure an employee experiences during a working week the more effort he or she should invest to accomplish the weekly

work tasks. Moreover, people who experience higher levels of work pressure perceive their work more effortful. The link between work pressure and task performance and also the links between work control and both performance-related outcomes are not found significant at both levels of analysis. The results show that emotion regulation capability has a significant relationship with effort expenditure only at the within-person level suggesting that an individual's fluctuations in emotion regulation capability are positively associated with his or her levels of effort expenditure during the respective working week. Moreover, emotion regulation capability is positively related to task performance at the within- and between person levels. The findings indicate that the degree to which an employee experiences emotion regulation capability during a working week is positively related to the level of task performance that he or she perceives at the end of the respective working week. Moreover, employees with higher levels of emotion regulation capability experience higher levels of task performance.

Although the direct relationships between affective rumination and both job performance-related outcomes are not found to be significant at both levels of analysis, the findings for the indirect relationships via emotion regulation capability are significant, but only at the within-person level (Indirect effect = .035, 95% CI = .010 to .068 for effort expenditure; Indirect effect = -.043, 95% CI = -.087 to -.011 for task performance). Therefore, the data provide support for Hypotheses 3a and 4a, whereas Hypotheses 3b and 4b are rejected. The results of a contextual effect analysis do not support that these indirect relationships are stronger at the within-person level compared to the same relationships at the between-person level.

The direct relationships between problem-solving pondering and both job performance-related outcomes are not found to be significant at either level of analysis. Additionally, the results show no significant mediation role of emotion regulation capability on the relationship between problem-solving pondering and effort expenditure at either level of analysis. Hypotheses 5a and 5b are thus not supported. However, emotion regulation capability is found as a significant mediator on the relationship between problem-solving pondering and task performance only at the between-person level (Indirect effect = .207, 95% CI = .042 to .434). Therefore Hypothesis 6b is supported and Hypothesis 6a is rejected. The contextual effect analysis also shows that this indirect relationship is stronger at the between-person level compared to the indirect relationship at the within-person level. The results are summarized and displayed in Figure 4.2.

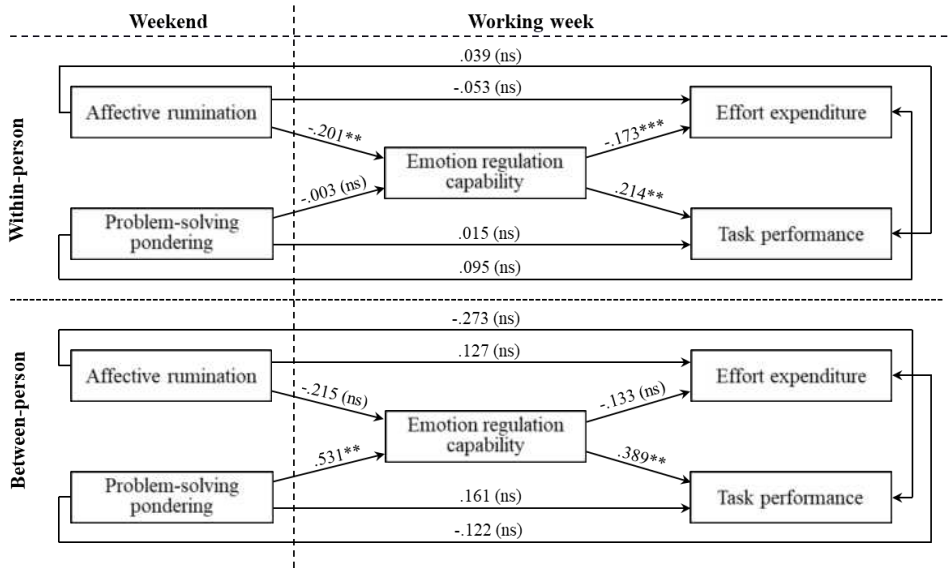


Figure 4.2. The multilevel structural equation model for the relation between two types of work-related perseverative thinking, emotion regulation capability, and performance-related outcomes

Discussion

In a 6-week diary study, we investigated how the experience of affective rumination and problem-solving pondering during the weekend is related to the degree to which employees experience emotion regulation capability during the subsequent working week. We also examined the indirect relationships between these two types of work-related perseverative thinking and two performance-related outcomes namely effort expenditure and task performance through emotion regulation capability. We examined the hypotheses at two levels of analysis: the within-person level and the between-person level.

The results showed that work-related affective rumination during the weekend is negatively related to emotion regulation capability during the subsequent working week only at the within-person level of analysis. The data did not provide support for this negative link at the between-person level. These findings suggest that the extent to which a person experiences affective rumination during the weekend is negatively related to his or her capability of emotion regulation during the

subsequent working week. This finding is consistent with the idea that an individual's momentary capability to involve in proper emotion regulation during working time depends on the extent to which he or she experiences energetic activation for emotional activity. Affective rumination as a process through which the individual's attention is directed to dysfunctional feelings associated with work-related problems is likely to drain such limited and expendable resources and influence negatively the subsequent emotion-regulation capability. In a within-person study, Firoozabadi et al. (2018a) found that the experience of affective rumination during the evening is related to lower positive affect and higher negative affect in the subsequent morning. Therefore, the more an employee engages in affective rumination during the weekend, the fewer resources remain for him or her to engage in emotion regulation (i.e. capability) during the subsequent working week. Although this significant finding at the within-person level is consistent with previous studies that used a within-person design (e.g. Firoozabadi et al., 2018a; Syrek et al., 2017), the non-significant finding at the between-person level is not consistent with studies that used a between-person design (e.g. Firoozabadi et al., 2018b; Kinnunen et al., 2017; Hamesch et al., 2014; Querstret & Cropley, 2012). Nevertheless, an analysis comparing the strength of the within and between relationships between affective rumination and emotion regulation capability revealed no significant difference between the results at the within-person level and the results at the between-person level. This finding indicates that this relationship cannot be significantly attributed only to the within-person level and the non-significant finding ($p = 0.15$) at the between-person level might be attributed to the small sample size ($N = 107$).

The relationship between problem-solving pondering and emotion regulation capability was found to be significantly positive only at the between-person level. These findings indicate that although weekly fluctuations of experiencing problem-solving pondering are not related to the subsequent capability of emotion regulation, employees with higher average levels of problem-solving pondering during weekends experience higher average levels of emotion regulation capability during working weeks. To explain the non-significant finding at the within-person level, a possible explanation is that problem-solving pondering draws on resources that are less likely to be crucial for the subsequent optimal function of emotion regulation. Problem-solving pondering can be then considered as a process that requires cognitive activation which does not considerably affect the energetic activation required for subsequent emotion regulation. This finding is consistent with the idea that conceptualizes resources as energetic activation that people experience for different types of activities such as

cognitive or emotional activities. Energetic activation is the degree to which an individual feels energized and perceives willingness to perform either cognitive or emotional activity. Another possibility is that the dynamic pattern of relationship between problem-solving pondering and emotion regulation capability might be masked by person-level variables. In a study by Firoozabadi et al. (2018a), it was found that person-level self-regulation moderates the day-level relationship between problem-solving pondering during the evening and the state of being recovered at bedtime. For employees high in trait self-regulation, problem-solving pondering was positively related to the state of being recovered, and consequently, to higher positive affect and lower negative affect in the subsequent morning. In contrast, for employees low in trait self-regulation, it was negatively related to the state of being recovered, and consequently, to lower positive affect and higher negative affect in the subsequent morning. Another possible explanation is that the weekly level design of data collection (compared to a daily level) might not be sufficiently time lag limited to capture the dynamics of the relationship between fluctuations in problem-solving pondering and emotion-regulation capability. This means that the effects of problem-solving in the weekend might fade out within the first few days of the next working week.

The finding of a significant relationship between problem-solving pondering and emotion regulation capability at the between-person level contrasts findings of previous longitudinal studies (Firoozabadi et al., 2018b; Hamesch et al., 2014) that did not find a significant relationship between problem-solving pondering and well-being indicators. Given the short cross-lagged relationship at the between-person level, this positive association might attribute to the relationships of these two variables with a third condition such as occupational health. In a cross-sectional study, Querstret and Copley (2012) found a negative relationship between problem-solving pondering and acute and chronic fatigue. Moreover, research showed that lower levels of exhaustion are associated with higher levels of energetic activation (e.g. Demerouti, Mostert, & Bakker, 2010). Therefore, there could potentially be a reversed causal effect: exhausted employees are less likely to engage in effortful activities such as problem-solving pondering and emotion regulation, compared to employees with lower levels of exhaustion.

These findings provide empirical evidence to support the core assumption proposed by Copley and Zijlstra (2011) indicating that compared to problem-solving pondering, affective rumination is more likely to involve emotional processes focused on dysfunctional emotions evoked by work-related problems. Therefore, affective rumination is more likely to have straining effects on the

organism by drawing on emotion-related resources. Moreover, the findings shed lights on the studies that have shown that work-related affective rumination is more detrimental to inhibit the recovery process (Firoozabadi et al., 2018a; Syrek et al., 2016) and to cause impaired well-being (Firoozabadi et al., 2018b; Hamesch et al., 2014; Querstret & Cropley 2012) than work-related problem-solving pondering.

The mediation analyses showed that emotion regulation capability mediates the relationship between affective rumination and the two performance-related outcomes only at the within-person level. Building on CoR theory (Hobfoll, 1989), emotion regulation capability is negatively influenced by the extent to which a person extended his or her resources (i.e. energetic activation) due to the tense activation triggered by prior affective rumination. Moreover, emotion regulation may act as a mechanism by which individuals may manage and conserve their remaining resources or replenish their depleted ones. Therefore, individual's failure of emotion regulation (i.e. less emotion regulation capability) during working time prolongs the experience of dysfunctional emotions and thereby causes prolonged expenditure of energetic resources and further depletion. Given the dynamic approach of performance (Hockey, 1997; Beal et al., 2005), depletion of such resources necessitates higher levels of effort expenditure in order to maintain the optimal level of performance. The employee then perceives his or her task accomplishment more effortful than the ordinary level. Moreover, engaging in dysfunctional emotion regulation may cause further depletion of resources that could otherwise be devoted to work-related tasks. The person does not then adequately perform his or her work-related tasks and shows a lower level of task performance. These findings are consistent with the idea that individuals' performance within each episode is influenced by their amount of available resources, allocation of resources, and negative emotions (Beal et al. 2006; Beal et al. 2005). An empirical study using a within-person design by Beal et al. (2006) showed that the experience of negative emotions impairs emotion regulation and consequently decrease job performance. The findings also extend the recovery literature by shedding lights on previous within-person research that found that insufficient recovery during non-work time is related to higher levels of compensatory effort and lower levels of task performance during the subsequent working time (Binnewies et al., 2010; Binnewies et al., 2009a). Our study showed that emotion regulation acts as a mechanism by which the experience of affective rumination influences the subsequent performance at work.

In addition, we found that emotion regulation capability mediates the relationship between problem-solving pondering and task performance only at the between-person level. This finding indicates that employees who engage more in problem-solving pondering experience higher levels of task performance due to their better capability of emotion regulation. This finding is in line with the finding of a study by Firoozabadi et al. (2018a) showing that the problem-solving pondering is associated with a better recovery after work only for employees with higher levels of trait self-regulation. Given this mediation finding, it seems that the trait level of emotion regulation is a determining factor by which problem-solving pondering is indirectly linked to a higher individual level of task performance. Studies using a between-person design (e.g. Klumper, DeGroot, & Choi, 2011; Mulki, Jaramillo, Goad, & Pesquera, 2015) also showed that emotion regulation is positively associated with task performance. Regarding the significant finding at the between-person level (versus the non-significant finding at the within-person level), one possible explanation is that problem-solving pondering is likely to be associated with higher levels of emotion-regulation capability by increasing the individual level of energetic resources at a long run only for employees who experience an effective problem-solving pondering.

Strengths, limitations, and directions for future research

Our study has two main strengths. First, using a multilevel approach, we examine all hypotheses at two levels of analysis namely the within- and between-person levels. This method provided the possibility to disentangle the weekly dynamics from the person-level differences in the relationships between different types of work-related perseverative thinking, emotion regulation capability, and job performance-related outcomes. Our study shows different results for the two levels of analysis, indicating that the patterns of relationships between variables may be different at different levels of analysis. Therefore, the results of this study were interpreted and compared with findings of previous research depending on the level of analysis. Second, we collected data by conducting Internet-based surveys that have specific advantages over paper-and-pencil surveys (Ohly, Sonnetag, Niessen, & Zapf, 2010). For instance, Internet-based surveys provide an objective indication of the time when participants fill in diaries. Moreover, in order to increase the employees' possibility to complete the surveys, we provided appropriate formats of surveys on all available devices such as smartphone, tablet, and computer. Third, we had a conservative approach to investigate the extent to which different experiences of work-related thinking during the weekend

influence the outcome variables by taking the possible influence of weekly non-work hassles, sleep quality, work pressure, and work control into account.

This study also has several limitations. First, the significant relationships between study variables should not be interpreted in a causal way. Future research with experimental designs can investigate causality. Second, using a sample of individuals who work in a variety of jobs with potentially mentally demanding nature restricts the generalizability of the findings to industrial workers who experience a different quality of work-related perseverative thinking (Pravettoni, Cropley, Leotta, & Bagnara, 2007). Third, in order to assess emotion regulation capability we used only four adapted items of the emotional repair subscale of TMMS. We used the subscale of emotional repair because we needed a short weekly survey to measure directly individuals' capability to regulate their negative emotions. However, this scale measures two more subscales including attention to feelings and clarity of feelings that were not involved in the present study. Fourth, using the self-report measures increase concerns about common method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). However, the within-person longitudinal design to assess predictors and dependent variables at different weekly time points reduced the effects of common method bias (Podsakoff et al., 2003). Nevertheless, because we assessed emotion regulation capability and the performance-related outcomes variables both at the end of working week, the relationships between these variables might be influenced by measurement bias. Fifth, because we use a self-report measure of task performance, the related findings should cautiously be interpreted.

We recommend future research to investigate underlying psychophysiological mechanisms contributing to the two types of work-related perseverative thinking by conducting experimental designs and using psychophysiological measures. Moreover, the future research is called to investigate within and between-person characteristics that determine the strength and also the nature of the relationship between problem-solving pondering and emotion regulation capability. More specifically, a research is needed to investigate the long-term effect of problem-solving pondering on individuals' well-being by taking the individuals' differences into account.

Conclusion

This study advances our knowledge on the job performance consequences of affective rumination and problem-solving pondering that employees experience during the weekend respite. The findings at the within-person level provided empirical evidence to support the core assumption indicating that affective rumination is more likely to drain emotion regulatory resources and thus to have straining effects on the organism compared to problem-solving pondering. Therefore, experiencing affective rumination during the weekend leads to higher levels of effort expenditure and lower levels of task performance, during the next working week. The findings at the between-person level showed that employees who engage more in problem-solving pondering in general, experience overall higher levels of task performance due to their better capability of emotion regulation.

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CHAPTER 5

General discussion

Introduction

Employees' capability to recover from work during non-work time has been considered crucial for their well-being and job-related performance (Sonnentag & Zijlstra, 2006). Due to advances in communication technologies and the mentally demanding nature of many contemporary jobs and, the boundary between work and non-work time has become blurred. Therefore, people are more likely to be constantly exposed to work-related issues during non-work time. This lack of detachment may inhibit the recovery process and thereby cause impaired well-being and job performance (Meijman & Mulder, 1998).

People may experience incomplete unwinding from their work-related issues when they engage in perseverative thinking. Perseverative thinking is described as repeated, pervasive, and prolonged activation of being mentally occupied with their work-related issues (Brosschot, Gerin, & Thayer, 2006; Brosschot, Pieper & Thayer, 2005). Perseverative thinking has been conceptualized as a mechanism that inhibits the recovery process and causes impaired well-being. However, Cropley and Zijlstra (2011) argued that whether or not work-related perseverative thinking during non-work time causes impaired well-being depends on the type of perseverative thinking. They conceptualized two fundamentally different types of work-related perseverative thinking, which they labeled affective rumination and problem-solving pondering.

This dissertation aimed to investigate the consequences of the two types of work-related perseverative thinking on well-being and job performance. It contributed to this topic by answering three research questions: *Research question 1*: What are the consequences of work-related affective rumination and problem-solving pondering on well-being and job-performance? *Research question 2*: Through what underlying dynamic processes do work-related affective rumination and problem-solving pondering have differential consequences on well-being and job-performance? *Research question 3*: How is the consequence of work-related problem-solving pondering on recovery from work influenced by individual differences in trait self-regulation?

In this conclusion chapter, I will first provide an overview of the main findings of the three empirical studies presented in Chapters 2, 3, and 4. I will then illustrate theoretical and practical implications of these results. Finally, I will discuss the strengths and limitations of our empirical studies and provide suggestions for future research.

Main findings

In order to answer the three research questions, I conducted three empirical studies presented in Chapter 2, 3, and 4.

Chapter 2 presented a longitudinal three-wave study that contributed to *Research question 1* by investigating how the experience of affective rumination and problem-solving pondering during evenings predict changes in two long-term well-being outcomes (i.e. exhaustion and general mental health complaints) over one year period. Using latent growth curve modeling (LGM), the study showed that employees who experience high levels of work-related affective rumination during evenings showed higher rates of growth in exhaustion across a period of 12 months. However, the findings showed that affective rumination was not a significant predictor of change in general mental health complaints over time. In addition, our results did not show a significant relationship between problem-solving pondering during evenings and changes in either exhaustion or general mental health complaints across a period of one year.

These findings demonstrate that when looking at the long term effects, not all types of work related perseverative thinking are equally negative for well-being outcomes. Whereas affective rumination particularly leads to increases in exhaustion, problem solving pondering is not related with such negative long-term outcomes. Moreover, this study showed that work-related affective rumination is particularly related to increase in exhaustion as a work-specific outcome of mental health, while it is not related to increase in mental health complaints as a general and context-free outcome of well-being. According to Warr (1987), context-specific mental health refers explicitly to job-related mental health such as exhaustion. In contrast, context-free mental health is a more global construct that is not tied to a specific context and reflects the general status of well-being.

Chapter 3 reports on a diary study over five consecutive working days that investigated *Research question 1, 2, and 3* by examining how daily fluctuations in work-related affective rumination and problem-solving pondering are dynamically related to recovery and well-being. In this study, I tested, using a within-person design, a model in which the state of being recovered at bed time mediates the relationship between the two types of work-related perseverative thinking during the evening and the level of well-being in the subsequent morning, while accounting for the moderating role of trait-self regulation on the pondering-recovery relationship.

The results of a moderated multilevel mediation analysis 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. 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. The findings demonstrated that 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 such a way that problem-solving pondering was positively related to the state of being recovered and consequently to improved well-being for employees high in self-regulation, while it was negatively related to the state of being recovered and consequently to impaired well-being for those low in self-regulation.

Contributing to *Research question 1* and *2*, these findings provide evidence to support the theoretical assumption proposing that the two types of work-related perseverative thinking operate differently on the recovery process and thereby have different effects on employees' well-being. Moreover, contributing to *Research question 3*, problem-solving pondering is beneficial or unfavorable for recovery and well-being, depending on the individuals' capability to regulate their thoughts and emotions. While, problem-solving facilitates the recovery process for employees with high levels of cognitive and emotion regulation, it inhibits the recovery process for employees with low levels of cognitive and emotion regulation.

Chapter 4 investigated *Research question 1* and *2* by examining how the two types of work-related perseverative thinking are related to two performance-related outcomes namely effort expenditure and task performance. Based on a diary study conducted over six consecutive weeks, I examined the role of emotion regulation capability as a mediator of the effect of work-related affective rumination and problem-solving pondering during the weekend on the job performance-related outcomes during the subsequent working week. Using multilevel structural equation modeling, this study found different patterns of relationships between variables at two levels of analysis: the within-person level (i.e. week-level dynamics) and the between-person level (person-level differences).

This study revealed that emotion regulation capability mediates the relationships between affective rumination and the two performance-related

outcomes (i.e. effort expenditure and task performance) only at the within-person level. This finding means that experiencing affective rumination during the weekend leads to higher compensatory effort and lower task performance in the subsequent working week through its negative influence on individuals' capability to regulate their emotions. Moreover, the results showed a significant mediating role of emotion regulation capability on the relationship between problem-solving pondering and perceived task performance only at the between-person level. This means that employees who in general experience high levels of problem-solving pondering during their weekends generally perceive high levels of task performance because they have high levels of emotion regulation capability. The findings shed lights on our findings presented in Chapter 2 and 3 and provide empirical evidence supporting the theoretical assumption indicating that affective rumination and problem-solving pondering have different influences on the organism due to their diverging pattern of drawing on emotion regulatory resources.

Theoretical implications

The findings of the current dissertation provide several theoretical implications for the recovery and occupational health literature.

Previous empirical research has shown that lack of detachment (i.e. switching off mentally) from work-related issues during non-work time impedes the recovery process and causes impaired well-being and unfavorable job performance (see Sonnentag & Fritz, 2015, for a review). However, the findings of my three empirical studies reported on in this dissertation advance the knowledge on recovery by showing that lack of detachment is not necessarily a threatening factor for the recovery process (Chapter 2), well-being (Chapter 2 & 3), and job-performance (Chapter 4) as this depends on the type of work-related perseverative thinking (i.e. affective rumination versus problem-solving pondering) and on trait self-regulation.

Considering the findings presented in Chapter 3, one contribution to the literature lies in identifying recovery from work as a process through which affective rumination and problem-solving pondering have differential influences on well-being. This means that the extent to which the two types of perseverative thinking decrease or enhance psychological well-being depends on their inhibiting or facilitating effects on the recovery process during non-work time. Particularly in the long run, this may explain how engaging in affective rumination causes emotional exhaustion (see Chapter 2) through cumulative effects of insufficient

recovery. By engaging in affective rumination about work, job stressors remain mentally present which causes prolonged activation (Brosschot et al., 2005; Ursin & Eriksen, 2004; Meurs & Perrewe, 2011). As a result, prolonged activation causes impaired well-being as it chronically draws on the individuals' resources over time (Brosschot, van Dijk, & Thayer, 2002; Sluiter, Frings-Dresen, van der Beek, & Meijman, 2001). Therefore, the findings presented in Chapter 2 and 3 provide empirical evidence to support the theoretical assumption of the effort-recovery model (Meijman & Mulder, 1998) proposing the detrimental cumulative effect of insufficient recovery on well-being in the long run. Research (e.g. Fleuren, van Amelsvoort, Zijlstra, de Grip, & Kant, 2018) has documented insufficient recovery as a characteristic that negatively affects individuals' ability to effectively function in current and future work throughout their working life (i.e. sustainable employability).

In addition, it is concluded that the extent to which problem-solving pondering contributes to the recovery process should be taken into account for considering the effect of problem-solving on well-being. Accordingly, the study presented in Chapter 3 extends the knowledge on work-related perseverative thinking by showing that problem-solving pondering might be beneficial or unfavorable for recovery depending on individuals' trait level of self-regulation. This means that problem-solving pondering is not beneficial to everyone, but it is even detrimental for some people. Engaging in problem solving contributes to the recovery process and thereby is considered beneficial only for employees who possess the ability to effectively regulate their thoughts and feelings. In contrast, it causes insufficient recovery and thereby is considered detrimental for employees who possess less capability to regulate their thoughts and feelings. These findings suggest a more fine-grained conceptualization of problem-solving, where not the act of thinking about work by itself determines the effects on well-being, but this effect instead is driven by people's ability to effectively regulate this process and achieve progress in their thinking. In particular the importance of goal-directed progress in thinking has been neglected in research on perseverative cognition. Problem-solving pondering is conceptualized as a goal-directed cognitive process by which individuals aim to reduce a cognitive discrepancy between the current state and the desired state (e.g. caused by dealing with a work-related problem) by discovering and generating solutions. However, in order to have a more comprehensive conceptualization, researchers should take into account the degree to which individuals experience progress in their thinking about work. This is in line with the assumption of Nolen-Hoeksema (1996) that problem-solving and rumination are different from each other in terms of whether progression in the thoughts occurs over a reasonable period of time. Accordingly, progress occurs

through completing three steps of the problem-solving process: assessing the problem, evaluating possible solutions to the problem, and eventually deciding about the most efficient solution.

Given Kanfer and Ackerman's (1989) conceptualization of self-regulation, for problem solving to be effective, people should be sufficiently capable to guide, evaluate, and regulate their process of thinking as well as the emotions elicited during this process. More specifically, they should manage and control the allocation of energetic resources and mental effort (Zijlstra, 1993, 1996) toward specific aspects of a problem and goal-relevant information (i.e. self-monitoring). They are then less likely to be distracted and engaged with goal-irrelevant information (e.g. dysfunctional emotions). Moreover, people should be sufficiently capable to compare the current state with a desired state (i.e. self-evaluation) in order to evaluate progression in reducing goal-performance discrepancies. If they notice progression in problem-solving process, they are likely to experience positive emotions related to their sense of achievement and self-efficacy for attaining work-related goals (i.e. self-reactions) (Amabile & Kramer, 2011). This may broaden the individuals' prospect to solve the problem (Frederickson & Joiner, 2002; Frederickson, 2001). However, in the case of notifying unfavorable progression, people should be capable to prevent excessive exertion of energetic resources for pondering that is not beneficial for goal attainment or not likely to solve the problem.

Our empirical study in Chapter 4 examined a model considering emotion regulation capability as a mechanism and dynamic through which affective rumination and problem-solving pondering are differentially related to performance-related outcomes. Given the conservation of resources theory (Hobfoll, 1989), the extent to which individuals can regulate their emotions in an optimal way depends on their momentary levels of emotion regulatory resources. The findings at the within-person level provide important theoretical contributions to the literature by indicating that affective rumination and problem-solving pondering have differential impacts on the organism due to their diverging pattern of drawing on emotion regulatory resources. It is thus concluded that affective rumination as a process that involves dysfunctional emotional processes drains emotion regulatory resources. In contrast, problem-solving pondering is considered as a cognitive activation process that is less likely to draw on emotion regulatory resources that are crucial for optimal emotion-regulation processes. Considering positive affect as an indicator of emotional resources, results presented in Chapter 3 also contribute to this conclusion. As presented earlier, this empirical research showed that the experience of affective rumination

during the evening is related to lower levels of positive affect in the subsequent morning; whereas, the experience of problem-solving is related to higher levels of positive affect in the subsequent morning for employees who effectively regulate their dysfunctional feelings.

The results presented in Chapter 4 contribute to the recovery and occupational health research by demonstrating the importance of employing well-being-related outcomes that are conceptually related to the underlying processes of different recovery experiences. For example the findings regarding affective rumination at the within-person level may explain the results presented in Chapter 2 demonstrating that affective rumination causes increase in emotional exhaustion in the long run, while it does not cause change in general mental health. Compared to general mental health, emotional exhaustion is more likely to be caused by work-related affective rumination probably because this type of perseverative thinking drains considerably emotion regulatory resources. This finding is in line with the conceptualization that Quinn, Spreitzer, and Lam (2012) provided for emotional exhaustion. They conceptualized emotional exhaustion as a sense of incapability to achieve high levels of energetic activation (i.e. resources) to perform work domain activities. However, compared to emotional exhaustion, impaired general mental and physical health is a broader health outcome that is not directly influenced by the depletion of emotion regulatory resources that people require specifically to perform their work-related task.

Additionally, the findings presented in Chapter 4 provide important insights for the dynamic energetical-control approach of job performance (Hockey, 1997; Zijlstra 1993; Kahneman 1973; Hockey & Earle, 2006; Beal, Weiss, Barros, & MacDermid, 2005) by demonstrating the important role of emotion regulation capability on individuals' effort expenditure and task performance. More specifically, given the findings at the within-person level, this means that the active and dynamic management of emotion-regulatory resources affects job performance through the goal-directed mobilization of these resources to environmental demands. This motivational control of performance contributes to job performance not only by energizing individuals to adequately meet their work-related demands but also by causing initiation, maintenance, and regulation of their adaptive and goal-directed activities across work demanding conditions.

Methodologically, the findings presented in Chapter 3 and 4 contribute to the recovery research by showing that the patterns of relationships between variables might be different at different levels of analysis (i.e. within-person

dynamics versus person-level differences). Therefore, research should take into account that results should cautiously be interpreted and compared with findings of previous research depending on the level of analysis.

Practical implications

Based on the findings reported in this dissertation, in order to enhance recovery from work and prevent the negative consequences of thinking about work on health and job-performance, a number of recommendations can be made for governments and legislative assemblies of labor laws, organizations (more specifically Human Resource (HR) managers), and employees.

Governments and legislative assemblies of labor laws should critically evaluate their current labor laws and assess whether these sufficiently protect employees from work-related factors that inhibit the recovery process during non-work time. Current labor laws have often been developed in an era before developments, such as the intense use of communication technology and mentally demanding complex jobs became standard in our societies. As a result, most rules mainly cover issues related to basic working conditions such as salary rate, working environment, weekly working hours, daily working time, and holidays (see Arbeidswet 2000 BES of the Netherlands and the Labor Law of the Islamic Republic of Iran, 1990 as two examples). Yet, the findings of this dissertation suggest that also *the way employees spend their time outside of work times*, influences their well-being in the short and in the long run. Therefore, it would be advisable to revise these laws in such a way that they also protect employees' rights to *not engage* in work-related activities outside of their official working times that trigger work-related rumination. For instance, they may oblige organizations to limit the pressure they explicitly or implicitly put on their employees during non-work time to engage in work-related cognitive processing (e.g. by limiting work-related e-mail and smart-phone use or by planning assignments in such a way that they can be fully completed during work time). For example, these laws can protect employees' rights to refuse to respond to emails received from their managers during the evening or the weekend.

HR managers may provide recovery guidelines that help their employees to improve the balance between professional and personal life. More specifically for employees with mentally demanding jobs, they might develop guidelines that enable employees to overcome obstacles to unwind from work-related issues during the time of recovery from work. For example, the use of communication technology (e.g. email or phone) has been known as one of the main factors that

blurs the work-home boundary and inhibits the recovery process by causing work-related thoughts (Park, Fritz, & Jex, 2011; Boswell & Olson-Buchanan, 2007; Chesley, 2005; Valcour & Hunter, 2005). Therefore, in order to prevent work-related rumination, a guideline might be developed to protect employees to not be interrupted by work-related emails or phone calls after leaving work places. This strategy contradicts the Bring Your Own Device (BYOD) policy (Madkour, 2008) by which employees are financially and technically supported to buy and use their own devices (e.g. laptop, tablet, or smart phones) for work purposes.

HR managers can also provide facilities that encourage and enable employees to regularly engage in individual or group recreational activities during evenings of the working week or at weekends. These strategies not only directly facilitates the recovery process by improving a sense of detachment and positive affect but also implicitly improves employees' attitudes towards the importance of recovery after working time. For example, organizations may provide facilities to support employees for engaging in leisure activities in evenings or weekends. Studies showed that engaging in physical activities such as sports (e.g. Rook & Zijlstra, 2006; Sonnentag & Zijlstra, 2006) and mastery experiences (e.g. Fritz, Sonnentag, Spector, & McInroe, 2010; Sonnentag & Fritz, 2007) during non-work time facilitates the recovery process.

This research demonstrated that high-ruminating employees are highly vulnerable for burnout over time due to the detrimental effects of affective rumination on the recovery process. Therefore HR managers may suggest psychological interventions to these employees, such as cognitive behavior therapy (Querstret, Cropley, Kruger, & Heron, 2016) and mindfulness-based techniques (Querstret, Cropley, & Fife-Schaw, 2017; Hülshager, Feinholdt, & Nübold, 2015; Hülshager, Alberts, Feinholdt, & Lang, 2013). These interventions help employees to disengage from affective rumination and improve the possibility to prevent impaired health and job-performance that affective rumination causes in the short and long run. Moreover, providing training courses aimed at promoting problem-solving skills such as internet-based Rumination-Focused Cognitive Behavioral Therapy (RFCBT; Watkins, 2008) may help employees to act as more successful problem solvers. This intervention aimed at reducing dysfunctional thinking (i.e. abstract and evaluative thinking focused on negative outcomes and difficulties causing negative affect) by shifting individuals towards a functional thinking (concrete and action-oriented thinking involving cognitive strategies, such as anticipating coping, planning, rehearsal, and problem solving) 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 affective rumination and enhancing problem-solving skills.

Not only HR managers but also employees themselves could undertake actions to manage their recovery from work and prevent work-related rumination. As a first important step, employees should obtain knowledge on how the process of recovery works. In particular, it is relevant that they develop awareness about how different recovery experiences and more specifically different types of being mentally engaged with work-related issues during non-work time influence their recovery from work and consequently their well-being. Research has shown that health-related knowledge is an important factor for preventing impaired well-being (e.g. Chin et al., 2011; Parker & Gazmararian, 2003). Employees are recommended to schedule and manage their non-work time in a way that the possibility of being caught up in thinking about work-related issues during non-work time is reduced to a minimum level. For example, they may impose some restrictions on using technology after regular working hours (Kreiner, Hollensbe, & Sheep, 2009). To do so, they may use separate communication devices, email accounts, or phone lines for work and personal activities. They may also deactivate the notifications of their mail and message inboxes on their mobile devices. For the case of necessity and when working is strictly required, they may determine a limited time span during which they are available to reply important emails or make phone calls.

As a finding of this dissertation, depending on the employees' capability to regulate cognitions and emotions, problem-solving pondering may have a positive or negative impact on recovery from work during non-work time. Given this finding, if employees find themselves engaged in thinking about work-related problems, they are recommended to become conscious of the nature and process of their thinking. They then should decide to continue their thinking only if their thoughts are directed at discovering solutions to a specific work-related problem over a reasonable time. They should ensure that they are completely in charge of finding a solution for that specific problem and have control over this experience. If they do not experience a progressive and productive thinking process (i.e. problem-solving), they should stop thinking about the issue. Although this sounds, like a simple decision rule, it may be much more difficult to apply in practice. Therefore, employees should receive specifically designed training to develop this meta-awareness and enhance their problem-solving skills.

Strengths and limitations

The studies presented in this dissertation have several strengths. First, compared to the majority of studies that used samples of employees from western developed countries, using a sample of Iranian employees (in Chapter 2 and 3) allowed us to extend the recovery and occupational health literature particularly on people from a developing country. According to Schaufeli, Leiter, and Maslach (2009), people in developing countries are more likely to become exhausted because of rapid changes in modern working life and experiencing higher levels of work-related stressors. Second, using diary designs and multilevel analyses provided the possibility to examine the relationships of interest at within- and between-person levels of analysis. This provided the possibility to distinguish between within-person dynamics versus person-level differences.

As with any study, these studies also have several limitations. First, I conducted our studies using a path-modeling correlational approach. Therefore, the patterns of relationships between study variables should not be interpreted in a causal way. Future research with experimental designs might extend the related knowledge by investigating causalities. Second, all data were gathered by self-report measures. Using the self-report measures increase concerns about common method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). However, the within-person and longitudinal design of research with measurement assessed at different time points reduced the effects of common method bias.

Future research

One important issue that surfaced from this research that should still be addressed in the future, is a test of the causality of the relationships between the two types of perseverative thinking and outcomes variables (e.g. recovery). This is important because the current state of the literature does not fully rule out reversed causality nor that the effects may have been driven by an unmeasured variable. Therefore, I recommend scholars to design well-controlled experimental studies in order to demonstrate the causality relationships between different types of work-related perseverative thinking, recovery, well-being, and job performance. Experimental studies shed also light on the physiological and cognitive underlying mechanisms by which affective rumination and problem-solving pondering lead to different levels of psycho-physiological arousal. For instance, an experimental study may investigate whether affective rumination and problem-solving pondering differently affect endocrinological and cardiovascular indicators of prolonged

activation (Brosschot et al., 2005). Moreover, from the cognitive point of view discussed by the cognitive activation theory of stress (CATS: Ursin & Eriksen, 2004; Ursin & Eriksen, 2010), being mentally engaged with job stressors causes prolonged activation only when individuals experience negative outcome expectancies. Therefore, a study may investigate the different response outcome expectancies that people experience in affective rumination compared to problem-solving pondering.

Research is needed to further clarify the physiological or psychological characteristics of affective rumination and problem-solving pondering. In Chapter 3, I found self-regulation as a between-person variable that positively influences the effect of problem-solving pondering on recovery from work. As a theoretical contribution, I concluded that the degree to which individuals experience progress in goal-directed thinking process should be taken into account to provide a more comprehensive conceptualization of problem-solving pondering. Future research can investigate other between-person or even within-person factors that may play a determining role in productive problem-solving pondering. This will lead to a more comprehensive conceptualization of work-related problem-solving pondering that may help researchers to develop problem-solving trainings. For example, regarding the findings presented in Chapter 3, research may focus on developing training that help employees to regulate the thinking process, recognize unproductive thinking, prevent affective rumination, and implement effective problem solving strategies.

According to our findings that showed that affective rumination leads to impaired well-being, one may be interested in developing and testing interventions to help employees who ruminate affectively about work-related issues. Moreover, research is called to develop trainings and interventions aimed at promoting problem-solving skills in a way that does not inhibit the recovery process.

Conclusion

The findings of this dissertation provided empirical evidence showing that the experience of perseverative thinking about work-related issues during non-work time is not always detrimental for well-being and job performance as it depends on the type of perseverative thinking (i.e. affective rumination versus problem-solving pondering). Compared to problem-solving pondering, affective rumination is more likely to draw on emotion-regulatory resources and thereby impede the recovery process during non-work time. Through prolonged


activation and cumulative drawing on resources, affective rumination leads to impaired well-being in the long run. However, problem-solving pondering may be beneficial or unfavorable for recovery depending on the degree to which employees can regulate their cognitions and feelings.

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Summary

Recovery from work in the evening or the weekend is considered to be crucial for employees' well-being and job performance. Recovery refers to the process during which employees are no longer confronted with work-related demands and their depleted energetic resources are replenished. They then feel energized and again capable to take the subsequent course of working. The extent to which employees can switch off mentally from work-related issues (i.e. psychological detachment) during off-work time has been recognized as an essential recovery experience. Unwinding from work-related stressors prevents additional expenditure of remaining energetic resources and thereby prevents impaired well-being over time.

For many contemporary jobs, work nowadays is mentally demanding. Therefore, employees are more likely to be constantly confronted with work-related issues during their off-work time, particularly due to recent advances in communication technologies. This has led to a more blurred and diffuse boundary between work and off-work domains which is considered as a high risk factor for insufficient recovery and thereby impaired well-being and inadequate job performance.

Employees may experience lack of psychological detachment during their off-work time because they engage in perseverative thinking about work-related issues. Perseverative thinking concerns the experience of repeated, pervasive, and prolonged activation of mental occupation with work-related issues. Although perseverative thinking has been conceptualized as a mechanism by which work-related stressors are translated into impaired well-being, this might not always be true as it depends on the type of perseverative thinking (i.e. affective rumination and problem-solving pondering). Affective rumination is defined as perseverative cognitive processes in which thoughts are mainly directed to dysfunctional emotions associated with work-related issues. Problem-solving pondering refers to perseverative cognitive processes in which thoughts are directed to possible solutions to work-related problems in order to progress toward choice of a solution or reevaluate work-related performance in order to consider how it can be improved.

This dissertation contributes to three central research questions concerning the effects of the two types of work-related perseverative thinking on recovery, well-being, and job performance. The central questions of this dissertation are: 1) What are the consequences of work-related affective rumination and problem-solving pondering on well-being and job performance?

2) Through what mechanisms do work-related affective rumination and problem-solving pondering have differential consequences on well-being and job performance? 3) How is the consequence of work-related problem-solving pondering on recovery from work influenced by between-person differences in trait self-regulation?

Chapter 2 presents the findings of a longitudinal three-wave study with a time lag of six months between each wave. This study investigated how the experience of affective rumination and problem-solving pondering during evenings predict changes in two long-term well-being outcomes (i.e. exhaustion and general mental health complaints) over a one year period. The three waves of data obtained from a total of 123 participants were analyzed using latent growth curve modeling. The results showed that employees who experience high levels of work-related affective rumination during evenings showed higher rates of growth in exhaustion across a period of 12 months. However, the findings showed that affective rumination was not a significant predictor of change in general mental health complaints over time. In addition, our results did not show a significant relationship between problem-solving pondering during evenings and changes in either exhaustion or general mental health complaints across a period of one year. Contributing to *Research question 1*, these findings demonstrate that when looking at the long term effects, not all types of work related perseverative thinking are equally negative for well-being outcomes. Whereas affective rumination particularly leads to increases in exhaustion, problem solving pondering is not related with such negative long-term outcomes.

Chapter 3 presents the findings of a diary study over five consecutive working days. This study examined, using a within-person design, how fluctuations in work-related affective rumination and problem-solving pondering during the evening are related to recovery and well-being, while accounting for the moderating role of trait-self regulation on the pondering-recovery relationship. Analyzing data obtained from 177 participants over 677 days revealed 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 pondering 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, while 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. This chapter provides empirical evidence for *Research question 1, 2, and 3*.

Chapter 4 presents the findings of a diary study conducted over six consecutive weeks ($N = 107$; 490-568 week-level data points) investigating whether the two types of work-related perseverative thinking have different consequences on two job performance-related outcomes (i.e. effort expenditure and task performance) via their differential draining effects on individuals' emotion regulatory resources. Using a multilevel approach, this study found different patterns of relationships between variables at two levels of analysis: the within-person level (i.e. week-level dynamics) and the between-person level (person-level differences). The results revealed that affective rumination negatively related to emotion-regulation capability only at the within-person level, whereas problem-solving pondering positively related to emotion regulation capability only at the between-person level. Emotion regulation capability mediated the relationships between affective rumination and the two performance-related outcomes only at the within-person level. However, the mediating role of emotion regulation capability was significant on the relationship between problem-solving pondering and task performance only at the between-person level. These findings provide empirical evidence to support the core assumption indicating that affective rumination is more likely to draw on emotion regulatory resources and thus to have straining effects on the organism than problem-solving pondering. This chapter provides empirical findings examining *Research questions 1 and 2*.

Together the studies reported in this dissertation provided empirical evidence showing that the experience of perseverative thinking about work-related issues during off-work time is not always detrimental for well-being and job performance as it depends on the type of perseverative thinking (i.e. affective rumination versus problem-solving pondering). Compared to problem-solving pondering, affective rumination is more likely to draw on emotion-regulatory resources and thereby impede the recovery process during off-work time. Through prolonged activation and cumulative drawing on resources, affective rumination leads to impaired occupational health in the long run. However, problem-solving pondering may be beneficial or unfavorable for recovery depending on the degree to which employees can regulate their cognitions and feelings.



Samenvatting

Voor het welzijn en de productiviteit van werknemers is het cruciaal om in de avonduren of het weekend te herstellen van het werk (of: bij te komen van het werk). Met dit herstel (of: Hiermee) wordt het proces bedoeld waarbij werknemers niet langer geconfronteerd worden met werk gerelateerde eisen of taken en ze zich opnieuw kunnen opladen. Hierdoor voelen zij zich weer energiek en in staat om hernieuwd aan de slag te gaan (of: aan een nieuwe werkdag te beginnen). De mate waarin werknemers in hun vrije tijd mentaal kunnen afschakelen van werk gerelateerde zaken (de zg. psychologische onthechting) wordt gezien als een essentiële herstel ervaring. Het afschakelen van werkgerelateerde stressoren voorkomt een extra aanslag op de overgebleven energiebronnen en voorkomt daarmee dat met de tijd het welzijn nadelig beïnvloed wordt.

Voor veel banen is werk tegenwoordig mentaal veeleisend. Daarom hebben werknemers meer kans om ook buiten hun werktijd met werkgerelateerde problemen te worden geconfronteerd, met name door recente ontwikkelingen in communicatietechnologieën. Dit heeft geleid tot een onduidelijkere grens tussen het werk- en het niet-werkdomein. Deze onduidelijke grens wordt beschouwd als een belangrijke risicofactor voor onvoldoende herstel en kan het welzijn en de prestaties op het werk aantasten.

Werknemers kunnen tijdens hun vrije tijd een gebrek aan psychologische onthechting ervaren omdat ze perseveratief denken aan werkgerelateerde kwesties. Het perseveratief denken aan werk betreft de ervaring van het herhaaldelijk, pervasief en langdurig mentaal bezig zijn met werkgerelateerde kwesties. Hoewel perseveratief denken is geconceptualiseerd als een mechanisme waarmee werkgerelateerde stressoren worden omgezet naar verminderd welzijn, is dit niet noodzakelijk terecht omdat er verschillende soorten perseveratief denken onderscheiden kunnen worden (nl. affectieve ruminatie en probleemoplossende overpeinzing). Affectieve ruminatie wordt gedefinieerd als perseveratieve cognitieve processen waarin gedachten zich voornamelijk richten op disfunctionele emoties die verband houden met werkgerelateerde problemen. Probleemoplossende overpeinzing omvat perseveratieve cognitieve processen waarin gedachten zich richten op mogelijke oplossingen voor werkgerelateerde problemen om tot oplossingen te komen of werkprestaties te heroverwegen om verbetermogelijkheden te genereren.

Dit proefschrift draagt bij aan drie centrale onderzoeksvragen die de effecten van de twee soorten werkgerelateerd perseveratief denken op herstel, welzijn en werkprestaties beschouwen. De centrale vragen van dit proefschrift zijn: 1) Wat zijn de gevolgen van werkgerelateerd affectieve ruminatie en probleemoplossend overpeinzen voor het welzijn en de werkprestatie? 2) Via welke mechanismen hebben werkgerelateerd affectieve ruminatie en probleemoplossend overpeinzen verschillende gevolgen voor het welzijn en de werkprestatie? 3) Hoe worden de gevolgen van werkgerelateerd probleemoplossend overpeinzen op het herstel na werk beïnvloed door interindividuele verschillen in de trek zelfregulatie?

Hoofdstuk 2 presenteert de bevindingen van een longitudinaal onderzoek met drie meetmomenten die telkens zes maanden uit elkaar lagen. Deze studie onderzocht hoe de ervaringen van affectieve ruminatie en probleemoplossend overpeinzen gedurende de avonden veranderingen voorspellen in twee welzijnsmaten (nl. oververmoeidheid en algemene psychische gezondheidsklachten) over een periode van één jaar. De drie meetmomenten omvatten gegevens van in totaal 123 deelnemers, welke vervolgens zijn geanalyseerd middels latente groeicurve-modellen. De resultaten laten zien dat werknemers die 's avonds veel werkgerelateerde affectieve ruminatie ervaren ook een sterkere groei in oververmoeidheid laten zien over een periode van 12 maanden. De bevindingen laten echter ook zien dat affectieve ruminatie geen significante voorspeller is van veranderingen in algemene psychische gezondheidsklachten over de tijd. Bovendien laten de resultaten geen significant verband zien tussen probleemoplossend overpeinzen tijdens avonden en veranderingen in oververmoeidheid of algemene psychische gezondheidsklachten gedurende een periode van één jaar. Bijdragend aan *Onderzoeksvraag 1* tonen deze bevindingen aan dat over de lange termijn niet alle soorten werkgerelateerd perseveratief denken dezelfde negatieve effecten op welzijn hebben. Waar affectieve ruminatie vooral relateert aan oververmoeidheid, houdt het probleemoplossend overpeinzen over de lange termijn geen verband met de welzijnsmaten.

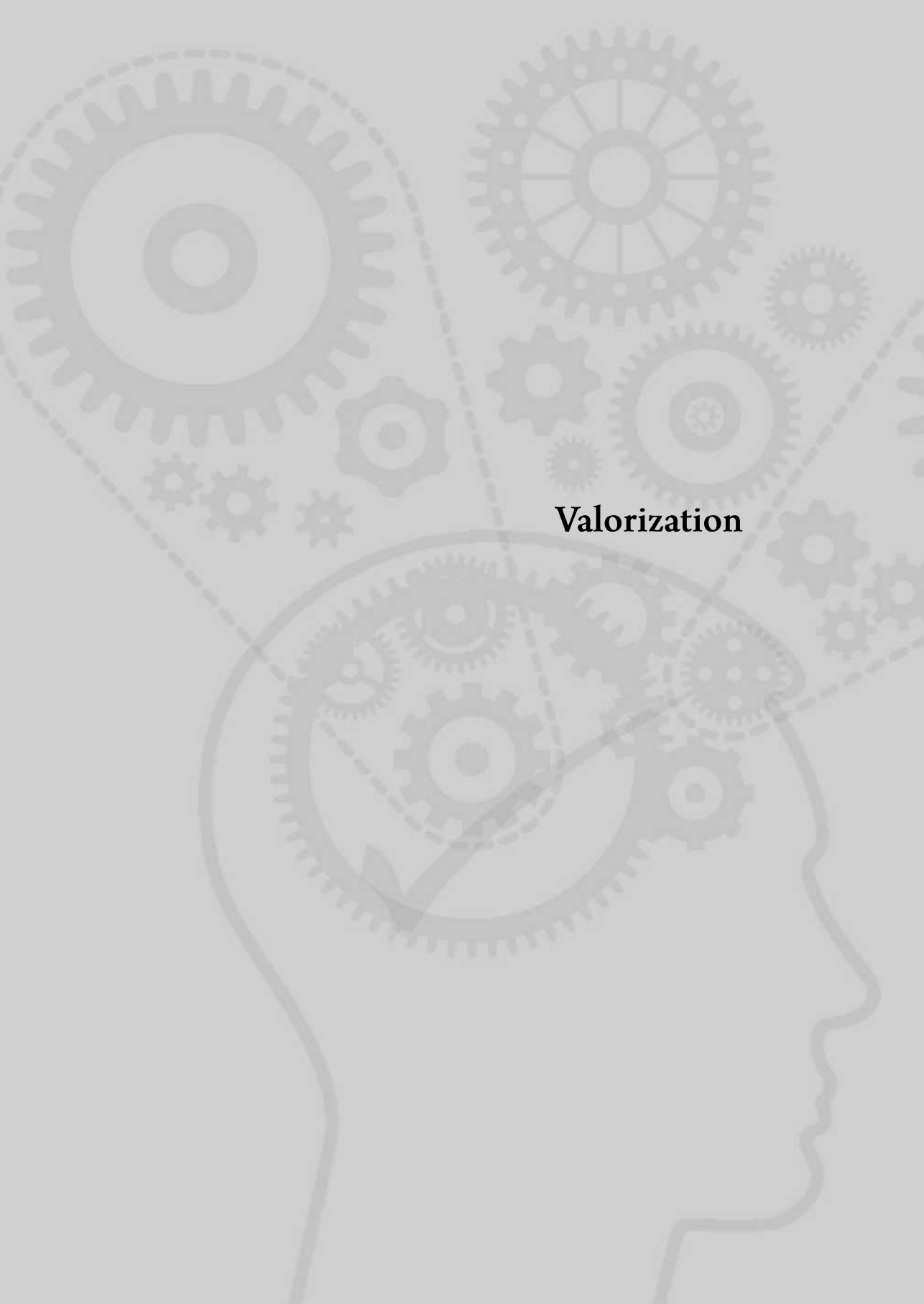
Hoofdstuk 3 presenteert de bevindingen van een dagboekstudie over vijf opeenvolgende werkdagen. Deze studie onderzocht, door middel van een binnenpersoon onderzoekopzet, hoe fluctuaties in werkgerelateerde affectieve ruminatie en probleemoplossend overpeinzen tijdens de avond gerelateerd zijn aan herstel en welzijn, terwijl rekening wordt gehouden met de modererende rol van zelfregulatie in de relatie tussen probleemoplossend overpeinzen en herstel.

Gegevens van 177 deelnemers werden verzameld gedurende 677 dagen, en uit analyse van deze data bleek dat affectieve ruminatie tijdens de avond indirect verband hield met een verminderd welzijn in de volgende ochtend, via de staat van herstel van werk vóór het slapengaan. Probleemoplossend overpeinzen was indirect gerelateerd aan welzijn in de daaropvolgende ochtend door de relatie met de toestand van hersteld voor het slapengaan. Dit indirecte effect werd echter gemodereerd door de mate waarin men zelfregulerend vermogen bezit, op de manier dat probleemoplossend overpeinzen positief gerelateerd was aan de staat van herstel en bijgevolg aan een verbeterd welzijn voor werknemers met een hogere zelfregulatie, terwijl het negatief gerelateerd was aan de staat van herstel en bijgevolg tot een verminderd welzijn voor degenen die minder zelfregulerend vermogen bezitten. Deze bevindingen suggereren dat nadenken over het oplossen van problemen gunstig of ongunstig kan zijn voor herstel en welzijn, afhankelijk van de mate waarin werknemers hun cognities en gevoelens kunnen reguleren. Dit hoofdstuk biedt empirisch bewijs voor *Onderzoeksvraag 1, 2 en 3*.

Hoofdstuk 4 presenteert de bevindingen van een dagboekonderzoek dat gedurende zes opeenvolgende weken is uitgevoerd (N = 107; 490-568 weekniveau datapunten). In deze studie onderzocht ik of de twee soorten werkgerelateerde denkprocessen (affectieve ruminatie en Probleemoplossend overpeinzen) verschillende gevolgen hebben voor twee werkgerelateerde resultaten (d.w.z. inspanningen en taakuitvoering) doordat ze een verschillend effect hebben op het vermogen voor het reguleren van emoties van individuen. Gebruikmakend van een multilevel-aanpak, vond ik in deze studie verschillende patronen van relaties tussen deze variabelen op twee analyseniveaus: het binnenpersoonsniveau (d.w.z. dynamiek op weekniveau binnen een individu) en het tussenpersoonsniveau (verschillen tussen personen). De resultaten toonden aan dat affectieve ruminatie alleen negatief gerelateerd was aan emotie-regulerend vermogen op het binnenpersoonsniveau, terwijl probleemoplossend overpeinzen alleen positief gerelateerd was aan emotie-regulerend vermogen op het tussenpersoonsniveau. Emotieregulatie vermogen was een alleen op het binnenpersoonsniveau een mediërende variabele in de relaties tussen affectieve ruminatie en de twee prestatiegerelateerde resultaten. De mediërende rol van emotieregulerend vermogen had echter alleen een significante invloed op de relatie tussen probleemoplossend overpeinzen en taakuitvoering op het tussenpersoonsniveau. Deze bevindingen bieden empirisch bewijs ter ondersteuning van de kernaanname die aangeeft dat affectieve ruminatie meer gebruik maakt van emotieregulerende middelen en dus belastende effecten op het organisme heeft

dan probleemoplossend overpeinzen. Dit hoofdstuk biedt empirische bevindingen waarin *Onderzoeksvragen 1 en 2* worden onderzocht.

Tezamen leveren de in dit proefschrift gerapporteerde studies empirisch bewijs dat aantoonde dat de ervaring van perseveratief denken over werkgerelateerde problemen tijdens werktijd niet altijd nadelig is voor het welzijn en de prestaties op het werk, omdat het afhangt van het type perseveratief denken (d.w.z. affectieve ruminatie versus probleemoplossend overpeinzen). In vergelijking met probleemoplossend overpeinzen, heeft affectieve ruminatie een groter effect op het emotie-regulerende vermogen en heeft daardoor een belemmerende werking op het herstelproces buiten werktijd. Door langdurige activering en cumulatief gebruik van het emotie-regulerend vermogen leidt affectieve ruminatie op de lange termijn tot een verslechterde gezondheid op het werk. Probleemoplossend overpeinzen kan echter gunstig of ongunstig zijn voor herstel, afhankelijk van de mate waarin werknemers hun cognities en gevoelens kunnen reguleren.



Valorization

In this valorization chapter I will expand on the social value of the findings presented in this dissertation. Therefore, I will first identify the target group of the research and groups that could potentially benefit from the findings. I then provide an overview of the practical insights that the findings presented in this dissertation provide for employers and employees. I will propose a number of products and innovations that could be based upon the findings of this research. Finally, I will consider the insights that the findings provide for society more generally including potential implications for labor legislation.

Target group

The target population of this dissertation are employees, and more particularly employees with mentally demanding jobs. The findings presented in this dissertation are therefore foremost useful for these employees. Our results shed light on how different types of being mentally engaged with work-related issues during off-work time influences their recovery from work and consequently their well-being and job performance. Employees can use this information to schedule and manage their off-work time in such a way that the possibility of being caught up in thinking about work-related issues during off-work time is minimized. Given the findings related to problem-solving pondering, employees need to know the condition under which experiencing problem-solving pondering during off-work time may facilitate their recovery process.

There are two additional groups that can potentially benefit from the findings of this research including HR managers in organizations and legislative assemblies of labor laws. The findings can help HR managers to design and implement not only strategies that minimize mental engagement with work-related issues during off-work but also strategies that prevent the detrimental effect of thinking about work on the recovery process. The findings also provide insights for legislative assemblies of labor laws where the current labor laws can be evaluated to protect employees from work-related factors that have detrimental effects on the recovery process.

Products, innovation, and implementation

There are a number of products that could be developed based on the findings of this dissertation, including recovery guidelines, trainings, and well-being apps. The results presented in this dissertation demonstrated that employees with

mentally demanding jobs are highly vulnerable for exhaustion over time if they engage in affective rumination during their off-work time. The results may encourage HR managers in organizations to design recovery guidelines that enable employees to overcome obstacles to unwind from work-related issues during off-work time. For example, a guideline might be developed to protect employees to not be interrupted by work-related emails or phone calls after leaving their work places.

Regarding the importance of employees' subjective experiences during off-work time on their well-being and productivity, HR managers may provide facilities that encourage and enable employees to regularly engage in individual or group recreational activities during the evening or the weekend. Moreover, HR managers may suggest psychological interventions such as cognitive behavior therapy and mindfulness-based techniques for their high-ruminating employees. These interventions can help employees to disengage from affective rumination and improve the possibility to prevent impaired health and job-performance that affective rumination causes in the short and long run. Employees themselves can also undertake actions to manage their recovery from work and prevent work-related rumination. For example, they can impose restrictions on using technology (e.g. email, phone) during the evening or the weekend as a factor that may triggers affective rumination (Kreiner, Hollensbe, & Sheep, 2009).

This research is innovating as it showed that the experience of work-related problem-solving pondering has positive effects on the recovery process and well-being only if people can properly regulate their cognitions and emotions. This finding then suggests training courses aimed at promoting problem-solving skills as a strategy that HR managers can take to prevent burnout in their employees. These skills can help employees to act as more successful problem solvers when they are mentally engaging in work-related problems during the time of recovery. However, further research is needed to adapt and implement psychological intervention approaches on enhancing problem-solving skills. Given the findings related to problem-solving pondering, employees are recommended to become conscious of the nature and process of their thinking. They should then develop the ability to stop thinking about work-related issues if they do not experience a progressive and productive thinking that results in finding a solution for a specific problem. To enhance this capability, psychological self-awareness and problem-solving trainings can be useful.

Insights for society and implications for labor legislation

The sixth European Working Conditions Survey (EWCS; 2016) showed that, on average, 10% of the EU workforce (ranging from 4.5% in Finland to 20.5% in France) feels severely “burned-out” against 17% of the non-EU countries (ranging from 13% in Albania to 25% in Turkey). The burnout prevalence is even worse in developing countries. For example a review study by Rezaei, Matin, Hajizadeh, Soroush, and Nouri (2018) showed that on average 36% of Iranian nurses experience high levels of burnout. Research also showed that burnout is not only negatively related to work-related well-being (e.g. work engagement and job satisfaction), but it is also negatively related to context-free well-being (e.g. happiness). Occupational health at the country level can be considered as a factor determining productivity and economic performance. In countries where employees highly value not only work but also their leisure, the prevalence of burnout can be less and employees can be more productive. This means that in countries where employees work harder and longer, economic performance is not necessarily higher if employees are not productive due to their insufficient recovery during off-work time.

The findings of this dissertation demonstrated that the way employees spend their time outside of work time (i.e. during the evening or the weekend) influences their well-being and job performance. More specifically, the results showed that the ruminative form of thinking about work during off-work time has a negative influence on well-being and job performance. Given these results, governments and legislative assemblies of labor laws should critically evaluate their current labor laws and assess whether the current laws sufficiently protect employees from work-related factors that inhibit the recovery process. More specifically, these laws might be revised in such a way that they protect employees’ rights to *not engage* in work-related activities outside of their official working time that trigger work-related rumination. For instance, they may oblige organizations to limit the pressure they explicitly or implicitly put on their employees during off-work time to engage in work-related cognitive processing (e.g. by limiting work-related e-mail use or by planning assignments in such a way that they can be fully completed during work time). As an example, these laws can protect employees’ right to refuse to respond to emails received from their managers during the evening or the weekend.

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Acknowledgements

First of all, I am very grateful to the God for all the countless blessings and strength which provided me the capability to complete and finish my PhD. Now, I am in the final destination of my PhD journey and I would like to thank all the amazing people who have directly and indirectly supported me during this journey. I am glad that, at least, this section of my dissertation provides the opportunity to name some of those amazing people who made the journey possible, memorable and enjoyable and I would like to express my heartfelt gratitude towards them.

This PhD would not have been possible without my two supervisors *Fred* and *Sjir*. Honestly, I do not know how to thank you and it is difficult to find proper words to express my gratitude to you. Thank you for investing your time and effort in supervising me during my PhD. The PhD is just part of the experience that I have had with you over all of the past years. You have been the creators of all the moments that have brought me confidence and happiness and those that have taught me new lessons for my life.

Dear *Fred*, I still remember your quick and positive reaction to my first email which eventually gave me the chance to start my PhD. You have always asked about my and my family's situation before any question about the PhD project. I really appreciate it. I will never forget your support when I shared my problems with you and you always did your best to support me (so no prolonged *affective rumination* after leaving your office). When I came to your office you were always welcoming, even if you had a lot of printed papers - waiting for your pen and paper comments - on your desk. Contrary to what I expected from the Dutch culture, I have never heard during these years (even once) that you would ask me to visit you for a better and later time. I think (or at least hope) that this did not lead to any exhaustion in you as it might be experienced as a positive deep acting experience (you are always the boss, so no pressure for any surface acting). I also appreciate the learning opportunities you provided me with regarding teaching (e.g. supervising several master theses together).

Dear *Sjir*, regarding all experiences we have had together in the past years, I do not know what I should call you; my supervisor, my teacher, my colleague, or my best friend. Of course I keep all in my mind and prefer to call you as my best Dutch friend who supported me a lot during my PhD. When I had no clue how to proceed or where I simply got stuck, you excellently guided me by leaving your office, sitting in the kitchen, and accompanying me for a constructive *problem*

solving pondering. If it did not work or it needed more time, you suggested a nature walk around the University which always worked! Thank you for your excellent guidance, support and consideration.

I would like to thank *Prof. dr. B. A. Ghanbari Hashemabadi*, my former teacher and supervisor in Iran, who has kindly supported me during my PhD over all the past years. Thanks also to *Prof. dr. M.R. Sadeghi*, my former teacher in master education in Iran, who encouraged me to pursue my education.

My officemates, Alicia, Philippe, and Alicia (Sui); thank you for all memorable moments we have had together in the office as the PhD candidates. *Alicia*, you were my first officemate in WSP. You provided me very useful information about the Dutch culture. Thanks for all the discussions we had about our cultures and thank you for being my Paranymp. *Philippe*, sharing the office with you was really awesome. When I had a question, usually about shopping, you could easily search it on Google (of course in Dutch) and always showed me the best one. Throwing your stress ball in the pot was a good coping, and we still have to wait for the football match between Iran (the Cheetahs of Persia) and Belgium (the Red Devils). I wish in 2022. *Alicia (Sui)*, you were my last officemate in WSP. Working as a teacher did not allow me to spend much time in our office. However, it was always nice to have you as a quiet officemate who understood and allowed me to keep concentration on my thesis. I would also like to thank *Bram*, a gentleman who accepted to be my Paranymp. You were always very welcoming for any question and help. As you already thanked me in your great book, I would like to thank you in return for all theoretical discussions. Of course, you will be welcome for visiting Iran in the future.

I would like to thank all my colleagues in WSP and some of them in particular. *Mariëlla* and *Trudy*, thanks for all the kind support with administrative issues. You always did your best and cared about me and my family. *Gerjo* and *Rob*, two great professors in WSP, thank you for all the support you provided me during my PhD. Thank you also for the scientific support that you provided for Iranian researchers and students. *Ute*, thank you for your support of using Mplus and Multilevel analysis. I also appreciate your effort as the chair of the assessment committee. *Gemma*, thanks for your positive attitude. Talking with you was always full of empathy and consideration. *Margje*, I would like to appreciate all the support that you provided me regarding the BKO-program. You were always available for my questions and encouraged me for attending the teaching workshops. *Gerda*, thanks for suggesting me as the trainer of the Psychiatric

anamnesis course. This practical course provided the opportunity for me to retrieve and update my clinical skills. *Fleurie*, I appreciate all the support that you provided me to act as the supervisor of the academic writing skills course. You were always welcoming for any question. *Robert*, thank you for all the information you gave me to supervise bachelor and master theses. I really admire your sense of humor. *Merve*, it was really nice to have a colleague from our neighbor, Turkey. We always had many things to talk about our cultures. *Marie*, thanks for all the friendly moments. *Astin*, thanks for all the positive cultural discussions. *Phil*, as office neighbors, we had much fun and very good discussions. It was always nice and fun to meet you around the printer zone. *Annika*, I really appreciate your support during tutoring the Personality course. *Sylvia*, I did not see you often, but it was always nice to see you somewhere. *Mart*, thanks for sharing your experiences in the Research practical course. It was always nice to know more and more about your PhD project. *Rosine*, working with you to supervise two groups of master students was a great experience for me. Thank you also for helping me to prepare the Dutch summary. *Tobias*, I know that people thank you for your role in social events. However, I was not a lot in the events. Thank you for your cooperation in supervising some master thesis. *Irma*, thanks for all the support and information about mentoring students. *Herco*, we had good discussions together. Thank you. *Karlijn*, thank you for the good advice you provided for parenting. Thanks for replacing me for tutoring the Motivation and Emotion course. *Untung*, it was really nice to meet you in your office and talked about your lovely children. Thank you *Fraukje*, for your positive attitude and all the fun conversation we had about the Netherlands weather. *Philippe* (Verduyn), it was always nice to hear a different Dutch accent when you were speaking in the kitchen. Finally, thank you *Kai*, *Darta*, *Joedith*, *Nathalie*, and *Gill* for contributing to the pleasant working climate at WSP.

I would like to appreciate and thank my Iranian former colleagues and all friends who helped me to collect data in Iran; *Mahin Hashemi*, *Parvaneh Nikkhah*, *Ali Sadr* (also for importing data into the Excel), *Hamid Daroudi*, *Maliheh & Mitra Naroui*, *Abolfazl Daroudi*, *Homam Moayedfar*, *Mehdi Rahmani*, *Morteza Nouri*, *Danial* and my family members *Mojtaba* (for printing the booklets and designing the cover), *Mahmoud* and *Mehdi* (for all the support), *Nematollah*, *Neda* (also for importing data into the Excel), *Batool*, *Fatemeh*, *Zeynab*, and *Zahra*. Without your help, it would not be possible to prepare the booklets, to distribute and collect them, and to import data into the software. Living thousands kilometers far from your homeland is not easy, even though people of the host country are so friendly to you. My dear friends; *Iman*, *Morteza*

Karami, Mohammad, Naser, Naghi, Javad Salehi and Zohreh Sepehri, , Morteza Keyvanloo, Majid, Reza, Ali Mashhadi and Leon, thank you for all the support.

I would like to thank my **parents** *Ali* and *Nesa*. I love you a lot and appreciate your effort and love in raising me and bringing me up to be a better individual. I am much lucky to have you both as my parents and thank God for giving me you. I would also like to appreciate my *wife's* **parents** for their kindness and patience during all the past years.

My dearest **Mahboubeh**, it is really difficult to find proper words to thank you for all your efforts, attention, and love which have supported me to pursue my education from the beginning to the end of this journey. Thank you for making all the relaxing and amazing moments at our home after each working day. This all helped me to have a sufficient level of *recovery*. My lovely **Elsa**, you have been my lovely companion on this journey. Thank you for all beautiful colors you poured on our life which made it incomparably delightful.

Curriculum vitae

Abbas Firoozabadi was born on 11 March 1983 in Sirjan, Iran. He grew up in this city and completed high school there. In 2001, he started his Bachelor of Clinical Psychology at Ferdowsi University of Mashhad. He continued studying at Ferdowsi University by pursuing a Master in Clinical Psychology by which he obtained the knowledge of mental health, psychopathology, psychiatric diagnosis, and psychotherapy. Having obtained his master in 2008, Abbas worked as a lecturer in BSc program at Bojnord University. At the same time he worked as a psychotherapist at a mental health clinic for almost four years. Since June 2012, he has been working as a PhD candidate at the department of Work and Social Psychology at Maastricht University. His research was about the consequences of thinking about work during off-work time for employees' recovery, occupational health, well-being, and job performance. Since 2017, Abbas has also worked as a teacher at Maastricht University's Faculty of Psychology and Neuroscience.

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