



RESEARCH ARTICLE

Today, tomorrow, and then forever: Exploring how workflow experience is sustained from a work-home perspective

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Abstract

This study explores how employees' flow experience at work emerges, is sustained, and continuously grows over time. Based on the job demand-resource model, we propose the intraday upward spiral of flow: Challenging demands and job resources activate employees' flow experience, further encouraging them to seek more challenges and resources. Furthermore, drawing on the perseverative cognition theory and spill-crossover model, we propose the inter-day upward spiral of flow: The antecedents (or consequences) of flow can overflow from work to the family domain and result in employees' positive rumination, thus promoting the next-day flow experience. Our diary study generated 1,208 data points from 142 employees over 10 working days. We found that in the morning, challenging demands and job resources positively affected the participants' flow, further encouraging them to pursue more challenging demands and job resources in the afternoon and thus enter this state again. Moreover, the afternoon's challenging demands and job resources promoted the respondents' problem-solving pondering at night, which further increased their next-morning challenging demands, job resources, and, thus, their flow. Through this study, we expand the emerging literature on positive organizational behavior and provide information for practitioners on how to build and sustain employees' peak states.

Keywords: flow experience; problem-solving pondering; job demands; job resource

In the last century, organizational behavior and occupational health research focused on understanding how negative work events affect employees, aiming to eliminate adverse events and the concomitant psychological, physical, and economic costs (Bono, Glomb, Shen, Kim, & Koch, 2013). The consequence of this bias toward focusing on negative antecedents is that scholars knew far more about fighting disease and infirmity than promoting positive health, welfare, and positive functioning (Seligman & Csikszentmihalyi, 2000). However, a contrasting line of research called positive organizational behavior (POB) has emerged in the past decade, specifically focusing on identifying positive events and maximizing their beneficial effects (Bono et al., 2013; Luthans, 2002; Xiong, 2023). Increasing employees' positive experiences at work is significant as it builds their behaviors, skills, and resources as well as improves their nonwork functioning (Bono et al., 2013; Demerouti, Bakker, Sonnentag, & Fullagar, 2012; Seligman & Csikszentmihalyi, 2000). Although the study of humans' strengths and optimal functioning has drawn a growing amount of attention in modern organizations in line with the principles of POB, how to identify and make use of positive events and

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experiences still generally has untapped potential that can be leveraged in both theory and practice (Bono et al., 2013; Luthans, 2002).

One of the most important positive phenomena in POB is flow, which is a state of optimal experience and maximal concentration through which people reach their demand-skill balance, act at the peak of their capacity, and feel as though time is flying by (Csikszentmihalyi, 2014; Norsworthy, Jackson, & Dimmock, 2021). Flow has the potential to generate a sense of achievement and awaken emotions in employees as it ensures that they commit to a fulfilling and worthwhile life, which can improve their subjective well-being, work performance, job satisfaction, and organizational citizenship behaviors (Bakker & Van Woerkom, 2017; Engeser & Rheinberg, 2008; Salanova, Bakker, & Llorens, 2006; Tse, Fung, Nakamura, & Csikszentmihalyi, 2016). Flow is an important state for humans' well-being, and describing, explaining, and predicting this phenomenon may allow employees to take the best course of action and change their behavior. Therefore, a scientific understanding of flow has become a prerequisite for improving humans' lives (Šimleša, Guegan, Blanchard, Tarpin-Bernard, & Buisine, 2018). In fact, research on the construct of flow is essentially consistent with the idea of POB, in that, "in [the] search for a more positive model, which focuses on human strength, optimal experiences, and human flourishing ... a new and promising field of study [opens]" (Ceja & Navarro, 2009, p. 666). Therefore, over decades, scholars have gained insights into the various antecedents of the flow experience (e.g., Peifer, Schulz, Schächinger, Baumann, & Antoni, 2014; Peifer, Syrek, Ostwald, Schuh, & Antoni, 2019; Peifer & Tan, 2021; Peifer & Wolters, 2021).

Although scholars have identified several prerequisites for activating flow, how this positive state is sustained is poorly understood as most studies have assumed that flow is a highly volatile and fragile short-term experience (Bakker, 2008). Indeed, recent studies have even concluded that, because of the dynamic nature of this state of being (i.e., the within-day and within-person fluctuation), it will not stabilize over time (Ceja & Navarro, 2011; Debus, Sonnentag, Deutsch, & Nussbeck, 2014; Fullagar & Kelloway, 2009). Nevertheless, a few studies have also indicated the possibility of challenging this view through two means. First, the aftereffects of flow are stored in the form of organizational or personal resources that form the basis of a new round of flow (Demerouti et al., 2012; Šimleša et al., 2018) as individuals with higher resource endowment tend to obtain more resource via their investment (Hobfoll, Halbesleben, Neveu, & Westman, 2018), such as seeking out and coping with more challenging demands. In fact, studies have already identified the reverse causality among challenges, resources, and flow (Salanova, Bakker, & Llorens, 2006). As such, our first goal is to explore whether and how flow develops over time in the workplace. Second, scholars have also confirmed that the basic components or consequences of flow (i.e., challenging demands and job resources) can spill over from employees' work into their homes, which may then overflow into the work domain to form the basis of flow (Debus et al., 2014; Demerouti et al., 2012; Feng, 2022a, 2022b). Therefore, our second goal is to illustrate that flow may develop across different domains, from work to family and vice versa. With the understanding of these micro-foundational processes, we can both explain the nature and functions of flow more accurately as well as provide information that allows employees to more frequently enter this positive state and maintain high levels of well-being (Debus et al., 2014; Demerouti et al., 2012; Feng, 2022a, 2022b; Salanova, Bakker, & Llorens, 2006).

To this end, we established and tested the model shown in Fig. 1. The intraday model shown in Fig. 1(a) is based on the job demand-resource (JDR) model (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001), which allowed us to expound on the notion that flow is activated by challenging demands and resources, which gradually forms a self-sustaining and forward-developing spiral (Demerouti et al., 2012; Hobfoll, 2002; Salanova, Bakker, & Llorens, 2006). Furthermore, drawing on the perseverative cognition theory (PCT; Brosschot, Gerin, & Thayer, 2006) and the spill-crossover model (SCM; Bakker, Shimazu, Demerouti, Shimada, & Kawakami, 2014), we propose the inter-day model shown in Fig. 1(b), in which we introduced positive rumination (i.e., problem-solving pondering) as the family domain counterpart of daytime workflow experience. Through this addition, we suggest that problem-solving pondering captures the spillover effect of workflow experience

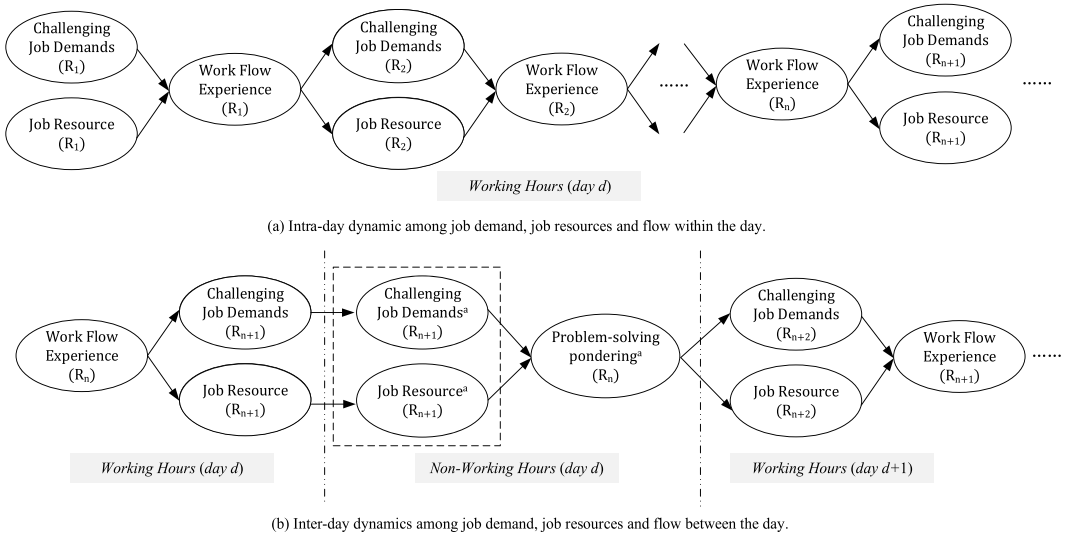


Figure 1. The theoretical model.

Note: A superscript (a) indicates variables that occur during nonworking hours. Dotted squares (----) indicate variables or processes that don't actually exist. R_n represents the round n . In our data analysis, $n = 1$.

and promotes the next-day flow experience by encouraging employees to pursue more challenging demands and acquire additional job resources. Thus, we make three theoretical contributions.

First, we expand the nomological network of flow in occupational settings as studies have mainly focused on the antecedents or consequences of flow (e.g., Feng, Han, & Terpstra Tong, 2023; Fullagar & Kelloway, 2009; Peifer & Zipp, 2019; Xie & Feng, 2023), but by integrating two-sided literature to expound on the work- and nonwork-related antecedents of flow, we develop a new understanding of this construct's dynamic evolution and development. Moreover, this study also tests the reciprocal association between nonworking factors and flow, which extends the academic dialogue of this concept from the workplace to the home (Debus et al., 2014; Demerouti et al., 2012). For instance, future scholars can focus on the previously overlooked factors in nonwork-related domains that have potentially positive effects on employees' workflow experiences.

Second, this study allows us to enrich, supplement, and expand on JDR-related theories. Although the JDR model has been widely used to explain various organizational management phenomena, studies have mainly focused on the predicting role of demand and resources (Feng, 2022a, 2022b; Lesener, Gusy, & Wolter, 2019; Verhoef, De Ruiter, Blomme, & Curfs, 2021). Thus, little is known about the upward spiral between demand and resources, or more simply put, there is limited understanding of what factors affect individuals' further exploration of demands and resources (Lesener, Gusy, & Wolter, 2019; Salanova, Bakker, & Llorens, 2006). We solve this problem by highlighting that workflow experience and its spillover result (i.e., rumination) could act as the critical mechanism for the reciprocal relationship between challenging demands and job resources. Thus, our intraday and inter-day models offer a more complete account of the causal association implied in the JDR model.

Third, our findings contribute to the literature on the PCT and rumination. Scholars who have adopted the PCT have largely assumed that perseverative cognition is only caused by stressful demands or inhibition of goal progression, resulting in negative psychological and somatic consequences (Brosschot, Gerin, & Thayer, 2006; Flaxman, Stride, Newman, & Ménard, 2023; Liang, Cai, & Duan, 2023; Verkuil, Brosschot, Gebhardt, & Thayer, 2010), and they have postulated that the challenging demands can generate harmful effects on recovery (Wach, Stephan, Weinberger, & Wegge, 2021). By integrating the PCT with the SCM, we deconstruct two triggers (i.e., challenging demands and job resources) of flow and propose that they can jointly activate the perseverative

cognitive process that sustains the original positive influence of daily flow experience. Essentially, we highlight that focusing only on stress-related factors can mask and even hamper our understanding of the potentially beneficial role of perseverative cognition. Additionally, we open up a new domain in terms of applying the PCT in the study of POB.

Theoretical background and hypotheses development

Csikszentmihalyi (1975) defines flow as a peak state in which people are absorbed in an activity, feel a sense of effortlessness, and perceive time as flying. Bakker (2008) first applied the concept of flow to the organizational background and identified three characteristics of workflow: (1) absorption, which refers to complete concentration, in that employees are completely immersed in their work; (2) enjoyment, which denotes employees feeling happy and positive about their work; and (3) intrinsic motivation, which concerns employees engaging in their work activities for inherent interests rather than external benefits. To enter a flow state, a person must balance the perceived challenges with their abilities (Csikszentmihalyi, 2014; Csikszentmihalyi & LeFevre, 1989). That said, if employees do not have enough resources to overcome challenges, they may be in a state of anxiety or even panic and are thus unable to invest their attention in their work effectively. On the contrary, if assigned too many simple tasks, employees may become bored and indifferent (Engeser & Baumann, 2016).

This theory about the antecedents of flow also implies that there is a relationship between this construct and stress. Indeed, scholars have noted that individuals typically experience flow in situations characterized by low to medium levels of stress (Feng, 2022a, 2022b; Peifer et al., 2014; Peifer & Zipp, 2019; Weimar, 2005). Moreover, the transactional theory of stress suggests that if an employee appraises a certain task as personally relevant (i.e., benign, harmful, or threatening) and considers the task as having demands that exceed their coping resources, the individual will experience stress. The response to this appraisal is determined by the employee judging whether they can take action or make efforts to cope with these demands (Lazarus & Folkman, 1984). Therefore, flow is described as a cognitive strategy used to cope with stressful demands that is integrated into the transactional model of stress and flow (Weimar, 2005). Following this vein, Peifer et al. (2014) believed that a task can be transformed into a flow experience when it is interpreted as challenging (Csikszentmihalyi, 1990; Peifer & Tan, 2021).

Based on this, we clarify the sustainability of flow using the stress-related theories in this article. Specifically, we used the JDR model in the intraday model, and we adopted the SCM to capture the spillover of flow-related elements in the inter-day model.

The JDR model

The JDR model is a unified job design theory that integrates various viewpoints on tension and motivation (Bakker & Demerouti, 2017; Bakker, Demerouti, & Sanz-Vergel, 2023; Van Veldhoven, Van den Broeck, Daniels, Bakker, Tavares, & Ogbonnaya, 2020). Due to its extensive alignment with reality and its ability to comprehensively explain theories, the JDR model has been used to investigate employees' job attitudes, well-being, and performance in different occupations and organizations (Bakker, Demerouti, & Sanz-Vergel, 2023; Lee, Kee, Lau, & Jan, 2023; Lesener, Gusy, & Wolter, 2019). The first assumption of the JDR is that although all organizations are unique and their work may have different features and characteristics, all these job features and characteristics can be modeled using two distinctive categories: challenging demands and job resources (Bakker & Demerouti, 2017; Bakker, Demerouti, & Sanz-Vergel, 2023; Demerouti et al., 2001). Job demands are the physical, psychological, or organizational aspects that require continuous physical and psychological efforts, and they are related to specific physical and psychological costs (Bakker & Demerouti, 2017; Demerouti et al., 2001), such as time urgency and organizational politics. The concept of job resources refers to employees achieving their work goals, reducing the physical and psychological costs related

to their job demands, and stimulating their personal growth, learning, and development. Some examples of job resources include autonomy and job feedback (Demerouti et al., 2001).

The second assumption of the JDR model is that employees' well-being originates from two relatively independent processes: (1) The health impairment process, during which long-term job demands exhaust employees' resources and lead to energy consumption (burnout) and health-related problems; and (2) the motivational process, which is when job resources exert their incentive potential and lead to a positive emotional state (i.e., job engagement), which leads to employees performing better as well as experiencing increased satisfaction and organizational commitment (Bakker & Demerouti, 2017; Li, She, & Gu, 2023).

The original JDR model broadly defined two basic job characteristics, with subsequent researchers distinguishing between the types of job demands and resources in a more detailed manner. For example, Hakanen, Bakker, and Turunen (2021) compared the relative importance of various job resources to individuals, and they identified the three most prominent resources: (1) skill dismissal; (2) job feedback; and (3) team empowerment. Moreover, based upon whether job demands are appraised as opportunities for or obstacles to personal growth and well-being (i.e., the preliminary appraisal) and whether actions can be taken to improve the stressful situation through various coping methods (i.e., the secondary appraisal), they can be conceptualized as a challenge or hindrance (Bakker & Sanz-Vergel, 2013; LePine, Zhang, Crawford, & Rich, 2016; Schilbach, Arnold, Baethge, & Rigotti, 2023). Challenging demands are tasks that require effort but present personal growth and rewards after they are handled, such as time pressures and responsibility. By contrast, hindrance demands have no potential for personal growth and reward, such as role conflict, interpersonal conflict, and organizational politics (Bakker & Sanz-Vergel, 2013; LePine et al., 2016). An investigator adopting this framework confirms that both kinds of demands positively relate to strain. However, challenging demands induce individuals' positive emotions and their problem-solving skills, while hindrance demands arouse individuals' negative emotions and avoidant coping strategies. As such, they have opposite influences on employees' attitudes, emotions, and motivation to work (Bakker & Sanz-Vergel, 2013; Lepine, Podsakoff, & Lepine, 2005; LePine et al., 2016).

An upward spiral triggered by flow experience

Based on the two kinds of job demands, we posit that challenging demands can activate a flow state in two ways. First, individuals who regard a task as challenging will believe that despite the high demand, they can use their skills to improve the stressful situation, which meets the challenge-skill balance prerequisite for activating flow (Csikszentmihalyi, 1990). For instance, Ceja and Navarro (2012) found that individuals perceiving tasks as having challenges plays a key role in the change of flow over time. Second, overcoming challenging demands allows employees to gain potential benefits and ensures the possibility of their growth, thereby encouraging individuals to fully devote themselves to the current task (LePine et al., 2016; Peifer et al., 2014). Bricteux, Navarro, Ceja, and Fuerst (2017) showed that the balance between challenges and skills can lead to a flow experience only when individuals perceive tasks as beneficial and when the tasks generate interest. Therefore, the motivation to activate individuals' efforts through challenging demands may be the key to activating flow experiences (Bakker & Van Woerkom, 2017). Additionally, other impacts of challenging demands identified in the literature include positive emotions and happiness (Widmer, Semmer, Kälin, Jacobshagen, & Meier, 2012), with the latest studies also confirming that there is a positive correlation between tasks' challenging components and employees' flow experiences (i.e., Feng, 2022b; Van Oortmerssen, Caniëls, & Van Assen, 2020). Therefore, we propose the following hypothesis:

Hypothesis 1a: Challenging demands are positively associated with workflow experience.

In the aforementioned challenge-skill balance, "skills" refer to the employees' personal resources they have available to deal with challenges, with the role of job resources being further examined

(Bakker & Van Woerkom, 2017; Fagerlind, Gustavsson, Johansson, & Ekberg, 2013; Liu, Bakker, Tse, & Van der Linden, 2022; Liu, Van der Linden, & Bakker, 2022). Job resources provide employees with information about the results of their activities, give employees' work meaning, and increase employees' responsibility (Bakker & Van Woerkom, 2017), all of which encourage employees to pursue relatively challenging tasks (Fan, Hou, & Lin, 2019). Another view comes from the job resource nature of the flow experience: One of the basic principles of the conservation of resources (COR) theory is that individuals are inherently motivated to strive to acquire, retain, cultivate, and protect what they centrally value. Thus, individuals with high-resource endowments have higher motivation levels and the ability to expand their resource pool via investments. Especially when they are facing slightly stressful demands, individuals identifying their potential resource gains, such as by experiencing flow, become more important as these gain in value. Furthermore, the resource caravan and passageway corollary suggest that resources often exist in packages or caravans, so abundant work resources and personal resources are likely to support and maintain each other (Dechowatnapaisal, 2022; Hobfoll, 2002, 2011; Hobfoll et al., 2018), which is more conducive to promoting individuals' flow experiences. For example, Salanova, Bakker, and Llorens (2006) found that the comprehensive index of five kinds of work resources (i.e., skill diversity, task identity, task importance, autonomy, and feedback, Sibunruang & Kawai, 2023) was positively correlated with flow, and Fullagar and Kelloway (2009) identified a positively correlated relationship between skill diversity and autonomy and flow experience. Moreover, Bakker's (2005) study showed that teachers with high autonomy, social support, and feedback are most likely to experience flow at work, and Tadić, Bakker, and Oerlemans (2015) used a diary study to determine that job resources such as coaching, opportunities for self-growth, and feedback can predict the core dimensions of flow. In contrast, the lack of job resources impairs employees' initiative because it hinders their realizing their practical goals, and it destroys employees' learning opportunities (Fagerlind et al., 2013). Taken together, employees with more resources (i.e. skills and job resources) are most likely to experience flow.

Therefore, we propose the following hypothesis:

Hypothesis 1b: Job resources are positively associated with workflow experience.

Scholars are increasingly aware that flow experience is a dynamic and continuous process as both constant feedback and employees' adaptations to tasks promote the continuous evolution of the challenge-skill balance (Csikszentmihalyi, 2014; Nakamura & Csikszentmihalyi, 2009, 2014). Indeed, Šimleša et al. (2018) used the input–process–output framework, in which they added retroaction loops, to explain the functional mechanism of flow. In this model, the input comprised the challenging demands and job resources mentioned above, the process denoted the participants' automatic attention and intrinsic motivation, and the output referred to task achievement, positive emotions, and employees feeling as though they were in control of the whole situation (Csikszentmihalyi, 2014; Šimleša et al., 2018). In terms of creating a flow cycle, these results may nourish next-round inputs.

We also suggest that flow experience may encourage employees to seek more challenging tasks (i.e., challenging demands). According to Fredrickson's (2001) broaden-and-build theory (BnB), the positive emotions brought by flow expand individuals' attention, cognition, and action scope, which may allow them to identify more opportunities for growth or rewards in tasks (the broaden hypothesis; Fredrickson, 2001). Moreover, the expanded instantaneous thinking-action scope allows individuals to build lasting personal resources, such as problem-solving skills and new knowledge (the build hypothesis). Under these two forces, we propose that individuals who have experienced flow have the ability and motivation to seek more challenges to obtain continuous positive experiences. That is, "to experience flow again, they will set themselves more challenging tasks" (Bakker, Oerlemans, Demerouti, Slot, & Ali, 2011, p. 444; Philip, 2023). Schuler and Brunner (2009, p. 173) observed that the flow experience in marathons is related to the motivation to run in the future: "Flow functions as a reward of the running activity, which leads to the desire to perform the activity again" (p. 173). Recent

research on how flow leads to addictive behavior also stated that when individuals feel in control of the situation and are experiencing positive emotions caused by flow, they may even underestimate the risks and continue to pursue similar and higher-level challenges (Costantini, 2022; Ramsey & Lorenz, 2020; Zimanyi & Schüler, 2021). Thus, we propose the following hypothesis:

Hypothesis 2a: Workflow experience is positively associated with challenging demands.

In addition, flow experience may encourage employees to obtain job resources. According to the idea of the cycle of resources suggested by the COR, individuals with more resources have more ability and motivation to gain resource benefits, while those who lack resources are more susceptible to resource loss (Hobfoll, 2002, 2011; Hobfoll et al., 2018). That said, the loss and gain of resources cumulate over time and eventually trigger the resource gain/loss spiral or resource caravans (Hobfoll, 2002, 2011). Therefore, resources, in terms of flow experience, may increase individuals' ability to continuously acquire more resources. Accordingly, based on the principles of the COR theory and BnB, Salanova et al. (2006) first identified the reciprocal association among flow, personal resources, and job resources over time. Furthermore, Xanthopoulou, Bakker, Demerouti, and Schaufeli (2009) believed that the core dimension of work engagement in flow stimulates self-enhancement through learning and goal realization (i.e., the broadening effect in the BnB), thereby building both job and personal resources. In addition, Llorens, Schaufeli, Bakker, and Salanova (2007) found that task resources contribute to students' work engagement, which further increases their task resources over time.

According to our theory and the core of the JDR model, assuming that flow experiences encourage individuals to seek challenging demands means that they also need more resources as, after a long-term lack of job resources, employees may feel the draining effects of challenging demands (Bakker, Demerouti, & Schaufeli, 2003), and they may exhibit job withdrawal behaviors to protect themselves against exhaustion (Hoare & Vandenberghe, 2022). Although research by Bakker and Demerouti (2017) suggested a complementary relationship between personal and job resources, under the premise of our proposed challenge-skill balance (i.e., personal resources), there may be no excess personal resources to complement the functionality of job resources. In this sense, individuals entering flow may have increased motivation to continuously obtain external feedback, autonomy, and other job resources, thereby maintaining their peak state. Thus, we propose the following hypothesis:

Hypothesis 2b: Workflow experience is positively associated with job resources.

Spillover of challenging demands and job resources

In recent decades, changes in work expectations and family responsibilities have made it more challenging for employees to achieve work–family balance. Indeed, the family and work domains are so closely linked that mutual interference between elements seems inevitable (Hetrick, Haynes, Clark, & Sanders, 2023). Therefore, this section proposes that flow, challenging demands, and job resources may spill over from work to nonwork hours based on two theories.

First, the PCT holds that employees may repeatedly think about work after their workday has finished, resulting in their work-related rumination that prolongs their daytime psychological and physiological activation (Brosschot, Gerin, & Thayer, 2006). Cropley, Michalianou, Pravettoni, and Millward (2012) further distinguished the types of work rumination based on their focus and valence: (1) affective rumination, which refers to individuals repeatedly thinking about uncontrollable and adverse events (Calderwood, Bennett, Gabriel, Trougakos, & Dahling, 2018); and (2) problem-solving pondering, which denotes individuals' continuous psychological examinations of current tasks or evaluations of previous work, including their thinking about an old problem from a new perspective or developing creative ideas for upcoming events (Cropley & Zijlstra, 2011; Kinnunen et al., 2017).

Recent studies confirmed that problem-solving pondering prolongs individuals' cognition and reaction to challenging demands because they think that tasks can be solved through their efforts, and they consider the potential benefits (Feng, 2022b; Syrek, Weigelt, Peifer, & Antoni, 2017). As such, it is worth investing more resources in thinking during nonworking hours.

Furthermore, the SCM proposes two ways of transferring experience from the work domain to the family domain. "Spillover" refers to the intra-individual transfer of experience from work to the nonwork domain, while "crossover" denotes inter-individual transfer among individuals. The daily work experience is transferred to related people via social interactions (Bakker et al., 2014). Although the SCM was initially applied in the study of the adverse effects of this transfer on the family domain, research has not only extended work experience to experiences other than stress but has also shown that positive spillover is possible (Demerouti et al., 2012; Rodríguez-Muñoz, Sanz-Vergel, Demerouti, & Bakker, 2014). Flow experience as well as the challenging demands and job resources that induce it have several benefits for employees, such as increasing motivation, positive emotions, and satisfaction as well as improving physical health through, for example, reducing depression and anxiety. We propose that these positive influences can extend beyond work. Under the guidance of perseverative cognition of challenging demands, spillover resources can be used to handle these rewarding tasks, thereby causing employees' problem-solving pondering. Therefore, we propose the following hypothesis:

Hypothesis 3: Challenging job demands (H3a), job resources (H3b), and workflow (H3c) are positively associated with problem-solving pondering.

Cross-day effect of problem-solving pondering

Rumination prolongs individuals' cognitions and their reactions to stressors, thus making it incompatible with psychological detachment and recovery. However, it does not necessarily generate negative impacts as this depends on whether rumination improves or hinders individuals in achieving their goals (Cropley & Zijlstra, 2011). In this vein, some scholars have argued that if employees think about work-related issues during off-duty hours and find a solution or positively reappraise their work, they may experience positive emotions and a sense of accomplishment, thus accelerating their recovery process (Syrek et al., 2017; Vahle-Hinz, Mauno, de Bloom, & Kinnunen, 2017; Wach et al., 2021). Problem-solving pondering involves ruminating over emotionally neutral and constructive ideas, which enables employees to get closer to solutions, and it can thus be regarded as a process of acquiring resources (Cropley & Zijlstra, 2011; Vandevala et al., 2017; Wach et al., 2021). This reasoning is supported by the COR theory: If thinking about work-related problems in spare time (i.e., resource investment) leads to an individual solving a problem (i.e., the increase of resources over time), the strain will be reduced, and positive emotions will be generated (Frone, 2015; Vahle-Hinz et al., 2017).

Furthermore, problem-solving pondering may constitute exploration and can prepare employees for future work (Zhang, Li, Ma, & Smith, 2021). For instance, Wach et al. (2021) stated that entrepreneurs experience more positive emotions by evaluating different solutions in their minds as it improves their happiness and resource acquisition abilities (Kinnunen, Feldt, & Bloom, 2019; Kinnunen et al., 2017). In addition, the new environment of being at home may stimulate employees to think outside of the box and establish new and unusual connections (Martindale, 1999), thereby facilitating their generation of more innovative ideas. Thus, problem-solving pondering from the previous evening can unsurprisingly have a significant positive impact on individuals' next-day creativity (Weinberger, Wach, Stephan, & Wegge, 2018). Studies that have used employees as samples also found that the positive effect of problem-solving pondering on work content has strong stability across time, such as 1-year creativity (Vahle-Hinz et al., 2017; Zubair & Kamal, 2015), job involvement after 2 years (Kinnunen et al., 2017), and initiative and organizational citizenship behaviors that last longer than a month (Binnewies, Sonnentag, & Mojza, 2009).

In summary, thinking about work-related issues at night helps employees seek more challenging tasks the next day. Additionally, according to the COR theory, as a process of resource accumulation, this rumination allows employees to acquire the necessary resources, thus promoting their next-day resource-seeking. As a result, employees are more likely to enter a flow state (Gerpott, Rivkin, & Unger, 2021). Therefore, we propose the following hypothesis:

Hypothesis 4: Problem-solving pondering is positively associated with next-day challenging job demands (H4a), job resources (H4b), and workflow experience (H4c).

Summary of the study

Integrating the above analysis, we propose that challenging demands and job resources activate employees' daytime flow experiences. Furthermore, employees in this state are motivated by tasks, they experience a sense of accomplishment and positive emotions, and they are more likely to seek more challenges and gain more resources. These positive experiences then induce them to think positively during nonworking hours through perseverative cognition and the spillover effect. By ruminating over how to accomplish future tasks in creative and positive manners, employees can overcome increasingly difficult challenges and obtain more resources, thereby promoting their flow experiences. Thus, we propose the following hypothesis:

Hypothesis 5a: Activated by challenging demands and job resources, flow experiences sustain individuals' growth via promoting their search for more challenging demands and job resources.

Hypothesis 5b: Activated by the spillover effect of challenging demands and job resources, problem-solving pondering increases employees' next-day flow via promoting their search for more challenging demands and job resources.

Methods

Procedure and sample

We implemented a 10-day sophisticated diary study that combined the advantages of both experience sampling and day reconstruction (Wach et al., 2021). The experience sampling method was used to capture employees' instantaneous experiences, and the day reconstruction was employed to evaluate their overall experiences over time (Wach et al., 2021). Our data were collected from eight scientific and technological enterprises in southwest China. From these organizations, 251 employees were invited to participate via e-mail, with 189 ultimately agreeing to participate and register on Question-Star (an online platform providing questionnaire distribution and analysis functions). We excluded employees who had been in their current positions for fewer than 3 months and those who worked fewer than 20 hr a week. This resulted in a sample of 159 employees who met the survey requirements. Before the survey, all the subjects provided their demographic information. We emphasized that participation was voluntary, and we ensured the anonymity and confidentiality of the participants' data. The subjects who completed the survey received a book coupon worth 50 RMB (7 USD).

Studies on flow have typically randomly invited subjects to respond within certain time intervals (e.g., Fullagar & Kelloway, 2009; Liu et al., 2022, 2022). Because the time and content of the survey are determined in advance (predictable), the subjects will feel less disturbed, and measuring variables at fixed times also allows us to infer their periodicity (Fisher & To, 2012; Gabriel et al., 2019). We performed three measurements in 1 day, and there were many items in each measurement due to the

operating times of these enterprises (8:00–12:00; 14:00–18:00). Using Wach et al.'s (2021) study as a basis, we programmed the platform to send the invitations to the participants at five-time points for different purposes: (1) 10:00 (morning) for challenging demands and job resources; (2) 12:00 (noon) for flow; (3) 16:00 (afternoon) for challenging demands and job resources; (4) 18:00 (evening) for flow; and (5) 21:00 (night) for rumination. The subjects were required to fill in the questionnaires within 30 min (morning: $M = 10:16$, $SD = 3.19$ min; noon: $M = 12:06$, $SD = 2.33$ min; afternoon: $M = 16:12$, $SD = 2.57$ min; evening: $M = 18:15$, $SD = 3.19$ min; night: $M = 2:11$, $SD = 2.92$ min). The data that included obvious answering rules (e.g., 123,456) or logical errors (e.g., age = 25 but tenure = 10 years) were excluded. Moreover, the days in which the participants worked <4 hr or took sick leave were also excluded.

From this, we obtained 1,208 data points from 142 employees in 10 working days (1,137 data points in nine days). We tested the intraday model with the complete dataset (i.e., the 10 working days), and we tested the inter-day model using the dataset comprising 9 working days. The response rate was 85.07% ($1,208/142 \times 10$). The employees in the sample worked in different departments, including human resources (16.9%), accounting (22.2%), operations (21.1%), sales (12.7%), research and development (16.9%), and miscellaneous (10.2%). The sex ratio of the subjects was similar (female = 59.16%, male = 40.84%), and the age range was 23–45 years, with the average age being 29.37 ($SD = 3.22$) years. Lastly, the majority of the participants had bachelor's degrees (95.07%) and comprised general staff (75.35%).

Measuring instruments

The scales we used went through a translation and back-translation procedure. Unless otherwise specified, we used the standard six-point Likert scale (1 = “never” to 6 = “always”) to avoid the trend of participants choosing the middle values. As is common in diary studies, we adopted the simplified version of the scale to reduce the subjects' boredom caused by multiple measurements over 10 days (Junker, Baumeister, Straub, & Greenhaus, 2020; Uy, Foo, & Ilies, 2015; Wach et al., 2021). As adopted in previous studies (e.g., Gerpott, Rivkin, & Unger, 2021; Uy, Foo, & Ilies, 2015; Wach et al., 2021; Zheng, Ni, Zhu, Song, Liu, & Johnson, 2022), the instructions for the measures were adapted to align with their corresponding measurement time. That is, we used “During this morning/afternoon ...” for all daytime measures and “Today, after work ...” for the night measures.

Despite myriad forms of challenging demands and job resources, based on previous research (e.g., Hakanen, Bakker, & Turunen, 2021; Pearsall, Ellis, & Stein, 2009; Razinskas, Weiss, Hoegl & Baer, 2022), we only tested the two most typical types. The first was challenging demands (R1), which was evaluated using Maruping et al.'s (2015) four-item time pressure scale that reflects the extent to which employees feel that they have little time to complete their work. An example item is “The amount of time provided to complete my tasks is short.” The Cronbach's α across the days for this measure was .81–.95. The challenging demands (R2) were then assessed using Goh, Ilies, and Wilson's (2015) four-item daily workload scale, with an example being: “I have to deal with a work backlog.” The responses were scored on a six-point scale (1 = strongly disagree to 6 = strongly agree). The Cronbach's α for this measurement across the days was .75–.94.

Job resources (R1) were assessed by employing Karasek's (1979) six-item skill discretion scale, an example of which is: “My work requires that I learn new things.” The Cronbach's α for this across the days was .90–.96. The job resources (R2) were then measured using Kerr's and Jermier's (1978) three-item job feedback scale. A sample item is: “I can tell right away from the results I get whether I've done it correctly,” with the items being rated on a six-point scale (1 = strongly disagree to 6 = strongly agree). The Cronbach's α for this measurement across the days was .85–.95.

To assess daily flow experience, we used Engeser's and Rheinberg's (2008) 10-item scale that includes two dimensions: (1) absorption and (2) fluency. The sample items are “I did not notice time passing” and “My thoughts/activities ran fluidly and smoothly,” respectively. The Cronbach's α for this across the 10 days was .82–.92.

Problem-solving pondering was then measured using all three of the items from the short version of the Work-Related Questionnaire (Querstret & Cropley, 2012) that was adapted by Junker et al. (2020). The sample item is “I found myself re-evaluating something I have done at work.” The Cronbach’s α for this measurement across the days was .80–.89.

We also included control variables in our analyses. At the between-person level, we controlled for the participants’ demographic information, comprising their gender, age, education levels, and tenure. Moreover, we controlled for the participants’ daily sleep efficiency at the within-person level as sleep plays an essential role in connecting 2 days’ emotions with resources (Demsky, Fritz, Hammer & Black, 2019), and it also allowed us to rule out the alternative explanation in the form of the influence of perseverative cognition (Wach et al., 2021). We provided all the subjects with an Actiwatch, which is a pocket-sized, lightweight activity monitor worn on the wrist that automatically collects and analyzes users’ sleep data. In accordance with existing studies (e.g., Jenkins et al., 2022; Rupp & Balkin, 2011; Wach et al., 2021), we obtained the subjects’ sleep data from the Sunday to Thursday nights during the period of study and adopted standard algorithms to analyze their total time in bed (hours), total time asleep (hours), and sleep efficiency. Their sleep efficiency was calculated by determining the ratio between the portion of sleep time over 1 night to their total sleep time over the 10 days. Notably, our model was still robust whether these control variables were added or removed.

Validity test

Before testing the hypotheses, we tested a series of measurement models in Mplus 8.4. For the in-traday model, the five-factor model ($\chi^2[82] = 193.88, p < .05$, root mean square error of approximation [RMSEA] = .06, comparative fit index [CFI] = .96) fit the data better than the alternative models, such as the model that had all the items loaded on one-factor ($\chi^2[64] = 1104.51, p < .05$, RMSEA = .28, CFI = .65) or a three-factor model (challenging demands + job resources = R1; flow, challenging demands + job resources R2; $\chi^2[76] = 750.64, p < .05$, RMSEA = .09, CFI = .72). In addition, we compared the proposed model to the alternative causality model (i.e., flow being regarded as the starting point that affects all demands and resources). Our model was determined to be more effective than the causality model ($\chi^2[82] = 250.79, p < .05$, RMSEA = .09, CFI = .81). We also compared our model against the reciprocity model, which changed the unidirectional influence of flow and challenging demands (R1) and job resources (R1) into mutual influences, but this model was not a significant improvement on ours ($\chi^2[80] = 348.79, p < .05$, RMSEA = .07, CFI = .90).

Similarly, we confirmed our inter-day model as the optimal preset model. First, a five-variable model that included job demands and resources (R2) as well as problem-solving pondering, challenging demands, and job resources (R3) was compared to a model in which these five variables were loaded into one factor. The degree of fit for the five-factor model ($\chi^2[142] = 266.51, p < .05$, RMSEA = .05, CFI = .95) was determined to be better than that of the single-factor model ($\chi^2[156] = 1802.01, p < .05$, RMSEA = .15, CFI = .65). Similarly, the preset model was found to be better than the causality model ($\chi^2[148] = 412.59, p < .05$, RMSEA = .13, CFI = .78) and the reciprocity model ($\chi^2[146] = 576.13, p < .05$, RMSEA = .10, CFI = .73). Therefore, our measures were determined to have good discriminant validity.

Results

Preliminary analyses

The means, standard deviations, and correlation coefficients were calculated, demonstrating that challenging demands, job resources, flow, and problem-solving pondering are positively associated, regardless of when they are measured (see Table 1).

Table 1. Descriptive statistics and correlations

Variable	M	SD	1	2	3	4	5	6	7
1. Challenging demand (R1)	3.92	.72	-						
2. Job resource (R1)	3.81	.63	.11**	-					
3. Flow experience (R1)	4.09	.70	.34**	.17**	-				
4. Challenging demand (R2)	3.95	.81	.56**	.13**	.36**	-			
5. Job resource (R2)	3.84	.87	.14**	.49**	.45**	.13**	-		
6. Flow experience (R2)	3.66	.68	.20**	.15**	.61**	.23**	.40**	-	
7. Problem-solving pondering (R1)	3.78	.94	.07	.12**	.03	.19**	.32**	.28**	-

** $p < .05$.

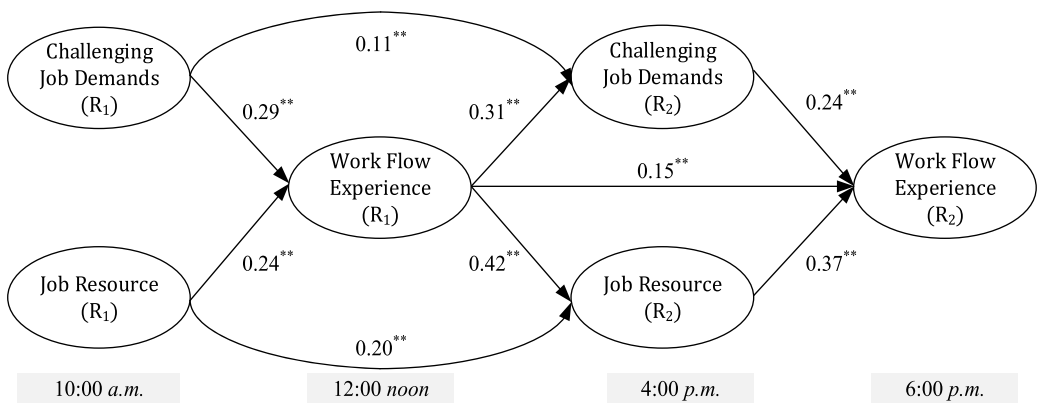


Figure 2. Results of intraday model.

Note: It should be emphasized that what factors activate flow (demand and resources) and whether and how these factors spill over into the family field (based on SCM or PCT) have received a lot of support from the literature. Therefore, we did not examine specific demands and resources in this paper but focus on the flow and spillover effects caused by them.

Hypothesis test

We tested all hypotheses using structural equation modeling in Mplus 8.4, the results of which are summarized in Figs. 2 and 3. According to the intraday model shown in Fig. 2, challenging job demands and job resources in the morning positively affected the participants’ flow experience ($\beta = .29, p < .05; \beta = .24, p < .05$, respectively), and their flow experiences positively predicted challenging demands and job resources in the afternoon ($\beta = .31, p < .05; \beta = .42, p < .05$, respectively). Moreover, challenging demands and job resources in the afternoon positively affected flow experiences in the evening ($\beta = .24, p < .05; \beta = .37, p < .05$, respectively). To test the mediating effect, we adopted the nonparametric bootstrapping approach used by Peifer and Zipp (2019), and we found that the indirect effect of challenging demands (R1) on job resources (R2) was significant ($b = .17$, 95% confidence interval [CI] = [.10, .33]) and that the indirect effect on challenging demands (R2) was also significant ($b = .12$, 95% CI = [.06, .24]). Similarly, the indirect effect of job resources (R1) on challenging demands (R2) was significant ($b = .42$, 95% CI = [.03, .12]), the indirect effect on challenging demands (R2) was also found to be significant ($b = .20$, 95% CI = [.16, .40]), and the indirect effect of flow (R1) on the flow (R2) through challenging demands and job resources was also significant ($b = .17$, 95% CI = [.07, .31]; $b = .34$, 95% CI = [.12, .29], respectively).

According to the inter-day model shown in Fig. 3, challenging demands and job resources positively affected the participants’ problem-solving pondering ($\beta = .38, p < .05; \beta = .19, p < .05$,

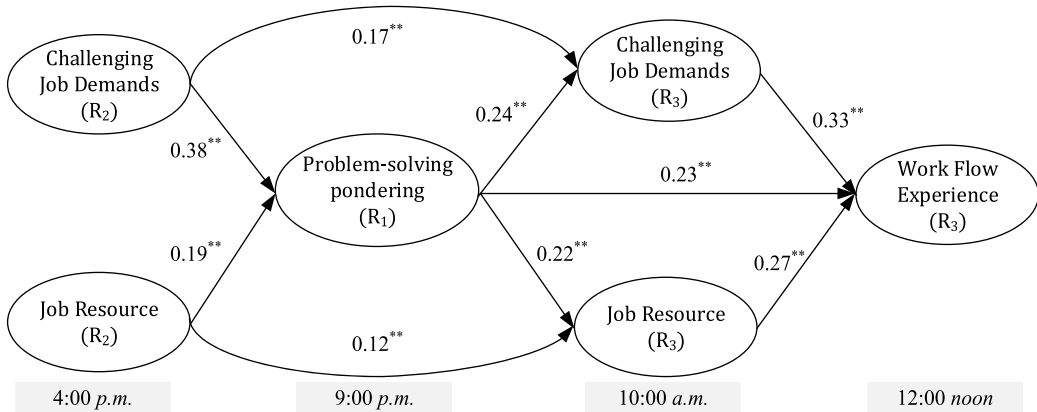


Figure 3. Results of inter-day model.

respectively). Moreover, the participants' problem-solving pondering positively predicted their next-day challenging demands and job resources ($\beta = .24, p < .05$; $\beta = .22, p < .05$, respectively) as well as their flow experiences ($\beta = .23, p < .05$). These findings support Hypotheses 1–4.

In terms of problem-solving pondering, the indirect effect of challenging job demands (R₂) on next-day job resources (R₃) and challenging job demands (R₃) were both found to be significant ($b = .15, 95\% \text{ CI} = [.10, .34]$; $b = .16, 95\% \text{ CI} = [.15, .30]$, respectively). Similarly, the indirect effect of job resources (R₂) on next-day job resources (R₃) and challenging job demands (R₃) were both significant ($b = .35, 95\% \text{ CI} = [.05, .32]$; $b = .21, 95\% \text{ CI} = [.08, .26]$, respectively). Finally, the indirect effects of problem-solving pondering on next-day flow (R₃) through challenging demands (R₃) and job resources (R₃) were both significant ($b = .11, 95\% \text{ CI} = [.08, .23]$; $b = .23, 95\% \text{ CI} = [.16, .31]$, respectively). These findings support Hypotheses 5.

Discussion

In this study, we proved that challenging demands and job resources promote employees' flow experience, which, in turn, encourages them to seek more challenging demands and job resources. Challenging demands and job resources can spill over to the family domain and lead to positive rumination (i.e., problem-solving pondering), which increases individuals' next-day positive work experiences, including their challenging demands, job resources, and, ultimately, their flow experience.

Theoretical implications

This study makes theoretical contributions in several important areas. First, our study extends the emerging research on flow experience at work by building on a model that spans different fields and cycles. The literature has separately investigated either the prerequisites or consequences of flow (e.g., Csikszentmihalyi, 2014; Feng, Han, & Terpstra Tong, 2023; Nakamura & Csikszentmihalyi, 2009, 2014; Van Oortmerssen et al., 2020; Xie & Feng, 2023), but it has not examined the potentially reciprocal relationship even though the basic elements of the JDR model and the COR theory (i.e., challenging demands and job resources) have indicated such a possibility (Bakker et al., 2023; Hobfoll et al., 2018; Philip, 2023; Philip & Kosmidou, 2023). As a result, researchers still largely regard flow as a fragile, fleeting, and exclusive experience. However, by integrating the current findings into the working context and expanding the investigation to nonworking hours, our theories clearly show that flow experience has a self-enhancement capability across time and domains. This understanding is important as, first, flow at work is a newly developed construct and there is an urgent need to expand

its nomological networks, and second, several studies have noted that flow's potentially dark side also stems from its persistence as it, for example, prompts employees to keep thinking about work while at home. In this regard, our "work-home-work" cycle theory may lay an explanatory framework that can be used to facilitate novel discussions on whether positive work experiences come at the expense of workers' family life.

Second, this paper builds on the current academic dialogue surrounding the JDR model. Although this theory initially proposed the direct one-way causal relationship among challenging demands, job resources, and results, scholars have recently proposed that there may be a cycle among these elements (e.g., Bakker & Demerouti, 2007; Bakker et al., 2023; Xanthopoulou, Bakker, Demerouti & Schaufeli, 2007). However, as a heuristic model, the JDR model hints at "what kind of job and personal characteristics lead to what kind of psychological states and outcomes but does not tell us why this would be so" (Bakker et al., 2014, p. 55). The fact that this model only provides limited insights into the psychological mechanisms involved is considered a salient limitation (Bakker et al., 2023; Ramos, Mustafa & Zainal Badri, 2022; Schaufeli & Taris, 2014). In addition, in Demerouti's and Bakker's (2023) extended theory of the JDR model, they speculated that the availability of resources from different life domains may enhance challenging demands and job resources and vice versa. Thus, our intraday and inter-day models provide some insights into these issues as our results show that flow and the rumination caused by it (regarded as flow's counterpart in nonworking hours) can provide subtle and meaningful procedural explanations for the upward spiral of specific challenging demands and job resources. Thus, we could increase the explanatory power of the JDR model (at least for challenging demands) to understand occupational health and well-being in more complex settings in the future.

Third, we expand on the SCM by connecting positive rumination to daily positive experiences. Research based on the PCT has mostly investigated toxic working environments or stressful demands (e.g., Blanco-Encomienda, García-Cantero & Latorre-Medina, 2020; Brosschot, Gerin, & Thayer, 2006). Through this study, we supplement the mainstream view that all ruminations are always harmful to personal well-being, in that they impair psychological detachment and recovery (Feng, 2022a, 2022b) as our research identifies that problem-solving pondering may be a counterpart of employees' daily flow experiences in nonworking hours, which allows them to prepare for the next day's challenging demands. Although we did not test the influence of negative rumination (i.e., affective rumination) and other energy losses, in theory, flow and other positive experiences may inhibit these processes because of the spillover of positive emotion caused by them (Demerouti et al., 2012; Salanova et al., 2006). Nevertheless, scholars have recently noted that thinking about tasks at home may cause dissatisfaction in employees' spouses or can lead to family conflicts (Feng et al., 2023; Junker et al., 2020; Peifer & Zipp, 2019; Schüler, 2012). Therefore, perseverative cognition may be a double-edged sword not only for individuals themselves (next-day positive experience vs. today's recovery) but also for their lives (next-day work vs. today's families; Wach et al., 2021). We encourage future researchers to integrate workers' daytime experiences and all types of rumination when determining the gains and losses in both work and family domains to gain a more comprehensive understanding.

Practical implications

Our findings offer new insights into job design. First, managers can create a workplace that is rich in challenging demands and sufficient job resources, thus allowing employees to frequently enter flow states. For example, they can determine project deadlines or assign workloads to specific employees, which will ensure their autonomy as well as timely feedback on work effectiveness (Hakanen, Bakker, & Turunen, 2021). Moreover, employees can increase their intense challenging demands by tailoring their jobs to their needs or setting specific goals and rewards (Bakker & Van Woerkom, 2017; Mukherjee & Dhar, 2023). Moreover, recent studies have found that hindrance demands invalidate

the positive role of challenging demands (Pearsall, Ellis, & Stein, 2009), so managers should try to eliminate these factors in their organizations.

Second, organizations should implement policies that simultaneously promote employees' reflection and recovery. For instance, leaders can require followers to write daily summaries that include "three little good things" (Bono et al., 2013), and employees can recall their positive experiences in diaries before they leave work or when going to bed so as to cope with the next-day challenge as these positive reflections might allow employees to reappraise stressful situations (Wach et al., 2021). However, since rumination is incompatible with recovery and may lead to work–family conflicts (Junker et al., 2020; Wach et al., 2021), employees should engage in some absorbing leisure activities, such as physical exercise, meditation and mindfulness, and socializing with their spouses or children, which will enable them to completely switch off after work (Hafenbrack, Kinias, & Barsade, 2014; Haun, Nübold, & Rigotti, 2020). Achieving the balance between the two allows employees to feel energized and rested the next day, and it allows them to prepare for more challenging tasks.

Limitations

This study has several limitations. First, due to the nonexperimental nature of this study, our results still need to be interpreted cautiously. In addition, this study relied on self-reported data, which is common in diary and daily studies (e.g., Uy, Foo, & Ilies, 2015; Wach et al., 2021), but our results could be affected by common method variance. As such, future research should break new ground by combining subjective and objective measures, such as triangulating employees' challenging demands and job resources with their leaders', colleagues', and spouses' perceptions as well as expanding the investigation of flow experience to objective physiological indicators, such as eye movement frequencies or pupil dilation changes (Harris, Vine, & Wilson, 2017; Mauri, Cipresso, Balgera, Villamira, & Riva, 2011). Moreover, as we studied flow experience at a relatively micro level (i.e., daily), another promising research avenue may lie in adopting longer time frames (e.g., weekly or monthly) to generate more holistic knowledge on how flow experiences unfold and evolve over time (Li, Tuckey, Bakker, Chen, & Dollard, 2022; Liu et al., 2022, 2022; Salanova et al., 2006). Furthermore, we measured challenging demands and job resources 2 hr after employees started work and then measured their flow 2 hr later, so future research can adjust the measurement interval appropriately by, for example, investigating whether challenging demands encountered 1 hr after starting work are still related to the employees' flow state 3 hr later.

Second, while our sample consisted of general employees from Chinese high-tech enterprises, it was not strictly homogeneous as the participants worked in different departments, and we focused more on psychological processes than group comparisons. Therefore, obtaining representative samples should be a priority in future studies (Xanthopoulou et al., 2007). It remains unclear whether our current findings are applicable to other positions, industries, or cultural contexts as, notably, studies have noted cultural differences in how individuals attribute rumination, which may lead to cultural differences in the relationship between rumination and employees' well-being (Choi & Miyamoto, 2023; Grossmann & Kross, 2010; Kwon, Yoon, Joormann, & Kwon, 2013). For example, employees from Eastern society are more likely to ruminate about improving their work after their work day has concluded as they place greater emphasis on collectivism and social or family responsibilities engendered by their having jobs (Elizur, Borg, Hunt, & Beck, 1991), but cross-cultural studies have also shown that rumination may generate weaker maladaptive effects in Eastern than Western cultural contexts (Choi & Miyamoto, 2023). As such, we encourage scholars to conduct extensive sampling across different occupations, industries, and cultures to expand the external validity of our results.

Third, there may be some alternative mechanisms that indicate interesting and novel research directions. For example, achievements and positive emotions activated by flow can also spill over to nonworking hours, thereby activating problem-solving pondering while also alleviating harmful affective rumination (Demerouti et al., 2012). However, we only tested the former as it better fit our theoretical perspective and our focus on challenging demands. In addition, challenging

and hindrance demands often coexist, affect flow, and induce rumination in completely different ways. Therefore, future research can examine the association between hindrance demands that increase negative emotions and deplete limited resources, flow, and affective rumination to gain more comprehensive insights (Feng, 2022a, 2022b).

Finally, we only tested two of the most representative challenging demands and job resources, so we encourage future researchers to increase the robustness of these conclusions by expanding the scope of the challenging demands and job resources. Additionally, to better understand how flow emerges and is sustained, scholars should classify the various challenging demands to assess their importance and expected consequences. It is important to note that the challenging demands in work may unfold in complex chains and clusters, resulting in additional complexity (Morgeson, Mitchell, & Liu, 2015). For instance, an employee may be given several unrelated tasks simultaneously or at short intervals. Similarly, a single challenging demand may trigger spillover effects, leading to additional challenging or hindering demands. Therefore, we encourage future researchers to investigate how flow emerges in reaction to chains and clusters of challenging tasks. As emphasized by the flow theory, this is a strictly exclusive experience (Csikszentmihalyi, 2014), and it may be difficult for employees to maintain fluency and, thus, enter a flow state when they face a complex chain of challenging demands (Peifer & Zipp, 2019).

Data Availability Statement. The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation, to any qualified researcher.

Author Contributions. Xingyu Feng developed the theoretical formalism, carried out the survey and supervised the project. All authors performed collection and analysis. All authors discussed the results and commented on the manuscript.

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Conflicts of Interest. The authors declare that they have no conflict of interest.

Ethical Standards. The whole research was completed under the approval and supervision under Xian Jiaotong University (Ethics Committee).

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Appendix – Measurement of Focus Variables

Challenging demands on R1 – Time pressure

1. I am often under a lot of pressure to complete my tasks on time.
2. I am not afforded much time to complete my tasks.
3. The amount of time provided to complete my tasks is short.
4. My task durations are often short.

Challenging demands on R2 – Workload

1. I have too much work to do.
2. I have to deal with a work backlog.
3. I have problems with the high pace of work.
4. I have a high workload.

Job resource on R1 – Skill discretion

1. My work requires that I am creative.
2. My work involves a lot of repetitive tasks (R).
3. My work requires advanced skills.
4. My work requires that I learn new things.
5. I am able to do a great variety of things in my work.
6. I have the opportunity of developing my inherent abilities.

Job resource on R2 – Job feedback

1. I can tell right away from the results I get whether I've done it correctly.
2. If I make a mistake or an error, I will be able to see that I have made it (R).
3. It is easy for me to see when I've done something exceptionally well.

Flow experience

1. I feel just the right amount of challenge.
2. My thoughts/activities run fluidly and smoothly.
3. I don't notice time passing.
4. I have no difficulty concentrating.
5. My mind is completely clear.
6. I am totally absorbed in what I am doing.
7. The right thoughts/movements occur of their own accord.
8. I know what I have to do each step of the way.
9. I feel that I have everything under control.
10. I am completely lost in thought.

Problem-solving pondering

1. I find solutions to work-related problems in my free time.
2. I found myself re-evaluating something I have done at work.
3. I find thinking about work during my free time helps me to be creative.