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**The ebb and flow of Flow: A micro-level
investigation of flow experiences as the
mechanism underlying energy
sustainability and employees' functioning**

By

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1 Abstract

The present thesis focuses on identifying and examining the psychological mechanism underlying employees' energetic resources at work and while working from home, which has the potential to foster employees' energy sustainability at work leading to higher wellbeing and improved performance.

I integrated the Conservation of Resources theory (Hobfoll, 1989; Hobfoll et al., 2018) and flow theory (Csikszentmihalyi, 1990, 1997; Csikszentmihalyi et al., 2014) to examine how employees can sustain their energy and functioning throughout a working day. I propose that daily flow experiences reflect a psychological mechanism that promotes employees' daily energy generation and subsequent work behaviours, such as task performance, interpersonal organisational citizenship behaviour, and creative process engagement. Additionally, I posit that the direction of resource investment for specific daily work behaviours is influenced by daily needs satisfaction, such that flow only promotes task performance, organisational citizenship behaviour, and creative process engagement on days with low competence, relatedness, and autonomy need satisfaction, respectively.

Furthermore, I expand on the work-home resources model (Ten Brummelhuis & Bakker, 2012a) by identifying work-related flow as a psychological mechanism underlying the depletion process of resources. Furthermore, I further identified work-family integration as contextual demand that negatively impacts employees' energy and effectiveness. Moreover, I argue that positive affect, as a volatile and personal resource, acts as a contingency factor and is crucial in mitigating the resource depletion process triggered by work-family integration. Finally, I explore flow interruption and its implications on employees' energy and functioning. I propose that a negative affective reaction to

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interruption puts employees in a resource conservation mood leading to a decline in daily flow experiences, which hinders creative process engagement and drains energetic resources.

Overall, the presented three studies support our propositions. First, I identified flow as a psychological mechanism for employees' and teleworkers' gain and loss cycles. Second, I demonstrated that unmet needs could drive and direct employees' energy investment. Moreover, I identified affective resources (positive and negative affect) as volatile personal resources that help employees sustain their flow experiences at work or while working from home. Finally, I demonstrated that sustaining employees' energy is positively related to their effectiveness at work. The theoretical and practical implications of this work, as well as the limitations and future research recommendations, will be discussed.

Keywords: Flow, conservation of resources theory, energy sustainability, resources gain cycle, resources loss cycle, Self-determination theory, work-home resources model.

2 Employees' energy sustainability

Organisations face an energy crisis in which the employees' psychological energy is consistently depleted through work (Loehr & Schwartz, 2006). That is potentially due to the unprecedented demands and expectations placed by current jobs (Hart & Cooper, 2012), which have increased complexity and interdependency (Griffin et al., 2007). Attending to these demands and expectations requires employees to maintain high psychological energy levels. However, employees' energy is limited and needs to be sustained (Halbesleben et al., 2014). Many empirical and meta-analysis studies have shown the detrimental effects of employees' inability to maintain sufficient energy levels to cope with work demands and stressors (Sonnentag, 2018). For example, a meta-analysis has concluded that work stress leads to fatigue, dizziness, and sleep issues (Nixon et al., 2011). Furthermore, serious consequences have also been reported in the review of Sonnentag (2018), indicating that such demands and stress lead to burnout, mental health issues, and overall deterioration of wellbeing. Understandably, such consequences were also linked to performance outcomes (Bakker & Demerouti, 2017; Binnewies et al., 2010; Crawford et al., 2010).

While these studies have underscored the crucial rule of having sufficient energy to manage work demands, they have also adopted an energy-draining view on work (Lilius, 2012; (Lilius, 2012; Nixon et al., 2011; Parker et al., 2021). However, the assumption that work is predominantly energy-draining may be too one-sided (Lilius, 2012), as another stream of research has adopted motivational and energising approaches to work (Bakker & Oerlemans, 2019; Bakker & Van Woerkom, 2017; Deci et al., 2017; Fritz et al., 2011; Gagné & Deci, 2005; Kowal & Fortier, 1999; Parker et al., 2021; Zacher et al., 2014) that suggest that employees' energy can be sustained at work. For instance, experiencing intrinsic motivation at work, that is, engaging in work tasks that are inherently enjoyable and

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satisfying, is positively related to employees' energy (Demerouti et al., 2012; Gagné & Deci, 2005). Furthermore, other work activities have been linked to employees' energy, such as seeking feedback, helping colleagues, and setting goals (Fritz et al., 2011; Lilius, 2012; Parker et al., 2021).

Integrating these two streams, work can be viewed as a resource-demanding and resource-generating experience. This means that work requires employees to exert energy while at the same time potentially generating energy. Through this integration, the present thesis aims to understand how employees can achieve energy sustainability, which refers' to the investment of energetic resources levels without undermining employees' energy levels (Barnes et al., 2022). One specific motivational theoretical framework that can be used to understand energy sustainability work is the Conservation of Resources theory (COR; Hobfoll, 1989; Hobfoll et al., 2018). Although initially, the theory was developed to explain individuals' coping mechanisms with stress (Hobfoll, 1989), the theory application goes beyond stress. It also incorporates motivational mechanisms at work (Hobfoll et al., 2018). The core tenet of COR suggests that employees have an inner desire to gain and accumulate resources, which are defined as the things that are perceived to help them achieve their goals (Hobfoll, 1989; Hobfoll et al., 2018). COR theory further suggests that employees' initial gain of resources would beget further gain creating a gain cycle of resources.

As illustrated by Hakanen et al. (2011), there is a reciprocal correlation between work engagement and wellbeing, which manifested as a gain cycle over three years. Such an assumption suggests that energetic resources could bring about further energetic resources thereby contributing to employees' energy sustainability at work. On the other hand, an

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initial loss of resources leads to further loss of resources, initiating a cycle of resources loss termed the loss cycle (Halbesleben et al., 2014). Ten Brummelhuis et al. (2011) conducted a longitudinal study that provided empirical evidence for the loss cycle. The study found that burnout, a condition characterised by depleted resources, resulted in the loss of job resources after two years, which in turn led to an increase in burnout. This assumption also indicates that a loss of employees' energetic resources could bring further loss of energetic resources leading to employees struggling with unsustainable energy at work. Understanding these cycles' mechanisms could be key to employees' energy sustainability at work. Such insight could help us foster gain cycles at work and mitigate the loss cycle of employees' energetic resources.

However, research on gain and loss cycles based on COR theory suffers at least three drawbacks. First, although the theory considers the role of time, it assumes that gain cycles are slow to develop over time (Hobfoll et al., 2018). Most of the longitudinal research conducted on gain cycles has mainly adopted longer time frames ranging between six months to three weeks (e.g., de Cuyper et al., 2012; Hakanen et al., 2008; Salanova et al., 2011). However, they do not provide a sufficient understanding of the process at the micro level, which opens up an interesting opportunity to observe how resource generation can occur within shorter periods, such as during a single workday (Halbesleben et al., 2014; Halbesleben & Wheeler, 2015). Furthermore, emerging studies in the domain of employee work-related health and wellbeing indicate employees' energy can also fluctuate on a daily basis (e.g., Harris et al., 2003; Ouweneel et al., 2012; Rivkin et al., 2018; Sonnentag, 2001). These studies highlight the importance of incorporating diary studies when investigating the gain cycle in the context of employees' energetic resources. Therefore, to advance our understanding of how the gain cycle of energy contributes to employees' daily energy

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sustainability, future research could benefit from investigating employees' energy utilising an intraindividual (at day-level) approach.

Second, the theory assumes that employees must invest resources to gain resources, in turn initiating a gain cycle (Hobfoll et al., 2018). That is a resource that can bring further resources through investing current resources. However, we still lack a clear and detailed understanding of *how* a resource could bring another resource (Halbesleben & Wheeler, 2015). In the context of employees' energy, understanding how an energetic resource could foster further energetic resources will help employees sustain their energy at work. This could be applied to the loss cycle as well. Understanding how gain cycles work can help employees sustain the energy levels at work and escape the loss cycle of energetic resources (Halbesleben et al., 2014). Therefore, future research might benefit from examining the psychological mechanism of both the gain and loss cycle of energetic resources, which would help employees sustain their energy.

Finally, the theory suggests that employees follow different investment strategies driven by different psychological mechanisms. Sometimes an investment is used to spend resources, and others to gain resources (Halbesleben et al., 2014). Other times a resource investment at work could lead to a resource loss at home (Bolino & Turnley, 2005; Halbesleben et al., 2009). Employees try to protect their resources pool and come up with investment strategies that not only protect their resources but maximise their return on investment (Baltes, 1997; Baltes & Baltes, 1990). However, perception of the investment return might not be the only drive for investment decision, as employees' investment decision seems to be context-dependent process (Hobfoll, 2001). The investment strategies seem to be a complex process that requires further examination (Halbesleben et al., 2014).

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Accordingly, future research might benefit from investigating conditional factors that determine when employees decide to invest their resources at work. This is highly important, considering that investment of resources is what triggers gain cycles. Therefore, understanding the conditions under which people invest their energetic resources can enable them to sustain their energy at work.

In the present thesis, I will present three studies that aim to address these limitations in the literature. First, in Study 1, we examined flow as a potential psychological mechanism underlying the gain of energetic resources at work. Furthermore, we examined basic psychological need satisfaction as a potential moderator that determines when employees invest resources into work and in which specific work behaviours. We examined the model at the day level to further advance our understanding of energetic resources gain cycles. Second, in Study 2, we examined work-family integration as contextual demand that triggers a loss cycle leading to a depletion in teleworkers' energy and poor performance. We further examined flow at the day level as a potential psychological mechanism underlying the depletion or the loss cycle for remote workers. We further propose that positive affect could be a potential moderator that buffers the depletion process and helps employees sustain their energy while working from home and improve their performance. After examining flow as a psychological mechanism underlying gain and loss cycles in both workplace and remote work settings, Study 3 seeks to further our understanding of the flow experience by exploring flow interruptions and their impact on employees' daily flow experiences and their energy at the end of the day. We further propose that negative affect as a conditional moderator predicts when flow interruption has detrimental effects on daily flow experiences and, subsequently, their energy level.

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In the following sections, I will present a theoretical discussion about flow and its relation to energy. After that, I will present a conceptualisation and operationalisation of employees' energy, followed by a theoretical and empirical discussion of the COR theory that lays the grounds for understanding energy as a resource. Afterwards, I will present an empirical discussion concerning the gain and loss cycles and the assumptions of the COR theory. Then I will briefly present Self-determination theory and how basic psychological needs are related to the investment principle. After that, I will discuss the Work-Home Resources model as an extension of the COR theory that explains the gain and loss cycles and their application for remote workers. Afterwards, I will present open questions that address the limitations of the current research presented above. Finally, I will present the three studies that address the presented research questions and conclude with a discussion and integration of the three studies, their limitations, recommendations for future research and practical implications.

3 Flow and Energy

3.1 Flow: overview and definition

The flow state was defined as “a subjective state that people report when they are completely involved in something to the point of forgetting time, fatigue, and everything else but the activity itself” (Nakamura & Csikszentmihalyi, 2014, p. 230). The flow state is characterised by “intense experiential involvement in the moment-to-moment activity, attention is fully invested in the task at hand, and the person functions at his or her fullest capacity” (p.230). Individuals who experienced such a state commonly reported other characteristics, such as being fully immersed in a task where the individual's awareness blocks everything else.

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One's self-reflective process while experiencing the flow state gets suppressed. Once the self-reflective process is silenced, then a feeling of action-awareness emerges, in which one's actions become an extension of one's mind. This is a homogeneous state in which people's task becomes part of the self (Nakamura & Csikszentmihalyi, 2014). It has been reported that during this state, one does not experience anxiety about controlling the task at hand. This is due mainly to the sense of both mastery and control the state brings once experienced. Furthermore, one's perception of time during this state is usually distorted in a way that makes one lose track of time. People invest all of their mental processes to attend to the task; there is not enough room to process other information, such as time.

The flow state is a common phenomenon that has been documented in many activities. It is argued that the state of flow can be initiated whenever the circumstances meet three essential conditions (Nakamura & Csikszentmihalyi, 2014). The first condition states that the task at hand must be challenging enough for one's skills and knowledge. The perceived challenge must match the perceived skills or knowledge. Such a condition is subjective and highly dependent on the perception of the actor. There has to be a balance between the *perceived* challenge and *perceived* skills. If the challenge is being perceived as higher or lower than perceived skills, then it would be hard to enter the state of flow.

For people to enter the state of flow, another condition must be met; a clear set of goals must be realised (Nakamura & Csikszentmihalyi, 2009). A clear goal is necessary to guide one's attention and provide directions to their behaviours. Additionally, a clear goal helps in adding a purpose to their actions. The final condition states that one must receive immediate feedback on how they are doing and in what direction one must follow (Nakamura & Csikszentmihalyi, 2014).

3.2 Empirical studies on energy as an antecedent of flow

Many direct and indirect studies have shown that employees require initial energy to be able to engage with their work and enter flow. For instance, a study found that having sufficient energy at the beginning of the workday is important to help employees engage with the task and invest their resources at work (Sonnentag et al., 2017). Research demonstrates that high levels of energetic resources make employees more willing to invest effort into their work, allocate their time, and dedicate their energy to work tasks during the day (Lanaj et al., 2014; Sonnentag, 2003, 2012; Ten Brummelhuis & Bakker, 2012b; Volman et al., 2012). Furthermore, higher levels of energy allow employees to take on challenging tasks and persist when difficulties arise (Sonnentag, 2012). As a result, energy makes it more likely that employees become fully absorbed in challenging tasks (Sonnentag, 2003, 2012), which reflects flow.

Energetic resource availability is essential for initiating flow because flow requires employees to persist with a challenging task (Gerpott et al., 2021) without giving up or getting distracted (Nakamura & Csikszentmihalyi, 2009). Furthermore, as work activities that are likely to trigger flow tend to be challenging, they require one to apply and sometimes even stretch their existing skillset (Csikszentmihalyi, 1996b; Nakamura & Csikszentmihalyi, 2009), which in turn necessitates the investment of psychological energy. This notion has been empirically supported by a study that showed employees are more likely to experience flow on a day-to-day basis during mornings when they have sufficient energetic resources (Debus et al., 2014). On the opposite end, a longitudinal study showed that experiencing low levels of energetic resources reduces employees' experiences of flow (Mäkikangas et al.,

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2010a). Similarly, employees are less likely to experience flow when they start their day with low energetic resources due to an aversive morning commute (Gerpott et al., 2021).

3.3 Empirical evidence on energy as an outcome of flow states

The flow state has been found to be internally rewarding (intrinsically motivating) (Nakamura & Csikszentmihalyi, 2014). It is assumed that one usually engages in autonomous regulation, a “regulation that is initiated and sustained by one’s integrated, or true, self” at the time they experience the state of flow (Moller et al., 2006, p. 1025). Contrary to autonomous regulation, controlled regulation is not well integrated with the self. Furthermore, research shows that controlled regulation leads to resources depletion. However, autonomous regulation was found to be rejuvenating for one’s resources (Muraven, 2008). Being fully immersed in the flow and experiencing mastery and control is enjoyable on its own without any external rewards. Engaging in an intrinsically rewarding experience such as flow thereupon has many positive implications, including higher wellbeing (Csikszentmihalyi, 1999), improved positive affect (Cseh et al., 2015), and subjective vitality (Rivkin et al., 2018). Furthermore, a longitudinal has found that the flow state promotes self-esteem and also fosters intrinsic motivation (Hektner & Csikszentmihalyi, 1996). Self-esteem is considered a *key* resource that enables one to manage, alter and allocate other resources (Ten Brummelhuis & Bakker, 2012a). Flow state has also been linked to other types of resources as well. For instance, a two-wave study has found that flow can foster both personal resources (e.g. self-efficacy) and job resources (e.g. social support) as well (Salanova et al., 2006). Similarly, the flow state was found to be positively related to other work resources such as autonomy at the job, social support and performance feedback (Mäkikangas et al., 2010b). Research indicates that the relationship between flow and resources is reciprocal (Salanova et al., 2006). Moreover, One study found

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that experiencing the state of flow was positively related to an overall positive feeling of happiness and wellbeing (Moneta, 2004). Different studies suggested that the state of flow could improve momentary mood (Fullagar & Kelloway, 2009), and foster positive feelings across days (LeFevre, 2012) and general life satisfaction (Bryce & Haworth, 2002). The findings suggest that the state of flow can generate psychological resources that can manifest themselves in a variety of positive outcomes, including subjective vitality.

4 What is energy? Subjective vitality as a manifestation of human energy.

The literature seems to be inconsistent when they refer to human energy in an organisational context (Quinn et al., 2012). Researchers have been using different terms to refer to human energy or used the term human energy to refer to something different but related. Therefore, Quinn et al. (2012) have integrated the literature to conceptualise the term “energy”. In their review, they mainly refer to two types of energy. First, they define energy as *physical energy*, which is the ability to perform work, and it exists in two forms: potential and kinetic energy. Physical energy refers to the capacity to do work, which can be either potential or kinetic energy (Brown, 2000). The potential energy is stored in the chemical bonds in our body. Once these chemical bonds break, potential energy is transformed into kinetic energy. Physical energy allows individuals to move, do, and think. It can be intentional or unintentional and can be measured through physiological intervention such as taking a blood test (e.g., glucose). However, some researchers (e.g., Hobfoll & Shirom, 2001) attempted to measure physical energy through subjective measures such as the Likert scale. However, the issue with measuring physical energy with the subjective measure is that the correlation between physical energy and subjective energy is not strong.

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Imagine someone is really tired, but they push themselves to exert energy beyond their subjective energy (Quinn et al., 2012). Therefore, the physical energy might not be able to capture how energised employees are and cannot be used in our research for energy sustainability.

Accordingly, Quinn et al. (2012) have used the term *energetic activation* to refer to the degree to which employees feel energetic. Energetic activation is a dynamic subjective experience of vitality, vigour, or enthusiasm in the biobehavioural system of activation (Quinn et al., 2012). Furthermore, energetic activation towards a particular activity or schema can lead to action, transforming potential energy into kinetic energy, which suggests indicating that energetic activation includes a behavioural component. Energetic activation can broaden thought-action repertoires and can create new resources through its affective component (Fredrickson, 1998; Quinn et al., 2012). Energetic activation can also motivate employees to exert more effort for longer periods in activities in which they experience further energetic activation (Moller et al., 2006; Quinn et al., 2012), which indicates that energetic activation includes a motivational component as well.

The literature suggests that the closest operationalised construct to energetic activation could be *subjective vitality* (Ryan & Deci, 2008). Subjective vitality refers to the physical and mental energy that makes people feel enthusiastic, alive, and full of energy. It is an indicator of motivation that is associated with positive feelings of vigour, and positive affect, which can be harnessed for purposeful actions (Ryan & Deci, 2008). Accordingly, subjective vitality captures energy as a construct compatible with the definition of Quinn et al. (2012). Based on this theoretical definition of energy, the present thesis conceptualises and operationalises employees' subjective vitality as a proxy for employees' energy.

5 Subjective Vitality from a COR Theory Perspective

In the following sections, I will first provide an overview of the COR theory and define “resources” as a construct within the theory. Then, I will argue how subjective vitality fits in the context of the theory.

5.1 *Conservation of Resources Theory: Overview*

The Conservation of Resources theory (COR; Hobfoll, 1989) was first proposed as an integrative stress model that takes into consideration both environmental and cognitive processes (Hobfoll, 2001). However, the theory, in essence, is a motivational theory that aims to explain human behaviours, which are built around human’s evolutionary need to conserve and obtain resources in order to survive (Hobfoll et al., 2018). The theory assumes that cognition is evolutionarily biased to overemphasise the loss of resources and to underemphasise the gain of resources. The basic tenet of the theory states that “individuals strive to obtain, retain, foster, and protect those things [resources] they centrally value” (Hobfoll et al., 2018). Choosing COR as the theoretical backbone for this study for two main reasons. In essence, the present study aims to understand how employees manage their energetic resources, which is a key construct in COR theory, as I will discuss in the sections below. Second, no other theory provides such detailed and testable predictions of how resources change and interact over time, like in gain and loss cycles (Hobfoll et al., 2018).

5.2 *Defining resources*

Resources within COR are viewed as a fundamental element in the theory (Hobfoll, 2001). Therefore, defining resources first is a crucial step before outlining the theory. When COR theory was first introduced, it defined resources as “those objects, personal characteristics, conditions, or energies that are valued by the individual or that serve as a

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means for the attainment of these objects, personal characteristics, conditions, or energies” (Hobfoll, 1989, p. 516). The theory has emphasised that resources are things that people value, which implies that resources must lead to a positive outcome. Researchers in management have documented convincing evidence that resources are not only beneficial but crucial for work functioning (Bakker & Demerouti, 2017). However, recent research has shown that resources can lead to a harmful outcome which then makes the resources definition problematic (Halbesleben et al., 2014). For instance, it was found that providing employees with social support might leave them feeling inadequate and lead to higher strains (Beehr et al., 2010). Another research has shown that employees with job resources can get too engaged in their job, which in turn could lead to work-family conflict (Halbesleben et al., 2009).

The previous research put a question mark on the term “value” in resources’ definition because people would not value something that could hurt them. Therefore, a change to the definition of resource has been proposed to address this critique. Resources have been defined as “anything perceived by the individual to help attain his or her goals” (Halbesleben et al., 2014, p. 1338). There are two key terms in the new definition: “perception” and “goal attainment”. The definition highlights that individuals perceive resources to be helpful regardless of whether the actual outcome is harmful or not (Halbesleben et al., 2014). This way, the definition can accommodate parts of the literature that showed that resources could lead to a negative outcome. The new definition added goal attainment, which is a common key component in other motivational theories such as self-determination (Deci & Ryan, 2000), expectance theory (Reinhardt & Wahba, 1975) and goal-setting theory (E. Locke, 1996). Including goal attainment allows COR theory to be integrated smoothly with a variety of motivational theories. It can be argued that the later COR definition of resources is very

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broad. However, a goal-focused definition provides academics with a flexible framework that allows for easier integration of resources and motivational research.

One more advantage of having a goal-based definition of resources is that it helps researchers understand the nature of resources and how resources can help individuals attain their goals (Halbesleben et al., 2014). For instance, research on goal attainment has shown that one goal can be achieved through a variety of means, a property called *equifinality*, or resources in this case (Shah & Kruglanski, 2000). In other words, resources can substitute for each other in order to meet the same goal (Huang & Zhang, 2013). Another goal's property is *multifinality*, which is the idea that one typically has multiple goals that can be achieved through one mean (one resource) (Kruglanski et al., 2013). For example, research has found that core self-evaluation, a resource that can empower individuals to feel in control while effectively coping with stressors, can lead to a variety of positive outcomes such as improved motivation, organisational citizenship behaviours, and job performance (Chang et al., 2012).

The literature on resources, including COR, presupposes that individuals' resources are finite (Ten Brummelhuis & Bakker, 2012a). This assumption might be clear when it comes to addressing resources such as time or objects resources such as money. On the other hand, it might be controversial to assume that energetic resources such as vitality or willpower are limited in nature (Job et al., 2010). For example, the strength model of Self-Control states that the regulatory resources used to exert self-control are limited and can get depleted (Muraven & Baumeister, 2000). On the other hand, other scholars have argued that believing that willpower is an unlimited resource leads to a reduction in ego depletion, a resource for self-regulation (Job et al., 2010). Such research indicates that believing a

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resource is unlimited leads to less depletion and only acts as a moderator (Bernecker & Job, 2015).

Based on the presented theoretical and empirical discussion, the present thesis conceptualised subjective vitality as a limited energetic resource that helps employees achieve their work goals (Quinn et al., 2012; Ryan & Deci, 2008; Ryan & Frederick, 1997).

5.3 Categorising Resources

It might be a valid point to argue that COR has a broad definition of resources. However, to account for this issue, researchers have organised resources into different categories (Halbesleben et al., 2014). When Hobfoll (1989) first presented COR as a stress model, he organised resources into four categories: objects, state, personal characteristics and energies. *Objects* are resources that are valued on their own or because of what they can bring to people. For example, a car is a valued object resource as it facilitates transportation, whereas a luxurious car provides transportation and status. The second type of resources is *conditions* such as marriage and job security (Hobfoll, 1989). These two types of resources are unique as both types can be quantified through objective measures (Hobfoll, 2002). However, resources' value depends on the individuals' perception, which can vary from one culture to another (Halbesleben et al., 2014). Therefore, although these resources can be measured through objective means, their value varies, and so does their impact. The third type of resources is *personal characteristics*, which include optimism and self-efficacy (Hobfoll, 1989; Ten Brummelhuis & Bakker, 2012). The final resource is energy, which includes physical energy, cognitive energy and attention (Hobfoll, 1989).

One way to organise resources is based on their origin, from the self or outside the self (Hobfoll, 2002). Personal resources generate from within the self, such as the individual

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mental health, whereas contextual resources generate from outside the self. Organising resources in this way allows for a better understanding of how these resources can be utilised (Ten Brummelhuis & Bakker, 2012a). Another dimension that was introduced by Ten Brummelhuis and Bakker (2012, p. 548), to organise resources concerns “the extent to which resources are transient”. In this dimension, resources are either volatile or structural. Volatile resources are resources that can only be used for one thing, such as time, or they can fluctuate, such as mood and energy. On the other hand, structural resources are more stable over time and durable resources that can be used multiple times, such as social networks or experience (Ten Brummelhuis & Bakker, 2012a). Researchers have also identified another category, *key resources*, which refers to the resources that enable one to manage and allocate other resources (Hobfoll, 2002; Ten Brummelhuis & Bakker, 2012).

Accordingly, we also conceptualised subjective vitality as a personal, volatile/dynamic, energetic resource that enables employees to achieve their work goals (Sonnentag, 2015; Ten Brummelhuis & Bakker, 2012a).

6 Resources investment, gain and loss cycles: empirical evidence

6.1 Empirical evidence supporting the investment principle

The theory states that employees must invest the current resources to gain further resources and protect their resources from potential loss (Halbesleben et al., 2014). COR theory suggests that resources investment is a complex process that could serve multiple purposes. For example, the model assumes that during untaxing times, people are motivated to gain more recourses, and they do so via investing their current resources (Hobfoll, 1989). This kind of investment not only enriches their recourses pool but also protects their resources from potential future losses.

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A meta-analysis study (Ng & Feldman, 2012) tested the investment principle. In their study, they found that employees' investment of resources (employees' voice behaviour) leads to a gain of resources (e.g. in-role performance, creativity and implementing new ideas). This supports the notion that employees are motivated to invest their resources in order to gain more resources. However, that does not necessarily mean that resources investment leads to positive outcomes such as resource acquisition. For example, job resources that enable employees to engage at work could lead to work-family conflict (Halbesleben et al., 2009). Similarly, a high level of individual initiative (a form of resource investment) can lead to job stress and family conflict (resource depletion) (Bolino & Turnley, 2005). These findings highlight the important role perception plays in the investment decision process. Although these studies have not looked at perception's role per se, it suggests that sometimes resources lead to negative outcomes. Therefore, it might be destructive for people to pursue an investment knowing that it has a negative outcome unless they perceive otherwise. That being said, people might engage in risky behaviours when their resources are depleted (Halbesleben, 2010; Ng & Feldman, 2012). This suggests that, just like perception, the person's level of resources plays a role in their investment choices.

Resources investment serves another purpose, which is that it protects the resources from potential future losses. As a stress model, researchers have tested the investment principle in the context of coping (Halbesleben et al., 2014). For example, when people invest their resources in recovery experiences during a furlough, they experience fewer resources' depletion (emotional exhaustion) than those who do not (Halbesleben et al., 2013). Another study found that when employees engage in job crafting (resource investment), they experience less burnout (depleted resources state) (Hakanen et al., 2017). At other times when people experience a loss of resources, they choose to invest resources

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in order to compensate for the lost resources. To illustrate, when employees experience emotional exhaustion, they invest in organisational citizenship behaviours as a way to gain back the lost resources through enriching their social resources (Halbesleben & Bowler, 2007b).

Employees try to protect their resources pool and come up with investment strategies that not only protect their resources but maximise their return on investment (Baltes, 1997; Baltes & Baltes, 1990). And as resources investment is a strategic and context-dependent process (Hobfoll, 2001), investing resources might not be the choice they go with. Sometimes employees choose to avoid resource-taxing situations (Siegal & McDonald, 2004). In other words, employees sometimes conserve their resources in a situation where they need to protect their recourse. At times when the level of their resources is low, employees could conserve their resources by investing less effort in their performance (Halbesleben & Bowler, 2007b; Wright & Cropanzano, 1998). The mentioned studies indicate that the resources' investment strategies are driven by a complex psychological process that is not yet clear and requires more investigation.

6.2 *The availability of resources makes people less vulnerable to loss*

The first corollary states that people with more resources are less vulnerable to resource loss (Hobfoll & Lilly, 1993). Additionally, they would be more capable of gaining more resources than those with fewer resources. Equally, people with fewer resources are more vulnerable to resource loss and subsequently less capable of gaining more resources. For example, employees with less emotional exhaustion (more resources) are more likely to have more job resources and experience the flow state (Mäkikangas et al., 2010b). On the other hand, employees with more emotional exhaustion (fewer resources) were more likely

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to have fewer job resources. This is not limited to one domain, such as a job domain. Low resources (e.g. high emotional exhaustion) were found to be a predictor of work-home-interference and vice versa (Demerouti et al., 2004). This suggests that it is difficult for ill-equipped employees to protect their resources from future resources (Whitman et al., 2014). Resources have instrumental values to people (Hobfoll, 1989), as they enable people to acquire more resources that are necessary for survival and flourishing. Therefore, it is understandable that people with more resources are more capable of protecting their resources and gaining more resources. There are two corollaries that I will discuss in the below section, which emphasise the dynamic nature of resources.

6.3 Empirical evidence for resource loss cycles

The second corollary of the COR model states that individuals with fewer resources are not only susceptible to more losses, but the initial loss of resources leads to further resource loss (Hobfoll & Lilly, 1993). Resources are crucial for both individuals and organisations to cope with resource losses. Therefore, an initial loss of resources, which leaves individuals defenceless to further loss, leads to further loss of resources, initiating a cycle of resource loss termed the *loss cycle* (Halbesleben et al., 2014). The loss cycle corollary has been tested empirically in a longitudinal study that showed burnout (a state of depleted resources) leads to further loss of job resources two years later, which was also associated with an increase in burnout (Ten Brummelhuis et al., 2011). Another longitudinal study found that burnout can lead to further loss of personal resources (self-efficacy), as well (Llorens-Gumbau & Salanova-Soria, 2014). On the other hand, a decrease in job resources was found to be a predictor of burnout (Schaufeli et al., 2009).

These studies suggest that the loss cycle can be described as a reciprocal relationship.

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The COR model assumes that the loss cycle would gain momentum over time leading to a *loss spiral* (Hobfoll & Lilly, 1993). The loss spiral indicates that lost resources can accumulate over time. Indeed, the longitudinal studies mentioned above have shown that the loss cycle is a reciprocal one. A study, which used latent change score modelling, showed partial support for the accumulation effect. The study showed that employees who started the study with a moderate level of job resources and flow state experienced declining trajectories of both job resources and flow (Mäkikangas et al., 2010c). However, the results did not fully support loss spirals when employees started with low job resources and flow, as the results showed a relatively stable level of resources. Another study has shown a similar pattern has been found between bullying and anxiety and depression (Rodríguez-Muñoz et al., 2020). They found that when bullying increase, so do anxiety and depression, without showing an accumulation effect. In other words, the loss spiral stops once resource loss stops. However, bullying and insomnia have shown a different pattern. Insomnia stays stable even after bullying decreases, which implies an accumulation of strain due to the initial loss.

The empirical studies, therefore, provide strong evidence for the loss cycle assumption within COR. Consequently, employees' energetic resources can experience a similar cycle of loss in their energy, making it hard for them to sustain during the day. The loss spiral indicates that lost resources can accumulate over time. However, one methodological limitation of longitudinal designs is that they look at mean changes in resources without taking into consideration the accumulation effect (Halbesleben & Wheeler, 2015). Therefore, the current thesis will use the concept of a cycle rather than a spiral, as the cycle does not account for the accumulation effect.

6.4 Empirical evidence for resource gain cycles

Similar to the resource loss cycle, the third corollary of the COR model states that initial gain in resources brings in more resources initiating a gain spiral (Hobfoll et al., 2018). However, the gain cycle differs from the loss cycle in terms of its nature, impact and velocity. First, COR theory assumes resources gain requires people to invest their current (the investment principle). Investing resources might return a positive or negative net of resources. This implies that people might have to risk their resources in order to *initiate* a gain spiral (Hobfoll & Lilly, 1993). On the other hand, individuals might need to invest resources to *stop* a loss spiral. Second, the theory also assumes that resource loss is more powerful than resource gain, and individuals would be left with fewer and fewer resources with every iteration (Hobfoll et al., 2018). Consequently, the loss spiral would gain more momentum, making it way more powerful and faster than the gain spiral.

Empirically, the gain cycle has been tested, and studies have found support for this corollary. For example, a gain spiral was found in the form of a reciprocal relationship between work engagement and wellbeing (Hakanen et al., 2011). However, the study did not show the accumulation effect due to the design limitation. Nevertheless, the study used a three-wave design which gives more assurance that the reciprocal relationship between resources indicates some form of a gain spiral. A similar study showed a manifestation of a gain spiral in which job resources lead to work engagement which in turn leads to work-unit innovativeness through personal initiative (Hakanen et al., 2008). It could be argued that the study did not test for the spiral nature, such as an increase in momentum. However, the findings suggest that the initial gain in resources (job resources) initiated a chain of resources gain supporting the gain cycle corollary.

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COR theory assumes that the gain cycle is, generally speaking, slower than the loss cycle (Hobfoll et al., 2018). While the mentioned studies supported the gain spirals assumption, they were conducted over a relatively long period of time (weeks or years). However, other studies have found support for a cycle spiral between days. For example, a 5-day diary study (Xanthopoulou et al., 2009) has shown that “optimism” mediates the relationship between the previous day's resource “supervisor coaching” and work engagement. This suggests that the gain cycle can be detected over a short time, such as days. Halbesleben and Wheeler (2015) have found evidence of a gain cycle (trust and social support) between days, as well.

7 Basic psychological needs satisfaction: A motive for resource investment

Previous research has shown that the investment principle with the COR theory is a complex process. However, theoretical and empirical evidence from Self-determination theory indicates that the basic psychological need can play a role in determining when and in what employees invest their resources at work. In the following sections, I will provide an overview of self-determination theory and basic psychological needs. Then I will present the empirical evidence that supports the notion that needs satisfaction or lack of can act as a motive for direct employees' investment of energetic resources.

7.1 An overview of self-determination theory

Self-Determination Theory (SDT) assumes that all people have an internal inclination towards psychological growth, internalisation and wellbeing (Deci & Ryan, 2000). The theory also suggests that both the environment and the individual's actions can either hinder or facilitate their natural progression towards wellbeing. First, psychological growth is a representation of intrinsic motivation in which individuals engage in an activity that they

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find inherently rewarding without any external rewards or reinforcement (Deci & Ryan, 1980, 2000). Second, psychological internalisation refers to individuals' inclination to transform external reasons for engaging in any activity into a type of motivation that is integrated with the self (Van den Broeck et al., 2016). SDT identified three types of extrinsic motivation in contrast with intrinsic motivation (Deci & Ryan, 1985). The first type of extrinsic motivation is called *external* motivation, in which an individual engages in an activity or behaviour for external rewards, punishment or force. The second type of extrinsic motivation is *introjected motivation*: in which an individual chooses to either engage in an activity because it elicits a feeling of shame, guilt or pride (Deci & Ryan, 1985). Finally, *identified motivation*: in which an individual chooses to engage in an activity because they can identify with what it represents to them, such as values or because it is perceived as important. Third, SDT operationalised psychological wellbeing via a variety of measurements which includes but is not limited to vitality, positive affect and life satisfaction (Van den Broeck et al., 2016).

7.2 Basic Psychological Needs

SDT argues that individuals' natural inclinations towards psychological growth, internalisation and wellbeing are not always realised (Deci & Ryan, 2000). The theory suggests that there are three basic psychological needs that are crucial to achieving these inclinations. The theory assumes that achieving these inclinations depends on satisfying these needs: the *need for autonomy*, the *need for competence* and the *need for relatedness*. Satisfying these needs, SDT argues, would lead to more autonomous motivation, such as intrinsic motivation and identified motivation, and improve an individual's wellbeing (Deci & Ryan, 2000). In turn, intrinsic motivation leads to higher subjective vitality, which makes integrating them with energy sustainability studies very suitable.

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Self-determination theory defines the need for autonomy as the need to have the individuals' behaviours as expressions of their values and themselves (Deci & Ryan, 2002). To be autonomous is to approach behaviours with a sense of ownership and perceive that the individual is the origin of their actions (Deci & Ryan, 2000). The theory emphasises that people have the need to act with a sense of choice and volition regardless of whether these actions are in compliance with others' wishes or not (Van den Broeck et al., 2016). This is important as it distinguishes autonomy and independence. Dependence means relying on or being influenced by external sources. Therefore, a person can autonomously pursue an action that was requested by others "provided that one congruently endorses them" (Deci & Ryan, 2002, p. 8).

SDT defines the need for competence as the individuals' need for a sense of mastery over the environment while expanding their skills pool (Deci & Ryan, 2002). The theory views the need for competence as a natural inclination to both manipulate and explore the person's environment (Van den Broeck et al., 2016). The need for competence do not refer to skills or knowledge attainment; rather, it refers to the person's need to feel a sense of mastery and confidence (Deci & Ryan, 2002). Such a need also drives individuals to seek optimum challenges that are meant to maintain and enhance their skills and capacities.

Finally, SDT defines the need for relatedness as one's need for connection with others and one's community (Deci & Ryan, 2002). The theory states that individuals have a need to be cared for, to take care of others and have a sense of belongingness with others and their community, too. These three basic needs differ from other forms of motivation, desire or striving in two ways. First, the theory views these basic needs as fundamentally innate needs that every person poses (Deci & Ryan, 2000). Additionally, the theory views these needs as

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equally important for achieving wellbeing and thwarting people of these needs leads to hindering their progression towards psychological growth, internalisation and wellbeing (Van den Broeck et al., 2016). Second, SDT sets clear and specific criteria that are used to identify what can be considered a *basic psychological need*. SDT identifies a construct as a basic need if enough evidence shows that satisfying such a construct contributes to one's psychological growth, internalisation and wellbeing on top of other needs (Van den Broeck et al., 2016)

7.3 Needs as motives for resource investment: Empirical evidence

According to SDT theory, individuals have a natural tendency to proactively engage with their environment to foster their growth, development and wellbeing (Ryan & Deci, 2017). Since the satisfaction of basic psychological needs is considered a core determinant for employees' wellbeing, SDT argues that the level of satisfaction can also be a motive that regulates and directs one's engagement towards experiences and activities that satisfy their needs (Laporte et al., 2021; Vansteenkiste et al., 2020). Additionally, the satisfaction level of psychological needs prompts individuals to either reinforce or modify their engagement in experiences that maximise their need satisfaction (Sheldon, 2011). That is to say; basic psychological needs can influence employees' resources management strategies to maximise their satisfaction.

Employees have a natural inclination to satisfy their psychological needs for autonomy, competence, and relatedness, and when these needs are not met, individuals may experience discomfort or frustration, which can lead them to seek out opportunities to satisfy their needs (Sheldon, 2011; Sheldon & Gunz, 2009). Therefore, low satisfaction in a specific

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need might motivate employees investment of resources into a work activity that can compensate for the unmet need.

The need for competence arises from employees' need to feel a sense of mastery and to be effective in their work environment (Van den Broeck et al., 2016). In their strive for mastery at work, the need for competence motivates employees to excel at what they do (Ryan & Deci, 2017). The results of three studies, including cross-sectional, experimental, and longitudinal (Sheldon & Gunz, 2009), suggest that when people's need for competence is unmet, they exhibit a higher motivation to improve their skills. This desire to polish employees' skills when their need for competence is unfulfilled would channel their energy into investing resources in performing work duties. That is because when they perform well, they perceive a boost of competence (Arnold, 1985).

The need for relatedness reflects one's need for connection with others (Ryan & Deci, 2017). At work, employees need to both support their colleagues and feel supported by them as well (Van den Broeck et al., 2016). Feeling disconnected from others could motivate employees to desire more connection and belonging (Sheldon & Gunz, 2009). Ryan and Deci (2017) note that employees' need for relatedness could be fulfilled by helping and supporting others. Employees could be motivated to channel their efforts towards assisting their colleagues as a way of compensating for their unfulfilled need for relatedness

Employees need to feel that they are the origin of their actions, and these reflect their true values and interest (Van den Broeck et al., 2016). When employees' need for autonomy is unmet, they are motivated to restore it (Sheldon & Gunz, 2009). In experimental studies, Radel and colleagues (2011) found that experiencing a low sense of autonomy makes individuals gravitate towards autonomy-related stimuli, which in turn enable them to

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identify and direct them towards potential sources to restore their need for autonomy. For example, engaging in ideas generation could reassure employees that they are the origin of their behaviours and potentially restore their sense of autonomy on days when they feel their need for autonomy is not fully met.

The presented theoretical and empirical evidence indicate that unfulfilled needs can motivate employees to invest their energy towards compensatory work behaviours.

8 Sustaining energy when working from home

In recent years, the contemporary workplace has witnessed one of the greatest migrations of the workforce from working in offices to working from home, especially after the COVID-19 Pandemic (Parker et al., 2021). Since then, many companies have started adapting to the telework culture and flexible working policies that allow their employees to work from home at least once a week (Global Workplace Analytics, 2020; Robinson, 2022). Therefore, the present thesis aims to investigate the psychological mechanism underlying the loss cycle for teleworkers. The Work-Home Model (Ten Brummelhuis & Bakker, 2012a), which is an extension of the COR theory (Hobfoll, 1989), provides a suitable framework for our investigation.

8.1 Work-home Resources Model: overview

The Work-Home Resources Model (W-HR) (Ten Brummelhuis & Bakker, 2012a) is a framework developed based on the COR theory (Hobfoll, 1989, 2002). The model aims to explain how personal resources link the demanding and resourceful aspects of one domain (work) to outcomes in the other domain (home). There are two processes proposed within the W-HR model. First, the draining/depleting process refers to “work-home conflict”. It is described as a process in which demands in one domain deplete personal resources and

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impede accomplishments in the other domain (Ten Brummelhuis & Bakker, 2012a). The second process is the enrichment process between the two domains. It is described as a process of resource accumulation where work and home resources increase personal resources that can be utilised to improve outcomes in both domains. The W-HR model also considers how *key* resources, personality and culture may influence the occurrence of depletion and enrichment. The model also takes into account the role of time and how these processes develop over time. In sum, the model aims to address three main issues. First, it aims to identify the underlying causes of the draining and enrichment processes of the two domains. Second, it tries to identify the macro conditions and key resources among employees under which the draining and the enrichment process are more likely to occur. Finally, it aims to understand how the two processes that occur between work and home domains change and develop over time.

8.2 Resources typologies with W-HR Model

Similar to the COR theory, the W-HR model categorised and identified *resources* within the model. They proposed two dimensions and two subtypes of resources (Ten Brummelhuis & Bakker, 2012a). The first dimension categorises resources based on their source. Based on Hobfoll (2002), The first dimension distinguishes two kinds of resources, *contextual* and *personal*. Contextual resources are external to the self and can be found in social contexts such as supportive family or supportive manager (Ten Brummelhuis & Bakker, 2012a). Personal resources are traits and energies that are internal to the self, such as energy or time. The second dimension refers to the extent to which these resources are transient. This dimension includes two kinds of resources: volatile and structural resources. Volatile resources can be either temporal such as mood, or fleeting in the sense that they cannot be used more than once, such as time or physical energy. On the hand, structural

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resources are more stable and durable because they can be used multiple times, such as a house.

The first subtype of resources was also based on Hobfoll's (2002) typology of resources. They identify *key resources*, which refer to the resources that enable one to manage and allocate other resources (Hobfoll, 2002; Ten Brummelhuis & Bakker, 2012). These resources are personal as they represent personality traits such as self-efficacy. The second subtype of resources is *macro resources*, which refers to the cultural, social and economic context in which a person lives, such as the availability of public childcare, which workers can utilise. Based on these typologies, resources can be both personal and structural such as mental health, or both personal and volatile such as mood. Similarly, they can be both contextual and structural such as marriage, or contextual and volatile such as love.

8.3 W-HR Model: Resource gain and loss cycles

The W-HR model developed the first four propositions to identify the enrichment and the depletion process based on the gain and loss cycles proposed by the COR theory (Hobfoll, 1989, 2002). The propositions first start by identifying contextual demands as tasks or situations that require ongoing physical or mental exertion and can be related to various aspects such as physical surroundings, emotional atmosphere, social interactions, or organisational structures (Demerouti et al., 2001; Ten Brummelhuis & Bakker, 2012a). The model posits that contextual demands and resources either deplete or enrich personal resources, respectively. In turn, the depletion or the enrichment of personal resources leads to either diminishing or improvement in the other domain's outcomes. Concerning the direction of the depletion and enrichment process (work to home), the first proposition states that "contextual work demands diminish home outcomes through a loss in personal

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resources”, while the second proposition states that “contextual work resources improve home outcomes through a gain in personal resources” (Ten Brummelhuis & Bakker, 2012a, p. 549). Concerning the direction of the process from home to work, the third proposition states that “contextual home demands diminish work outcomes through a loss in personal resources”, while the fourth proposition states that “contextual home resources improve work outcomes through a gain in personal resources” (Ten Brummelhuis & Bakker, 2012a, p. 549).

The model proposed that contextual demands from home or work could include physical, emotional or cognitive demands that could lead to a loss in employee’s personal resources (Bakker & Demerouti, 2007; Ten Brummelhuis & Bakker, 2012a). Furthermore, personal resources could include physical, psychological, intellectual, affective, and capital resources. On the other end, home or work outcomes could include *production*, such as task completion; *behavioural*, such as absenteeism and *attitudinal* such as wellbeing.

Furthermore, the model proposed that key and macro resources play an important role in the enrichment and depletion processes. More specifically, the model argued that key and macro resources could moderate the processes between the two domains. Hence, the fifth proposition states that employees with key and macro resources are less likely to experience the depletion process between the two domains because key and macro resources buffer the negative relationships between contextual demands and personal resources. On the other hand, the sixth proposition states that employees with key and macro resources are more likely to experience an enrichment process between the two domains because key and macro resources strengthen the relationship between contextual resources and personal resources.

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The final propositions concern the temporality of the enrichment and depletion processes. Building on the COR theory's proposed gain and loss cycles, the model suggests that the enrichment and the depletion processes between the two domains can develop over the short and long term. The short-term implies that the process can unfold within a day, whereas the long-term processes imply that they can unfold over a longer period, such as months. In this way, the short-term process includes volatile contextual demands and volatile personal resources. On the other hand, the long-term process includes structural, contextual demands and personal structural resources. More specifically, the seventh proposition states that short-term enrichment and the depletion process “reflect daily processes between the work and home domains, whereby volatile contextual demands and resources from one domain affect daily outcomes in the other domain through a change in volatile personal resources”, while the eighth proposition states that long-term enrichment and depletion processes “reflect durable processes between the work and home domains, whereby structural, contextual demands and resources from one domain affect long-term outcomes in the other domain through a change in personal structural resources” (Ten Brummelhuis & Bakker, 2012a, p. 552).

8.4 The role of key resources in buffering the depletion cycle

As part of the work-home resources model, employees' key personal resources play an important role in buffering the depletion cycle. For example, a diary study has found that empathic concern could act as a demand at work, leading to a depletion of employees' volatile personal resources (emotional exhaustion), which then, in turn, leads to psychological withdrawal (S. H. Lin et al., 2021). However, the study suggests that employees with high positive affectivity are more likely to buffer the negative relationship between empathic concern and emotional exhaustion. The author argued that positive

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affectivity is a key stable resource that enables employees to be more resilient and better at managing their resources and work demands.

In a series two of longitudinal and diary studies, Du et al. (2018) reported that emotional stability and openness buffer the depletion process triggered by homesickness that negatively affects employees' use of resources at work, leading to poor performance. The argument is that emotional stability and openness are key resources that enable expatriates to deal with and cope better with homesickness as a demand. Another weekly study reported that work role centrality could strengthen the relationship between home resources and employees' personal resources (Bakker et al., 2019).

8.5 Positive affect: A potential buffer for the resource depletion process

While the main focus within the work-home resources model is centred around the role of key and stable resources because they help employees manage and better allocate their resources when needed. However, the COR theory suggests that those with more resources are able to mobilise these resources to cope with the depletion process and protect their resources (Hobfoll et al., 2018). Furthermore, this indicates that employees can mobilise affective resources to protect their resources from the depletion process. In support of this notion, the literature has provided sufficient evidence illustrating that affective resources, such as volatile personal resources, can play a role in the buffer variety of depletion processes that are not necessarily within the context of the work-home resources model.

Affect plays an important role in resources development. Positive affect broaden an individual's attentional focus and cognitive flexibility, which leads to the building of enduring personal resources such as resilience and psychological wellbeing leading to higher

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energy (Fredrickson, 1998, 2001). On the other hand, negative affect and negative emotions narrow individuals' attentional focus and cognitive flexibility, leading to decreased psychological resources.

For example, a study has found that positive affect act as a psychological resource that can buffer the negative effect of job insecurity (loss of resources) and work engagement (state of surplus resources) (Vander Elst et al., 2013). Furthermore, an experimental study reported that inducing positive affect through watching a funny video fosters employees' affective resources; in return, the increase in positive affect enables them to mitigate the depletion effect of self-control demands on regulatory resources (Schweitzer et al., 2022). While these studies have mainly focused on the work domain showing that workers can employ their state of positive affect to buffer the depletion process, the assumption of the COR theory is a general assumption that is still applicable to the home domain. Therefore, we expect that positive affect to play an important role in buffering the depletion process within the context of the W-HR model.

9 Open research questions concerning energy sustainability at work

Previous research has provided theoretical and empirical evidence that the inability to sustain employees' energy at work has a detrimental effect on their wellbeing and performance. Furthermore, the COR theory and related empirical evidence indicate that energetic resources are susceptible to going through either a gain cycle or a loss cycle. Such a framework implies that sustaining employees' energy can be achieved through generating energetic gain cycles and mitigating or buffering energetic loss cycles. However, there are a few research questions that have not been fully addressed within the COR theory. Hence, the present thesis aims to address these questions in the studies included.

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First, previous research within the COR theory has highlighted the role of time in resources development. Furthermore, the theory suggests that resources can fluctuate within hours, days, weeks and longer. However, the theory assumes that gain cycles are slow, at least compared to loss cycles. Previous research has, therefore, adopted a longitudinal design with periods ranging from weeks to years. However, emerging diary studies suggest that energetic resources can fluctuate within a day. Therefore, in order to achieve energy sustainability, future research might benefit from examining employees' energetic resources gain cycles at the day level.

Second, the research has demonstrated that energetic resources can bring further energetic resources, initiating a gain cycle of energetic resources. Although the theory suggests that resources must be invested first to gain resources, there is still a lack of understanding of how an energetic resources can bring further energetic resources. Therefore, in order to help employees sustain their energetic resources through the gain cycles, future research needs to identify the psychological and behavioural mechanism that underly energetic resources gain cycles.

Third, previous research highlighted that the investment principle plays a critical role in generating, protecting and recovering lost resources. Furthermore, the theory suggests that the investment can be driven by employees' perception that such investment will result in a gain. However, studies have shown that sometimes investment can lead to a loss of resources. Moreover, some studies have shown that a loss of resources could motivate employees to invest their resources to recover resources loss. On the other hand, other studies have shown that resources make employees less likely to invest so they can protect current resources. Accordingly, investment decisions and resources management within the

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COR theory seems to be complex and lack some clarity. Thus, future research might benefit from investigating boundary conditions that show when employees decide to invest. Understanding what drives employees' investment and resources management would enable employees to sustain their energy during the day.

Finally, previous research on the work-home resources model has mainly examined and identified macro and key resources and their roles in buffering depletion process. Although the work-home resources model was developed based on the COR theory, the model has overlooked the role of volatile and personal resources in buffering the effect of the depletion process. Furthermore, the model used a person-level approach to identify who can enrich their resources and who protects their resources. Accordingly, future research might benefit from a more dynamic approach to identify volatile resources that could help teleworkers to mitigate the daily depletion process and hence sustain their energetic resources.

In the following sections, I will address the presented questions and formulate the hypotheses examined in the three studies included in the present thesis.

9.1 *Flow as an underlying psychological mechanism of the gain cycle*

Capitalising on the COR assumption that those with more resources are more likely to gain resources and are more vulnerable to losing resources (Hobfoll et al., 2018), we start examining the daily gain cycle of energetic resources with subjective vitality as a starting point. Furthermore, we integrate the flow research (Nakamura & Csikszentmihalyi, 2014), which suggests that the flow experience requires an initial investment of energetic resources and the investment principle that indicates that for employees to gain energetic resources, they must invest energetic resources. According to such integration, we argue that starting

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the day with high subjective vitality would allow and motivate employees to gain further resources through investing their energetic resources in flow. As flow research has shown that employees are inclined to invest in flow-like work activities because they are inherently satisfying and enjoyable (Bakker, 2008).

Furthermore, previous flow research suggests that flow at work is an energetic state of high motivation (Bakker, 2008; Gerpott et al., 2021; Norsworthy et al., 2021; Van der Linden et al., 2021). Flow at work represents a state of high activation and energy that not only sustains employees' energy during the workday (Van der Linden et al., 2021) but also, according to COR, motivates employees to further invest in work (Hobfoll, 1989, 2001). On the one hand, we argue that employees need to have sufficient energetic resources in the morning to engage in flow; on the other hand, engaging in flow replenishes employees' energetic resources and motivates them to invest further at work. More specifically, we hypothesise that subjective vitality will lead to flow experience. Daily flow experiences would enable employees to invest in work behaviours that include task performance (i.e., a set of activities and behaviours that are required to achieve the organisational goals and objectives; Motowidlo & van Scotter, 1994), interpersonal organisational citizenship behaviours (i.e., the employee's unofficial and extra behaviours that contribute to their organisation's efficiency and effectiveness; Williams & Anderson, 1991) and creative process engagement (i.e., engaging in a set of activities that are conducive to creative outcomes Zhang & Bartol, 2010) we hypothesise the following:

Hypothesis 1: Daily morning energy is positively related to daily flow experiences.

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Hypothesis 2: Daily flow experience is positively related to a) task performance, b) organisational citizenship behaviour and c) creative process engagement captured at the end of work.

9.2 *Basic Psychological Needs Satisfaction as a drive for employees' resources investment*

To further understand and disentangle employees' investment strategies and management in work behaviours. We examined basic psychological needs as moderators for the relationship between daily flow experiences and work behaviours (task performance, organisational citizenship behaviour, and creative process engagement). As COR theory suggests that different factors can determine the investment strategies at work, but the common thread remains that employees strive to maximise resources gain (Hobfoll, 2001). Drawing on the theoretical and empirical argument that basic psychological needs can act as a motive for employees' investment, we argue that employees strive to maximise resources gain through their investment to satisfy their needs. More specifically, employees are more likely to invest in a certain work behaviour that corresponds with the unmet need as a compensatory strategy. As a result, on days when employees experience flow, they are motivated to allocate their resources towards displaying certain work behaviours that have the potential to compensate for the low satisfaction of a corresponding need. Accordingly, we propose that unmet needs motivate compensatory investments into three work behaviours: TP, OCB-I, and CPE, which are congruent with the three basic needs: competence, relatedness, and autonomy

H3: Daily a) competence, b) relatedness, and c) autonomy needs satisfaction moderate the relationships between the daily flow experiences and a) task performance, b) OCB-I, and

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c) CPE. Each relationship will be stronger when the daily satisfaction of a) competence, b) relatedness, and c) autonomy need is low as compared to high.

To demonstrate the role of flow experiences and needs satisfaction in the investment process as part of the psychological mechanism underlying the gain spiral, we propose that subjective vitality would enable employees to engage with their work in a way conducive to experience flow. As a result of experiencing flow, employees would be further encouraged to invest in work behaviours that correspond with unmet needs.

H4a: Daily satisfaction of the need for a) competence, b) relatedness, and c) autonomy moderates the indirect relationship between morning vitality and end of work a) task performance, b) OCB and c) CPE via flow experiences. The indirect relationship will be stronger when employees experience low as compared to high a) competence, b) relatedness and c) autonomy need satisfaction.

We further argue that morning energy allows employees to engage in their work in a way that is conducive to experiencing flow. As a state of high activation, flow sustains employees' energy during the day and encourages employees to further gain resources through investing in work behaviours (TP, OCB-I and CPE). Furthermore, work behaviours energise employees' end-of-work energetic resources. Finally, low needs satisfaction directs employees to invest in compensatory work behaviours

H5: Daily a) competence, b) relatedness, and c) autonomy needs satisfaction moderates the serial mediation linking morning energy and end of work energy via flow experiences and a) task performance, b) OCB-I, and c) CBE. The indirect relationships are stronger when the daily satisfaction of a) competence, b) relatedness and c) autonomy needs are low as compared to high.

9.3 *Flow as an underlying psychological mechanism for resource loss cycles*

complementing the proposed role of flow as an underlying psychological mechanism of the energetic resources gain cycle at work, we examine its role in the loss cycle as well. As the majority of the workforce moved to work remotely during the COVID-19 pandemic, the work-home resources model developed as an extension of the COR theory deemed suitable for examining the underlying mechanism of the loss cycle for teleworkers. First, we draw on the work-home resources model to conceptualise work-family integration as a dynamic contextual demand. Work-family integration refers to the extent to which the boundary between work and family is flexible (i.e., the ability and the capacity to relax work and family boundaries to attend to the other domain's demand) and permeable (i.e. the degree to which interruptions behaviours from one domain cross to the other domain) (Ashforth et al., 2000; Clark, 2000). The work-home resources model suggests that contextual demand diminishes employees' energy through depleting personal resources. Similar to our previous argument that the COR theory, the work-home resources model still lacks a clear understanding of the underlying psychological mechanisms of the loss cycle "depletion process". Flow research showed that a lack of sufficient resources hindered employees' flow experiences. Therefore, we argue that work-family integration is a contextual demand that depletes employees' resources and hinders employees' flow experiences.

Hypothesis 6: Employees' daily work-family integration behaviours are negatively related to daily flow experiences

On the other hand, the literature suggests that experiencing intrinsic motivation during an activity has the potential to restore and replenish employees' energy (Parker et al.,

2021; Ryan & Deci, 2000; Tóth-Király et al., 2021; Trougakos & Hideg, 2009). Building on our previous argument that flow is positively associated with work outcomes, we propose that work-family integration is a stressor that drains employees' resources, preventing them from entering flow at work, thereby leading to detrimental consequences for their energy and work outcomes (task performance and innovative performance).

Hypothesis 7: Daily flow experiences mediate the relationships between daily work-family integration and a) subjective vitality, b) task performance and c) innovative performance.

9.4 Positive affect as a buffer of the resource loss cycle for teleworkers

Research on emotions has shown that emotions are a critical component of energy (Diener et al., 2019; Fredrickson et al., 2000; Fredrickson & Levenson, 1998; Quinn et al., 2012; Schweitzer et al., 2022). That is because positive emotions accompany energetic activation (Quinn et al., 2012). To help employees mitigate the depletion cycle and enable them to sustain their energy, we examine positive affect (i.e., a state that reflects the extent to which employees are active and enthusiastic and alert Watson et al., 1988) as a potential moderator that buffers the depletion process. This is based on the theoretical and empirical evidence based on the COR theory that suggests volatile personal resources, such as positive affect can help employees protect their energetic resources during the depletion process (Hobfoll et al., 2018). Although the work-home resources model posits that employees who possess key and stable resources can effectively utilise such resources to alleviate and protect against the depletion process experienced in one domain caused by demands from the other (Ten Brummelhuis & Bakker, 2012a), the model overlooked the role of personal and volatile resources. Therefore, we posit that while work-family integration has a negative

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impact on flow experiences, the presence of high levels of positive affect can mitigate these detrimental effects. Consequently, employees with high levels of positive affect (which reflect high energy, concentration and pleasure, Watson et al., 1988) are better equipped to maintain their resources, thereby enabling them to better manage the demands of work-family integration and enhance their flow experiences as a result leading to higher energy and improved work performance.

Hypothesis 8: Daily positive affect moderates the relationship between work-family integration and daily flow experiences such that the relationship will be weaker on days when positive affect is higher.

Hypothesis 9: Daily positive affect moderates the indirect relationship between daily work-family integration a) subjective vitality, b) task performance and c) innovative performance via flow such that the relationship will be weaker on days when positive affect is higher.

9.5 Flow interruption: Understanding the implication of interrupting the psychological mechanism underlying resource gain and loss cycles

Building on previous empirical and theoretical evidence that demonstrates that flow can act as a psychological mechanism underlying both the gain and the loss cycles, we aim to advance our understanding of flow. Experiencing the flow state mandates that employees are fully immersed and concentrated on their work in which they can invest their attentional resources to the task at hand (Debus et al., 2014). However, given the dynamic nature of work and the advancement of instant communication, interruptions are becoming increasingly common, making it easy to disturb the process of flow development (Leroy et al., 2021; Leroy & Glomb, 2018; Mark, 2015; Puranik et al., 2021; Wajcman & Rose, 2011).

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Drawing on the COR theory that suggests employee investment decisions can be conditional on resource loss or failure in resources gain (Halbesleben et al., 2014). Resources threaten with loss cause stress and put employees in a resources' conservation state to protect their current resources from potential loss leading to less investment (Hobfoll, 1998, 2002). Accordingly, we argue that because flow requires an investment of resources, flow interruption would lead to a conservation mood indicated by a decrease in their engagement in subsequent flow experiences during the day only when they experience flow interruption as a threat to their resource generation process. More specifically, we suggest that flow interruption has a detrimental impact on future flow experiences only on days when employees exhibit negative affective (i.e., the extent to which employees feel distressed, displeasure engagement and aversive mood Watson et al., 1988) reactions after the interruption. Negative emotions can arise when employees' resources are lost or threatened affecting their energy investment and consequent energy levels (Zohar et al., 2003). Furthermore, drawing on the proposition that flow acts as a psychological mechanism underlying the gain cycle of energetic resources, we examine daily flow experiences as a mediator between flow interruption and end-of-day subjective vitality and employees' work outcomes (creative process engagement). Accordingly, we propose the following hypotheses:

Hypothesis 10: Negative affect moderated the negative relationship between flow in the morning and daily mean-level flow. That is, the relationship is conditional on high negative affect.

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Hypothesis 11: Negative affect moderated the indirect relationship between flow interruption and a) subjective vitality and b) creative process engagement via flow. That is, the mediation is conditional on high negative affect.

10 Studies included in the present thesis

The present thesis addressed these research questions through theoretical and empirical studies. The present work focused mainly on examining the daily dynamics of energy. Therefore, all three studies included used a daily diary design that enables us to capture within-person daily fluctuation of employees' energetic resources. In the following sections, I will present the three studies that empirically examined the proposed hypotheses. In Study 1, we examined Hypotheses 1 to 5. The sample included in this study consists of employees from different occupational backgrounds and different countries who voluntarily participated in the study. The first study aims to identify the psychological mechanism (flow) and behavioural mechanism (work behaviours) underlying the gain cycle of energetic resources. Furthermore, the second aim of the first study is to identify boundary conditions that disentangle the complex investment strategies used in the workplace (unmet needs as a motive for investment). The third aim of the first study is to examine the temporal nature of the energetic resources gain cycle within a shorter timeframe (a working day).

As most of the workforce moved to work from home during the pandemic, in Study 2 (Hypotheses 6-9), we examined the psychological mechanism (flow) underlying the depletion process for teleworkers. The sample for the second study consists of UK employees who were working from home at the time of the study. Furthermore, the second aim of the second study is to identify a volatile personal resource (positive affect) that could

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help teleworkers mitigate the depletion process triggered by a contextual demand (work-family integration).

Building on the first two studies that identify flow as an underlying psychological mechanism for both energetic resources gain and loss cycles, Study 3 aims to advance our understanding of flow. In Study 3 (Hypotheses 10-11), we tested the adverse effect of flow interruption on employees' daily flow experiences and their energetic resources at the end of the day. Furthermore, we examined a boundary condition (negative affect) that explains when flow interruption has a detrimental effect on employees' daily flow experiences and energetic resources. The sample of this study consisted of employees from different occupational backgrounds.

11 Study 1: Sustaining Energy at Work: Understanding Mechanisms and Boundary Conditions.

11.1 Abstract

While there is a profusion of research on how work compromises energetic resources, our understanding of how and when employees can sustain their energy during a working day is limited. We draw on the COR theory and self-determination theory to propose that daily flow experiences constitute a psychological mechanism underlying the daily energetic resource generation process. We further suggest that flow leads to energy investments in relevant work behaviours (i.e., task performance, interpersonal organizational citizenship behaviour, and creative process engagement), representing a subsequent behavioural mechanism that promotes employees' daily energy generation. Finally, we posit that the direction of resource investment for specific daily work behaviours is influenced by daily needs satisfaction, such that flow only promotes task performance, organizational citizenship behaviour, and creative process engagement on days with low competence, relatedness, and autonomy need satisfaction, respectively. The results of an experience sampling study support most of the hypothesized relationships. Combined, our findings hold implications for scholars and practitioners concerning how and when work can energize employees.

Keywords: COR theory, flow, energy, basic psychological needs, work behaviours, self-determination theory

11.3 Introduction

Contemporary workplaces snow employees under with unprecedented work demands that deplete their energy (Owens et al., 2016). Energy, that is, the degree to which one feels alive, energetic, and enthusiastic (Quinn et al., 2012; Ryan & Deci, 2008), is a crucial work-related resource, and effectively coping with work demands requires employees to expend their energy during the workday. Sustaining energy is thus paramount given that low energy is linked to severe health impairments such as burnout (Sonnentag, 2018), fatigue, and generalized ill-being (Sonnentag & Zijlstra, 2006), as well as negative repercussions for organizations, for example, a greater prevalence of presenteeism (Ferreira et al., 2019; Rivkin et al., 2022), absenteeism (Diestel & Schmidt, 2011) and reduced performance (Binnewies et al., 2010). At the same time, an emerging stream of research indicates that engaging in relevant work behaviours can promote employees' energy (Lilius, 2012; S. L. Parker et al., 2021). Work activities such as goal setting, feedback-seeking (Fritz et al., 2011), and supporting coworkers have been found to be energizing work behaviours. Given these empirical inconsistencies on the role of energy at work, our study aims to address existing gaps in our understanding of how and when employees can sustain their energy across a workday and be more effective at their jobs.

Theoretically, we draw from the COR theory (COR; Hobfoll, 1989; Hobfoll et al., 2018) and the associated literature on the resource-related implications of flow (Csikszentmihalyi et al., 2014) and basic needs satisfaction (Deci & Ryan, 2012; Ryan & Deci, 2017) to delineate our propositions. COR is a particularly relevant framework as it speaks directly to the importance of energy as a key resource that is not only valuable in its own right but can also help individuals acquire further resources (Halbesleben et al., 2014). In line with COR, we use the terms energy and energetic resources interchangeably when

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developing our theoretical rationale. COR's core tenet suggests that individuals are motivated to build, protect and develop their resources (Hobfoll, 1989). Furthermore, COR suggests that an initial gain in resources begets further resources. Accordingly, we propose that starting the day with higher levels of energy triggers a process of energetic resource generation that enables employees to sustain their energy levels until the end of the workday. Furthermore, we posit that a high level of morning energy enables employees to engage with their work in a way that is conducive to experiencing flow (i.e., an enjoyable state of optimal experience and development; Csikszentmihalyi, 2014). Energetic resources are required to enter flow states (Debus et al., 2014), yet flow also comes with positive implications for one's energetic resources as it is an inherently pleasant state of high activation (Gerpott et al., 2021; Norsworthy et al., 2021; Van der Linden et al., 2021). Furthermore, the energetic resources generated during states of flow can be further invested into work behaviours (Stollberger & Debus, 2020; Gerpott et al., 2022). In line with these propositions, we conceptualize flow as a central psychological mechanism underlying how employees can sustain energy at work. Capitalizing on the investment principle, which suggests that individuals must invest resources to gain further resources (Hobfoll et al., 2018), we propose that employees re-invest the energetic resources generated during flow back into work activities (Hobfoll, 2001). Accordingly, we propose task performance (TP; i.e., a set of activities and behaviours that are required to achieve the organizational goals and objectives; Motowidlo & van Scotter, 1994), interpersonal organizational citizenship behaviours (OCB-I; i.e., the employee's unofficial and extra behaviours that contribute to their organization's efficiency and effectiveness; Williams & Anderson, 1991) and creative process engagement (CPE; i.e., engaging in a set of activities that are conducive to creative outcomes Zhang &

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Bartol, 2010) as additional behavioural mechanisms that further explain how employees sustain their energy during the workday.

However, what is not yet fully understood based on COR theory (Halbesleben et al., 2014) is when employees invest their energetic resources in specific work behaviours. To address this question, we integrate COR theory with theoretical propositions and associated empirical findings from self-determination theory suggesting that the satisfaction of three basic psychological needs (competence; i.e., the feeling of effectiveness and mastery over their work environment; relatedness; i.e., the feelings of being connected and socially supported by colleagues; and autonomy; i.e., feeling of volition and integration with one's actions; van den Broeck et al., 2016; Vansteenkiste et al., 2020) reflects a core nutrient for employees' thriving and well-being (Deci & Ryan, 2012; Ryan & Deci, 2017). As a result, we posit that energy investment in work behaviours such as TP, OCB-I, and CPE is contingent on the satisfaction of the need for competence, relatedness, and autonomy, respectively. Based on our theoretical integration, we argue that employees will invest energy into behaviours that have the largest potential to compensate for the lack of satisfaction of a specific need. Conversely, employees should be less inclined to invest their resources in a work behaviour linked to an already sufficiently satisfied need. Specifically, we argue that employees will invest their energy generated through flow into daily TP on days when they experience low satisfaction in the need for competence. Similarly, low relatedness need satisfaction will make it more likely for employees to invest energy into OCB-I, and low autonomy need satisfaction facilitates energy investment in CPE.

Finally, the literature indicates that the investment in needs-satisfying activities enhances one's energy through the satisfaction of basic psychological needs (Ryan & Deci,

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2017). This also corresponds well with the empirical studies that suggest investing energy in work behaviours such as TP (Fisher & Noble, 2009; Quinn et al., 2012), OCB-I (Halbesleben & Wheeler, 2011; Koopman et al., 2016), and CPE (Conner et al., 2016; Tavares, 2016) can also foster energetic resources. Therefore, we argue that employees' engagement in compensatory work behaviours motivated by low satisfaction levels of the corresponding need should promote energy at the end of the day (Ryan et al., 2010; Sheldon et al., 2010; Weinstein et al., 2016), thus completing the cycle of energy sustainability over the course of a workday. Our theoretical model is depicted in Figure 1.

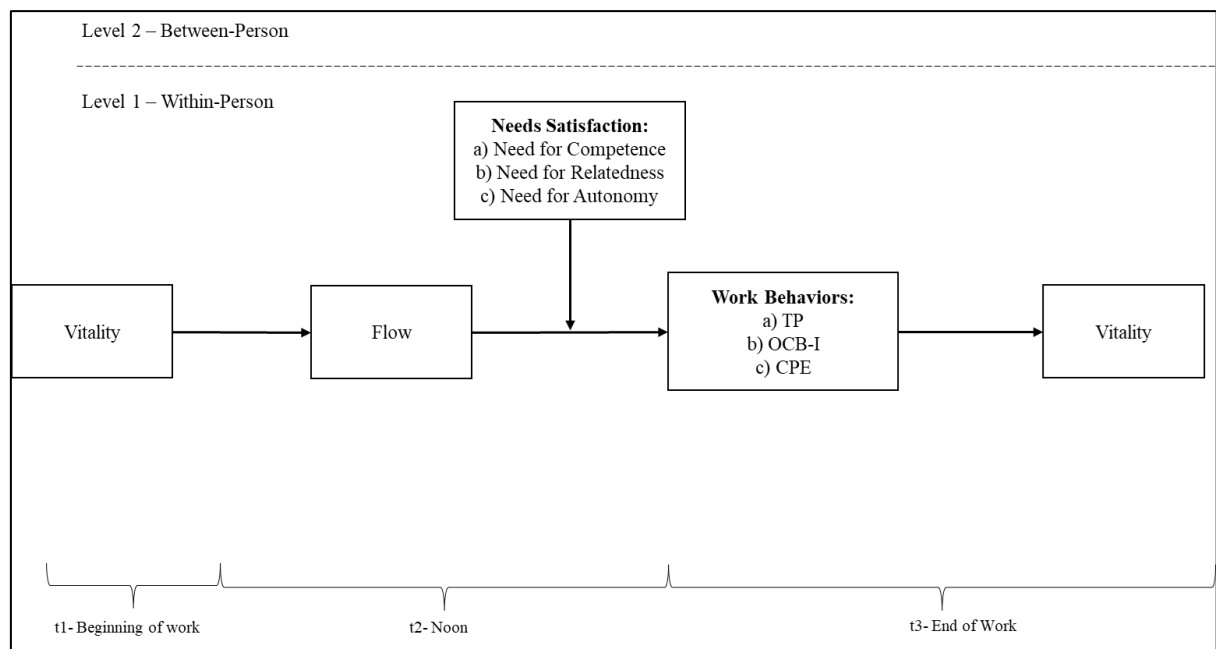


Figure 1. Theoretical Model

Our dynamic framework delineates a process perspective on sustainable energy management during the workday and contributes to the literature on work-related energetic resources in three important ways. First, we advance our understanding of the energetic resource generation process by empirically testing “how” initial energetic resource availability helps to sustain one’s energy over the course of a workday. More specifically,

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we propose flow experiences as psychological- and TP, OCB-I, and CPE as behavioural mechanisms underlying the daily energetic resource generation process. By doing so, our study elucidates the so far underexplored process that informs COR's corollary of how resources beget further resources (Kim et al., 2015). Second, we further unpack the somewhat equivocal nature of the investment principle by shedding light on a crucial boundary condition that explains “*when*” resources are invested (Halbesleben et al., 2014). Specifically, we argue that employees' energy investment in specific work behaviours is motivated by their striving to satisfy their basic psychological needs.

As a result, we propose that employees' energy investment in work behaviours that have the potential to compensate for low satisfaction of a specific need contribute to further energetic resource generation. This is a crucial insight as it demonstrates that investment of resources into work behaviours may, in part, be guided by low satisfaction of relevant needs. Finally, previous longitudinal studies have advanced our understanding of the resource generation process by utilizing longer time frames ranging from six months to three years (e.g., de Cuyper et al., 2012; Hakanen et al., 2008; Salanova et al., 2011). Yet, they do not offer sufficient insight into the micro-level process and the intriguing possibility that both resource investment and resource generation can unfold across shorter time frames, such as over a working day (Halbesleben & Wheeler, 2015).

11.4 Theory and hypotheses development

11.4.1 Starting the daily energy generation process: How energy leads to flow

COR suggests that individuals are motivated to gain and retain resources, which are defined as the things that are perceived to help them achieve their goals (Hobfoll, 1989,

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1998; Hobfoll et al., 2018). A key resource that employees strive to foster at work as it helps them achieve work goals is psychological energy (Ryan & Deci, 2008; Ryan & Frederick, 1997). COR posits that employees' initial gain of energetic resources triggers a process of energetic resource generation (Hobfoll et al., 2018). To generate further energetic resources, the investment principle suggests that employees must first invest available resources. Thus, the availability of energy enables resource investment that will lead to further energetic resource gains over time. This implies that a process perspective on employees' resource investment can offer valuable insights to expand our understanding of the energetic resource generation process.

Starting the day with a high level of energetic resources is essential for employees to be able to invest and engage with their daily tasks (Sonnentag et al., 2017). Research suggests that employees who start their day with high levels of energetic resources are more willing to invest effort into their work, allocate their time, and dedicate their energy to work tasks during the day (Lanaj et al., 2014; Sonnentag, 2003, 2012; Ten Brummelhuis & Bakker, 2012b; Volman et al., 2012). A high level of energy in the morning allows employees to take on challenging tasks and persist when difficulties arise (Sonnentag, 2012). Accordingly, it makes it more likely that employees become fully absorbed in challenging tasks (Sonnentag, 2003, 2012), which reflects flow, an experience of peak motivation characterized by deep concentration, a sense of control, merging of action and awareness, and intrinsic rewards (Nakamura & Csikszentmihalyi, 2014). The interplay of energetic resources and flow is highly dynamic. More specifically, energetic resource availability is essential for initiating flow because flow requires employees to persist with a challenging task (Gerpott et al., 2021) without giving up or getting distracted (Nakamura & Csikszentmihalyi, 2009). Furthermore, as work activities that are likely to trigger flow tend

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to be challenging, they require one to apply and sometimes even stretch their existing skillset (Csikszentmihalyi, 1996b; Nakamura & Csikszentmihalyi, 2009), which in turn necessitates the investment of psychological energy. This notion has been empirically supported by a study that showed employees are more likely to experience flow on a day-to-day basis during mornings when they have sufficient energetic resources (Debus et al., 2014). On the opposite end, a longitudinal study showed that experiencing low levels of energetic resources reduces employees' experiences of flow (Mäkikangas et al., 2010a). Similarly, employees are less likely to experience flow when they start their day with low energetic resources due to an aversive morning commute (Gerpott et al., 2021). That is, experiencing flow becomes more likely when employees have sufficient energetic resources at the start of the workday. Considering this evidence, we argue that energy allows employees to respond effectively to work demands. Furthermore, it helps them to stay focused on the tasks at hand and motivated them to persist when tasks become challenging. Engaging in work on days with high energy in the morning, therefore, makes it more likely to experience flow at work.

H1: Daily morning energy is positively related to daily flow experiences.

11.4.2 Sustaining the resources generation process

To maximize resource gain, COR suggests that acquired resources must be effectively invested in a way that is most fitting with the context of the resources (Hobfoll, 2001). The resources developed at work would be reinvested back into work behaviours for employees to be more effective at work and gain further work resources (Halbesleben et al., 2009; Halbesleben & Wheeler, 2008; Hobfoll, 2001). Examples of work behaviours that contribute to employees' work effectiveness are TP (Motowidlo & van Scotter, 1994), OCB-I (Podsakoff et al., 2009) and CPE (Zhang & Bartol, 2010b). Therefore, we expand our

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process perspective beyond flow as a psychological mechanism by also considering behavioural mechanisms that help employees to sustain their energy. Accordingly, we propose that the experience of flow will further promote the daily resource generation process by facilitating specific work behaviours. Although flow requires an initial energy investment (Debus et al., 2014), evidence indicates that experiencing it can also replenish employees' energetic resources (Gerpott et al., 2021). That is because flow is characterized by enjoyment, absorption, and intrinsic rewards (Nakamura & Csikszentmihalyi, 2009, 2014). Being fully immersed in the flow and experiencing mastery and control is enjoyable on its own without any external rewards. Engaging in an intrinsically rewarding experience such as flow thereupon has many positive implications, including higher well-being (Csikszentmihalyi, 1999), improved positive affect (Cseh et al., 2015), and subjective vitality (Rivkin et al., 2018). Furthermore, emerging neuroscientific evidence suggests that engaging in the flow experience could be associated with activating the brain's rewards system (Van der Linden et al., 2021), leading to reduced fatigue and high energy (Norsworthy et al., 2021). Therefore, flow at work represents a state of high activation and energy that not only sustains employees' energy during the workday but also, according to COR, motivates employees to invest further in work (Hobfoll, 1989, 2001).

Several empirical studies support the notion that flow acts as a psychological process that drives the enactment of certain work behaviours. We mainly focused on three performance outcomes that are crucial for organisations' success and competitiveness. First, flow, as a state of peak performance (Norsworthy et al., 2021), is a functional state that motivates employees to excel at work and perform well (Engeser & Rheinberg, 2008). Studies have shown that experiencing flow is positively related to in-role work performance (Bakker, 2008; Demerouti, 2006; Gerpott et al., 2021). Task performance has been shown

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to be critical for organisations' success and survival (Ostroff, 1992). Second, extra-role behaviours are resources demanding that are also essential for organisational effectiveness (Allen & Rush, 1998; Binnewies et al., 2009; Ostroff, 1992). Therefore, employees could draw from the energetic resources generated during flow to engage in OCB-I (Gerpott et al., 2021). Studies did indeed demonstrate that flow experiences promote extra-role performance (Demerouti, 2006; Gerpott et al., 2021; Kasa & Hassan, 2016). Finally, the positive emotions associated with flow promote cognitive flexibility (Fredrickson, 2001) that is required for creative engagement (Fredrickson & Branigan, 2005), which also adds to organisations' competitive advantages (Amabile et al., 2005). The empirical evidence also supports the link between flow and creativity (Cseh et al., 2015; Stollberger & Debus, 2020). Based on our theoretical rationale and accompanying empirical evidence concerning the role of flow at work, we propose that flow experiences motivate employees to further invest resources in work behaviours. More specifically, we propose the following set of hypotheses:

H2: Daily flow experience is positively related to a) TP, b) OCB-I, and c) CPE captured at the end of work.

COR theory highlights the assumption that employees follow different investment strategies to maximize resource gain (Hobfoll, 1989, 2001). However, employees' investment strategies that determine how employees invest in work behaviours are not entirely clear, according to COR (Halbesleben et al., 2014). Different psychological factors can determine investment strategies at work. For instance, initial findings have highlighted the role of both individuals (Halbesleben et al., 2009) and organizational boundary conditions (Halbesleben & Wheeler, 2015) that determine employees' investment. The

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common thread remains that employees strive to maximize resources gain (Hobfoll, 2001). One psychological factor that the literature strongly suggests is positively associated with employees' resources gain is the satisfaction of their basic psychological needs (Ryan & Deci, 2017; Van den Broeck et al., 2016). In line with this notion, we argue that employees strive to maximize resources gain through their investment to satisfy their needs because psychological needs can be a motivational force that directs the energy investment strategy (Sheldon & Gunz, 2009). An unsatisfied need sways employees' work investment preferences towards a work behaviour that can potentially contribute to the satisfaction of the respective need (Ryan & Deci, 2017; Sheldon & Gunz, 2009). Therefore, a lower-than-typical satisfaction level in a specific need motivates employees to seek opportunities to engage in a need-compensatory work activity (Sheldon & Gunz, 2009).

Concerning the need for competence, findings by Sheldon and Gunz (2009) suggest that when people's need for competence is not met, they exhibit a higher desire to improve their skills. That is, the degree of competence satisfaction can be a behavioural motive that encourages investment in work duties that aims to re-establish employees' mastery and competence (Sheldon, 2011). Therefore, the need for competence and the desire to excel at work shape the investment strategy that guides where and when employees invest their resources. When employees invest their energy in performing their job duties well, they tend to improve their skills through continued practice (Ericsson et al., 1993) and experience a competence boost (Arnold, 1985). Accordingly, we theorize that employees' investment in TP is a suitable strategy to compensate for low satisfaction in the need for competence. In a similar vein, employees' desire to connect with their colleagues increases when employees feel low satisfaction in the need for relatedness (Sheldon & Gunz, 2009). The literature suggests that employees start to look for opportunities to socially connect with others when

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they feel excluded and out of the loop (DeWall et al., 2009; Gardner et al., 2000). In a series of studies, Maner and colleagues (2007) found that people prefer to work with others rather than alone when they feel disconnected. Building on this, a resource investment strategy to build connections may be to help colleagues at work, as Ryan and Deci (2017) noted that employees' need for relatedness could be satisfied by supporting others. Therefore, we suggest that flow leads to resource investment in OCB-I when employees perceive low satisfaction in their need for relatedness.

Finally, we posit that perceiving low satisfaction in one's need for autonomy promotes the desire to engage in corresponding need-satisfying behaviours such as CPE (Sheldon & Gunz, 2009). Radel and colleagues (2011) experimentally demonstrated that experiencing a low sense of autonomy makes individuals gravitate towards autonomy-related stimuli, which in turn direct them towards potential sources to satisfy their need for autonomy. Another study also suggests that autonomy need dissatisfaction promotes people's engagement in autonomous behaviours (Radel et al., 2013). The study showed that participants' dissatisfaction with the need for autonomy was positively related to a higher engagement in solving a puzzle on their own. The evidence, therefore, indicates engaging in problem-solving behaviour could be a suitable investment strategy when employees experience autonomy dissatisfaction. Accordingly, we suggest that flow motivates employees to invest their energetic resources into work behaviours that can potentially compensate for low satisfaction in the need for autonomy to restore and re-establish their autonomy. For example, by engaging in problem identification, information search, and idea generation, that is, CPE could reassure employees that they are self-sufficient and generative at work, thus potentially restoring their sense of autonomy. By the same token, a study

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showed that people high in implicit autonomy motives are more likely to engage in creative performance (Baum & Baumann, 2018).

In summary, our theoretical arguments and available empirical evidence inform our proposition that on days when employees experience flow, they are motivated to allocate their resources towards displaying certain work behaviours that have the potential to compensate for the low satisfaction of a corresponding need. Accordingly, we propose that unmet needs motivate compensatory investments into three work behaviours: TP, OCB-I, and CPE which are congruent with the three basic needs: competence, relatedness, and autonomy. We hypothesize:

H3: Daily a) competence, b) relatedness, and c) autonomy needs satisfaction moderate the relationships between the daily flow experiences and a) task performance, b) OCB-I, and c) CPE. Each relationship will be stronger when the daily satisfaction of a) competence, b) relatedness, and c) autonomy need is low as compared to high.

Integrating H1-3, we propose the following set of hypotheses:

H4: Daily satisfaction of the need for a) competence, b) relatedness, and c) autonomy moderates the indirect relationship between morning energy and a) task performance, b) OCB-I and c) CPE via flow experiences. The indirect relationship will be stronger when the daily satisfaction of a) competence, b) relatedness, and c) autonomy needs are low as compared to high.

11.4.3 How morning energy leads to evening energy through psychological and behavioural mechanisms and compensatory resource investment

Capitalizing on the investment principle (Hobfoll et al., 2018), we expect employees' resource investments in work behaviours to have the potential to generate energetic resource gains. First, investing resources in activities such as focusing on the task at hand and performing work duties to the best of one's ability can be an energizing experience. Research has indeed shown that investing effort in tasks that make one feel effective and competent leads to higher energy (Sheldon et al., 2010). In a similar vein, Weinstein and colleagues (2016) found that participants who engaged in doing something challenging experienced a decrease in distress. Furthermore, Fisher and Noble (2009) have demonstrated that positively evaluating one's performance leads to an increase in positive emotions. Therefore, the evidence suggests that investing resources into performing one's tasks and duties can generate further energetic resources because it boosts employees' competence (Arnold, 1985; Sheldon et al., 2010) and brings them closer to accomplishing their work goals (Klug & Maier, 2015; Locke et al., 1970). Accordingly, employees' resource investment in TP should have a positive energetic impact.

Second, investing one's resources in providing help and support towards colleagues is inherently a rewarding experience (Weinstein & Ryan, 2010). Supporting colleagues offers the assurance of reciprocity which expands employees' social support (Halbesleben & Wheeler, 2011), creating an energizing work environment. Furthermore, supporting others also contributes to one's energetic resources. For instance, daily OCB-I was found to foster employees' psychological resources by improving positive affect (Koopman et al., 2016). In another study involving a set of experiments, Weinstein and Ryan (2010) demonstrated

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that volitionally helping others led to an increase in participants' energetic resources, such as positive affect and vitality. Taken together, extant empirical research indicates that employees' investment in OCB-I leads to a gain in energetic resources. Finally, creativity plays a vital role in generating energetic resources because it is a self-determined, intrinsically rewarding activity (Ryan & Deci, 2000). Ryan and colleagues (2010) demonstrated that engaging in volitional activities similar to CPE led to a higher vitality. In other words, one experiences a higher vitality when one feels that they are the origin of enacting the activities. In a study during the Covid-19 outbreak, participants who chose to engage in an activity that mattered to them experienced a higher vitality (Behzadnia & FatahModares, 2020). Additionally, creative activities at work have been found to foster employees' positive affect even after three months (Tavares, 2016). The evidence, thus, suggests that engaging in creative processes promotes well-being (Conner et al., 2016). Accordingly, we theorize employees' investment in CPE leads to greater energy.

Drawing on COR theory and corresponding empirical evidence, we integrate H1-H4 to propose a moderated serial mediation that reflects a resources generation process between morning energy and end-of-work energy. Morning energy allows employees to engage in their work in a way that is conducive to experiencing flow. As a state of high activation, flow sustains employees' energy during the day and encourages employees to further gain resources through investing in work behaviours (TP, OCB-I and CPE). Furthermore, work behaviours energize employees' end-of-work energetic resources. Finally, low needs satisfaction directs employees to invest in compensatory work behaviours. Specifically, we propose the following set of hypotheses:

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H5: Daily a) competence, b) relatedness, and c) autonomy needs satisfaction moderates the serial mediation linking morning energy and end of work energy via flow experiences and a) task performance, b) OCB-I, and c) CBE. The indirect relationships are stronger when the daily satisfaction of a) competence, b) relatedness and c) autonomy needs are low as compared to high.

11.5 Methods

11.5.1 Participants and procedure

We conducted a daily experience sampling study to test the proposed moderated mediated model. Ethical approval for the study was obtained by the ethics commission of [removed for blind peer review]. Master students recruited the full-time employed study participants, as part of MSc dissertation projects, through their contacts, thereby ensuring the heterogeneity of the sample (Demerouti & Rispens, 2014). Initially, a total of 224 participants signed consent forms to take part in the study. Out of these, 146 participants started the study (person-level response rate: 65%). On average, participants completed 5 out of 10 days of surveys (day-level response rate: 53%), which aligns with previous daily diary studies (Fisher & To, 2012). Employees were recruited from a variety of countries (63% UK, 13% Saudi Arabia, 12% Italy, and 12% other countries) and occupational backgrounds (30% health, 8% energy, 7% education, 7% finance, and 48% other sectors). Over half of the participants identified themselves as female (56%). The participants' age ranged between 20 and 57 years old ($M = 32$; $SD = 9.82$). Most participants reported that their dominant work activities were interacting with customers (71%), followed by knowledge work (66%), physical labour (12%), and creative work (11%). Participants were invited to take part in the present study via an online link with a description of the study and

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its objectives. After signing the informed consent forms, each participant received a pre-survey to assess demographic information. Henceforth, participants started to receive the daily survey links starting from the following Monday for ten consecutive workdays. Participants received three surveys each day at the following times: two hours after starting work, at noon, and one hour before the end of work. To promote the participants' compliance with the designated times of the survey, they were emailed a reminder one hour after each initial prompt. All participants were given four hours windows to complete the survey, after which the link to the survey was deactivated. Participants were not compensated for participating. The average completion times for the surveys were: 12:05, 14:10, and 18:05 for the beginning-of-work, noon, and end-of-work surveys, respectively.

11.5.2 Measures

All surveys were adapted for daily assessment. Two hours after the beginning of work, we measured energy utilizing the 7 items of the subjective vitality (SV) scale (Ryan & Frederick, 1997). That is because SV is in line with the theory and research definition of energy (see Quinn et al., 2012; Ryan & Deci, 2008 for review). A sample item is "Right now, I feel alive and vital". Participants rated each item on a Likert scale ranging from "1 = strongly disagree" to "5 = strongly agree". The same scale was used to measure participants' end-of-work energy one hour before the end of work.

At noon, participants' *flow* experiences were measured using the Flow-Short-Scale (Engeser & Rheinberg, 2008). A sample item from FSS is "In the last few hours, I didn't notice time passing". The scale consists of ten items, which participants rated on a Likert scale ranging from "1=not at all" to "5=great deal". At the same time, participants' *basic psychological needs satisfaction* was measured using the work-related basic needs

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satisfaction scale (van den Broeck et al., 2010). The scale contains twelve items that refer to the three basic needs: the need for autonomy, competence, and relatedness. Each need was measured with 4 items. Sample items for each need are “In the last few hours, how satisfied were you with the feeling of being competent in your job?” (competence), “In the last few hours, how satisfied were you with the feeling of being with a group at work?” (relatedness) and “In the last few hours, how satisfied were you with the following: the level of autonomy you have in your job?” (autonomy). Participants responded to each item with “1= very dissatisfied” to “5= very satisfied”.

One hour before the end of work we measured participants' work behaviours. Participants' *task performance* (TP) was measured using a 2-item scale (Demerouti et al., 2015) adapted from (Goodman & Svyantek, 1999b). The scale refers to the participants' subjective evaluation of how well they have done their tasks. A sample item is “Today I fulfilled all the requirements of my job”. Participants answered each item on a Likert scale ranging from “1=not true at all” to “5 = totally true”. At the same time, we also measured interpersonal OCB-I with four items from the OCB-I scale (Williams & Anderson, 1991). The scale refers to how often participants engaged in behaviours that are directed towards helping their colleagues at work in the last few hours. An exemplary item is “In the last few hours, I took a personal interest in other employees”. Participants rated each statement on a 7-point Likert scale ranging from “1= very slightly” to “7 = extremely”. Finally, participants' creative processes engagement was measured using items from the CPE scale (Zhang & Bartol, 2010a). The scale aims to measure the extent to which participants engaged in behaviours that are conducive to creative outcomes (To et al., 2012). The original scale contains eleven items that measure *problem identification, information searching, and encoding and idea generation*. To reduce the response burden, following To and colleagues

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(2012), we selected six items (two items per behaviour) that can vary between days. An exemplary item is “In the few hours at work I was trying to devise potential solutions that move away from established ways of doing things.” Participants responded to each item on a scale ranging from “1= strongly disagree” to “5= strongly agree”.

11.5.3 Analytical procedure

We examined the conceptual model through multilevel analyses as level-1 (day-level) variables (SV, flow, needs satisfaction, TP, OCB-I, and CPE) were nested in level-2 (person-level) clusters. Therefore, we used multilevel structural equation modelling and the recommended procedure by Preacher and colleagues (2010) to test the proposed moderated mediation model. We specified the hypothesized model using Mplus 8.2 (MLR estimating) (Muthén & Muthén, 1998-2017) and tested it by specifying a 1-1-1-1 moderated-mediation model (Preacher et al., 2010). First, we specified direct paths linking morning subjective vitality, flow at noon, end-of-work behaviours (TP, OCB-I, and CPE), and end-of-work SV. To account for the moderation effect of needs satisfaction, we specified 3 interaction terms for each need with flow to predict each work behaviour. We accounted for the high correlations of flow and satisfaction of each of the three needs ($r > .58$; cf Table 1), by adding the covariances of flow and each need satisfaction to our model. Furthermore, we controlled for morning SV in the model to predict the increase in end-of-work SV.

We used the Monte Carlo method of re-sampling to estimate the confidence intervals for the proposed (1-1-1-1) moderated-mediation model (Leeden et al., 2008; Preacher & Selig, 2012). This was necessary as indirect effects are theoretically non-normally distributed, and thus point estimates cannot be interpreted. Moreover, the bootstrapping procedure to calculate confidence intervals is not applicable. The bias-corrected 95%

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confidence intervals for the indirect effects were computed based on 20,000 re-samples using the R-package provided by Tofighi and MacKinnon (2011). Furthermore, to test the moderated indirect effects of needs satisfaction, we computed the conditional indirect effect at both lower (-1 *SD*) and higher (+1 *SD*) levels of each moderator, as recommended by Hayes and Preacher (2010). If the confidence interval does not include zero then it indicates the presence of a (conditional) indirect effect (Preacher et al., 2007). As recommended by Enders and Tofighi (2007), we centred all exogenous variables at the person mean, which allowed us to investigate within-person variation.

11.5.4 Measurement Models

To demonstrate the psychometric distinctness of all within-person constructs of our study, we conducted multilevel confirmatory factor analyses (MCFAs). We specified all models on the within-person level because our model exclusively focuses on within-person relationships. For this purpose, all items were group-mean centred to exclude between-person variance. First, we tested the proposed 9-factor measurement model, which reflects our proposed theoretical model. This model showed an acceptable data fit (χ^2 [1091] = 1720.97; RMSEA = .026; TLI = .949; CFI = 0.952; SRMR = .035), which meet the cut-off values recommended by Hu and Bentler (1999). We also examined alternative models. In Model 2 the three needs satisfaction were represented as one factor. This model showed an acceptable fit as well (χ^2 [1106] = 2306.022; RMSEA = .036; TLI = .905; CFI = 0.91; SRMR = .04) but performed significantly worse than the proposed model (S-B scaled $\chi^2 \Delta$ (15) = (385.679), $p < .01$). Finally, we examined another model that grouped work behaviours into one factor. The results indicate that this model (χ^2 [1106] = 2866.82; RMSEA = .043; TLI

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= .86; CFI = 0.869; SRMR = .067) also performed worse compared to the theoretically proposed model (S-B scaled $\chi^2 \Delta (15) = (212.076), p < .01$).

11.6 Results

Descriptive statistics, including internal consistencies and correlations among all the examined variables, are included in Table 1. All variables showed within-person variance between 30% and 54%, which is a reasonable day-level fluctuation, calling for multilevel analysis. Hypothesis 1 proposes that day-level SV in the morning is positively related to day-level flow experiences at noon. The results presented in Table 2 support that SV in the morning is indeed positively related to flow experiences ($\gamma = .27, p < .01$), offering support to Hypothesis 1. Hypothesis 2a) to 2c) proposes a positive relationship between flow experiences at noon and end of work TP, OCB-I, and CPE. Our predictions were not supported as our results do not indicate any significant relationships between flow experiences and work behaviours (TP; $\gamma = .133, p = .153$, OCB-I; $\gamma = .019, p = .88$, CPE; $\gamma = .097, p = .287$).

Hypothesis 3a) to 3c) suggest that daily needs satisfaction moderate the relationships between daily flow experiences and work behaviours. More specifically, we argue that the relationship between flow and TP (3a), OCB-I (3b), and CPE (3c) will be stronger on days with lower compared to high satisfaction of the need for competence (3a), relatedness (3b), and autonomy (3c), respectively. Our results suggest that the interaction between the competence need satisfaction and flow is related to TP ($\gamma = -.298, p < .01$). Similar relationships were found for the interactions between the need for relatedness and the need for autonomy with flow experiences in predicting OCB-I ($\gamma = -.357, p < .01$) and (CPE; $\gamma = -.159, p < .01$) respectively. To illustrate the patterns of the interactions, we plotted all within-

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person relationships at conditional values of each need satisfaction (± 1 SD; Cohen et al., 2003). However, the simple slope test for the moderation effect of relatedness need satisfaction on the relationship between flow, and OCB-I was found to be only significant at very low and very high values (i.e., 2 SD). The interaction plots in Figure 2 support our predictions. That is, flow experiences at noon have a positive relationship with work behaviours only on days when employees experience lower needs satisfaction compared to high, except for the need for relatedness, which displays significant interactions for both low and high need satisfaction.

Table 1

Means, Standard Deviations, Internal Consistencies (Cronbach's Alpha) and Intercorrelations

Variable	1	2	3	4	5	6	7	8	9	10
1. Subjective Vitality - Morning	.91-.93	0.33	0.15	0.20	0.17	0.28	0.13	0.00	0.28	
2. Flow - Noon	0.54	.80-.95	0.60	0.62	0.58	0.32	0.18	0.16	0.22	
3. Need for Autonomy - Noon	0.27	0.53	.86 - .95	0.70	0.57	0.26	0.18	0.19	0.20	
4. Need for Competence - Noon	0.37	0.62	0.71	.90 - .96	0.65	0.26	0.20	0.11	0.17	
5. Need for Relatedness - Noon	0.34	0.58	0.54	0.59	.86 - .95	0.28	0.22	0.15	0.18	
6. Task Performance - End of Work	0.43	0.60	0.41	0.60	0.46	.88 - .95	0.47	0.42	0.40	
7. OCB-I - End of Work	0.29	0.35	0.29	0.24	0.51	0.39	.87 - .96	0.38	0.27	
8. CPE - End of Work	0.18	0.27	0.41	0.28	0.27	0.18	0.41	.88 - .95	0.29	
9. Subjective Vitality - End of Work	0.55	0.34	0.15	0.18	0.20	0.29	0.29	0.23	.87 - .91	
10 Age	0.08	0.02	-0.05	-0.04	-0.04	-0.03	0.04	0.16	0.22	
11 Gender	-0.01	0.10	0.05	0.14	0.06	-0.08	0.05	-0.05	0.01	
M	3.23	3.27	3.46	3.66	3.56	3.81	4.01	3.05	2.83	1.45
SD	0.58	0.52	0.68	0.67	0.74	0.74	1.22	0.71	0.52	0.51

Note. Cronbach's alpha values for day-level variables represent the lowest and highest values across all measurement days. Correlations below the diagonal are person-level correlations (N = 147). Correlations above the diagonal are day-level correlations (N = 795). Numbers in bold $p < .05$

Table 2
MSEM model with unstandardized coefficients.

				Flow				TP				OCB-I				CPE				End-of-Work SV			
				Estimate	SE	z		Estimate	SE	z		Estimate	SE	z		Estimate	SE	z		Estimate	SE	z	
Within-level																							
Morning SV				0.184	0.035	5.296	**	0.2	0.084	4.714	**	0.108	0.088	1.232		-0.056	0.056	-0.993		0.175	0.040	4.348	**
Flow								0.133	0.093	1.431		0.019	0.124	0.155		0.097	0.09	1.077		0.051	0.046	1.123	
Need for Competence								0.016	0.084	0.194		0.191	0.158	1.208		-0.158	0.1	-1.587					
Need for Relatedness								0.09	0.079	1.131		0.127	0.143	0.889		0.115	0.079	1.464					
Need for Autonomy								0.073	0.07	1.04		0.026	0.118	0.223		0.178	0.063	2.813	**				
Flow X Need for Competence								-0.298	0.061	-4.848	**												
Flow X Need for Relatedness												-0.357	0.08	-4.441	**								
Flow X Need for Autonomy																-0.159	0.056	-2.852	**				
TP																				0.204	0.050	4.069	**
OCB-I																				0.046	0.030	1.209	
CPE																				0.133	0.043	3.085	**
Residual variance				0.249	0.031	7.921	**	0.399	0.038	10.61	**	1.194	0.125	9.516	**	0.469	0.041	11.362	**	0.289	0.024	12.083	**

Note. Estimates are unstandardized, resulting from one overall analysis including the prediction of all outcomes in one model.
* $p < .05$. ** $p < .01$

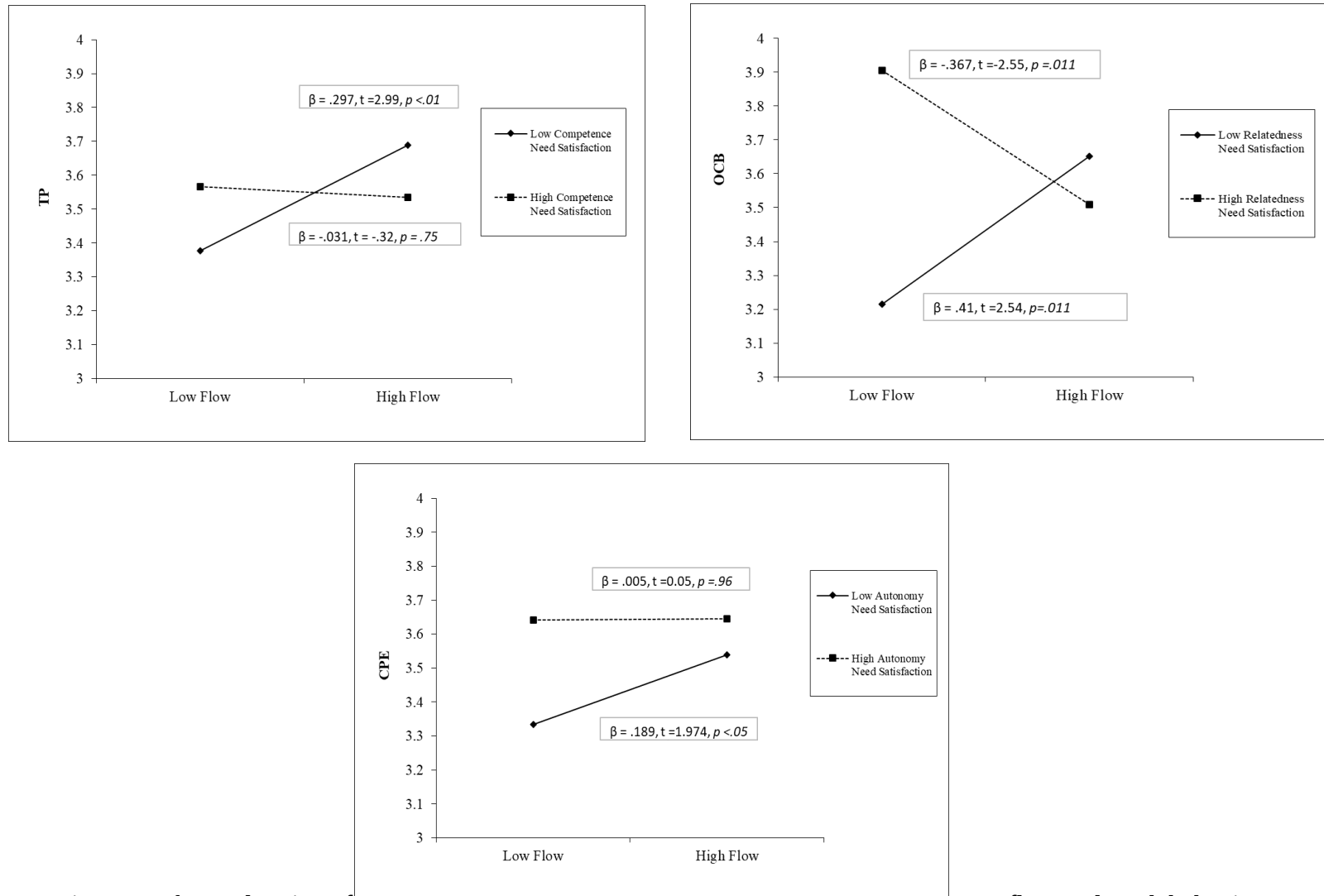


Figure 2. The moderating effect of basic psychological needs on the relationship between flow and work behaviours

Table 3
Indirect effects: Moderated Mediation (H4)

Mediator: Flow	High				Low				The difference in conditional indirect effects between high and low Need satisfaction			
	Estimate (SE)	<i>p</i>	LLCI	ULCI	Estimate (SE)	<i>p</i>	LLCI	ULCI	Estimate (SE)	<i>p</i>	LLCI	ULCI
Outcome: TP Moderator: Need for Competence Satisfaction	-.005(.018)	.758	-.0396	.0328	.016(.104)	.003	.0159	.1040	-.060(.016)	.000	-.0945	-.0308
Outcome: OCB-I Moderator: Need for Relatedness Satisfaction	-.034(.025)	.149	-.0856	.0120	.041(.027)	.106	-.0084	.0976	-.075(.022)	.000	-.1225	-.0358
Outcome: CPE Moderator: Need for Autonomy Satisfaction	.001(.018)	.959	-.0328	.0388	.035(.020)	.049	.0002	.0771	-.034(.013)	.004	-.0611	-.0102

Table 4
Indirect Effect moderated sequential mediation (final model H5)

Outcome: End-of-Work SV	High				Low				The difference in conditional indirect effects between high and low Need satisfaction			
	Estimate (SE)	<i>p</i>	LLCI	ULCI	Estimate (SE)	<i>p</i>	LLCI	ULCI	Estimate (SE)	<i>p</i>	LLCI	ULCI
2nd Stage Mediator: TP Moderator: Need for Competence Satisfaction	-.001(.004)	.759	-.0091	.0065	.011(.005)	.003	.0031	.0220	-.012(.004)	.000	-.0213	-.0052
2nd Stage Mediator: OCB-I Moderator: Need for Competence Satisfaction	-.001(.002)	.340	-.0051	.0010	.001(.002)	.325	-.0014	.0051	-.003(.002)	.232	-.0075	.0019
2nd Stage Mediator: CPE Moderator: Need for Competence Satisfaction	.000(.003)	.958	-.0050	.0056	.005(.003)	.050	.000	.0124	-.005(.003)	.006	-.0105	-.0008

Hypotheses 4a) to 4c) suggest that the satisfaction of each daily need moderates the indirect relationships between morning vitality and behaviours via flow. Our results supported our predictions (TP: $\gamma = -.06$, $p < .01$; 95% CI [-.945, -.031]; OCB-I: $\gamma = -.075$, $p < .01$; 95% CI [-.123, -.036]; CPE: $\gamma = -.034$, $p < .01$; 95% CI [-.061, -.010]; cf. Table 3). That is morning SV has a positive effect on work behaviours via flow only when the satisfaction of the corresponding need is low. No significant indirect effects were found when the satisfaction of each psychological need was high.

The final set of hypotheses 5a) to 5c) suggests that the indirect relationship between morning SV and the increase in SV at the end of work via flow and work behaviours (TP, OCB-I, and CPE) are moderated by the daily satisfaction of each psychological need (need for competence, need for relatedness and need for autonomy). The results in Table 4 indicate that both lower satisfaction of the need for competence and the need for autonomy moderate the indirect effect of morning vitality and the increased vitality via flow and task performance and CPE, respectively (TP: $\gamma = .011$, $p < .01$; 95% CI [.0031, .022]; CPE: $\gamma = .005$, $p = .05$; 95% CI [.000, .0124]; cf. Table 4). That is, morning SV leads to an increase in end-of-work SV via flow experiences and work behaviours (TP and CPE) only when the satisfaction of the corresponding need (competence and autonomy) is low. No significant indirect effects were found for high or low satisfaction of the need for relatedness (OCB-I: $\gamma = .001$, $p = .325$; 95% CI [-.0014, .0051]). Furthermore, no significant indirect effects were found for high competence and autonomy needs satisfaction.

11.7 Discussion

While previous research has predominantly focused on the energy-draining nature of work (Lilius, 2012; S. L. Parker et al., 2021), we set out to understand how and when work can be energizing and can help employees sustain their energetic resources over the course of a workday. Utilizing COR theory, the central aim of the present study was to

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uncover the psychological and behavioural mechanisms of the energetic resource generation process. Despite ample research on human energy, the mechanisms that underlie daily resource gain processes are not well explored (Halbesleben & Wheeler, 2015). Our dynamic model addresses this limitation in the literature by offering more detailed insights into how high levels of energetic resources at the beginning of the workday trigger daily processes that facilitate energetic resource generation. Specifically, our model suggests that daily flow experiences play a pivotal role as a psychological mechanism underlying the resource gain process. We demonstrate that flow (Bakker, 2005; Nakamura & Csikszentmihalyi, 2014; Norsworthy et al., 2021) not only helps sustain employees' energy but also facilitates the further investment of resources. Our results also suggest that employees' engagement in work activities represents a behavioural mechanism that further explains how resource gain processes develop during the workday. Finally, besides offering a detailed perspective on the resource generation process, our work also elucidates the complex investment principle proposed by COR and identifies boundary conditions that determine when employees' flow promotes work behaviours that contribute to a sustained energetic resource generation process. Specifically, our results demonstrate that employees invest in work behaviours in the case of lower-than-typical satisfaction of their corresponding basic psychological needs.

11.7.1 Theoretical implications

Examining the psychological and behavioural mechanisms of how and when the daily generation of energetic resources unfolds adds to COR theory in important ways. First, through integrating flow with COR, the present research expands our understanding of how employees' psychological experiences can sustain their energy during the day. On the one hand, the study shows that flow necessitates the availability of energetic resources. On the

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other hand, flow helps sustain energy by motivating further resource investment. The meditating role of flow linking energy to investment not only highlights the importance of this state of high activation in the resources gain process but also identifies flow as a critical puzzle piece explaining how energetic resources beget further energetic resources. This is also consistent with flow research that views flow as an energy-demanding state (Debus et al., 2014; Nakamura & Csikszentmihalyi, 2009) and a state of high activation (Gerpott et al., 2021; Norsworthy et al., 2021; Van der Linden et al., 2021). The present study also advances our understanding of flow as a concept by investigating both antecedents and outcomes of flow. Accordingly, our study demonstrates that the net gain of engaging in flow is positive, which is why flow acts as a psychological mechanism underlying the energetic resource generation process. However, contrary to our initial expectations, we did not find a direct relationship between daily flow experiences and work behaviours. These unexpected findings can be better understood by considering the integration of theoretical and methodological assumptions in flow research. The existing body of flow research typically posits various mechanisms that explain the performance-enhancing effects of flow. For instance, it suggests that flow is a functional state characterized by complete attention and accompanied by positive emotions (Bakker, 2008; Demerouti, 2006; Gerpott et al., 2021). Given this understanding, the lack of support for our predictions indicates the need to explore the specific mechanisms through which flow facilitates subsequent performance (Harris et al., 2021).

Second, going beyond identifying flow as a psychological mechanism, our findings suggest that employees' work activities represent another key behavioural mechanism for the daily resource gain process. Our results indicate that employees' investment in specific work activities enables them to gain further energetic resources. Investing in TP and CPE

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was found to predict the gain of further energetic resources. This corresponds well with the COR theory's proposition that employees' gained resources at work are reinvested back into work behaviours, which propels further resource gain (Halbesleben et al., 2009; Hobfoll, 2001). However, our results did not support the proposed role of OCB-I in sustaining the resource gain process. This unexpected result can be further understood in light of the wider literature, which highlights that OCB-I may be a double-edged sword, as some studies reported that OCB-I yields positive consequences for employees' resources as it fosters available social support (Halbesleben & Bowler, 2007a; Halbesleben & Wheeler, 2015) whereas others suggest a potential negative impact, particularly when also considering alternative explanatory processes, such as perceived work progress (Koopman et al., 2016). Due to the limited resources available to the employees during a workday, helping colleagues competes for the same resources such as time and hinders work progress which then leads to emotional exhaustion (critically low level of resources) (Koopman et al., 2016). Therefore, a gain process pathway through OCB-I may be dependent on potential contextual factors such as work progress towards the work's core goals or prosocial motivation (Arshad et al., 2021; Rioux & Penner, 2001). According to our results, employees' resource investment in task performance behaviours reveals a previously missing link in the resources gain process. Similarly, investing resources to be creative expands employees' resources which complements and extends the literature on creativity and psychological resources (Amabile et al., 2005; Tavares, 2016).

Third, the moderating role of needs satisfaction in the energy investment and gain process represents another novel theoretical implication for the study of energy at work. Integrating basic psychological needs satisfaction with the investment principle advances our understanding of the investment process by identifying needs satisfaction as a

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contingency that determines the investment of resources in work behaviours. More specifically, our study demonstrates that the natural tendency to satisfy our basic psychological needs guides investment behaviours towards a compensatory work activity that is congruent with the unsatisfied need. Our findings are in line with theory and research suggesting that unmet needs have a motivational potential to direct individuals towards needs-compensatory activities (Ryan & Deci, 2017; Sheldon & Gunz, 2009). Furthermore, our research contributes to a better understanding of the different strategies used to allocate employees' resources by supporting the assumption that people can be strategic even in the case of surplus resources (Hobfoll, 2001). Finally, our work highlights the temporal nature of micro-level daily resource generation and demonstrates that resource generation and accumulation processes can be captured within a day. This furthers our understanding of resource gains and challenges the common assumption in COR theory that such gains accumulate over long time periods by demonstrating that resource gains can be realized in the short term as well (Hobfoll et al., 2018). In so doing, we contribute to a more nuanced view of the temporal dynamics of resource generation at work.

11.7.2 Practical implications

Given the important implication of sustaining energy at work, our study offers several practical implications for practitioners. First, it suggests that a crucial precondition to having an energizing workday is to start the day with high energy in the first place. Feeling energetic at the beginning of the workday enables employees to engage with their work and perform well, making it more likely they end their day feeling energized. This means that healthy daily habits that help employees start their morning with high energy, such as a good night's sleep, are vital for employees' functioning and wellbeing (Diestel et al., 2015; Rivkin et al.,

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2021). Second, the study highlights the importance of experiencing flow at work as it demonstrates that flow is a crucial experience that transforms work from energy-draining to energy-generating. Therefore, it is highly recommended for organizations design jobs and tasks in a way that is conducive to experiencing flow by ensuring that employees are assigned tasks with clear goals, provided with regular feedback, and equipped with the necessary skills needed to perform challenging tasks (Demerouti, 2006).

Finally, although our study shows that low need satisfaction guides employees to channel their energy into need-satisfying activities, it does not mean that organizations should thwart employee needs. That is because previous studies have shown that thwarting needs leads to health impairment and dysfunctional performance (Vansteenkiste et al., 2020). Additionally, our study only showed that unsatisfied needs motivate employees to seek investment in needs-satisfying activities. As previous research has shown that needs cannot be fully realized (Ryan & Deci, 2017), it is recommended to provide employees with a work environment that is nurturing and always supportive of their basic psychological needs. Finally, our study implies that enabling employees to seek needs-compensatory work activities when they feel that their needs are not fully realized could lead to sustaining their energetic resources.

11.7.3 Limitations and direction for future research

Our work is not without limitations. First, the diary design adopted in our study did not allow us to establish a causal relationship between energetic resources and psychological and behavioural processes. However, the temporal nature of the study, in which the variables were measured at three different measurement points, gave us more confidence in the theorized relationships between the variables (Eschleman & LaHuis, 2014). Future research

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could implement an experimental design to establish a causal relationship to better understand whether experiencing flow causes employees to be more willing to invest resources (Spencer et al., 2005). Additionally, an experimental design would allow us to draw causal inferences on whether low needs satisfaction leads employees to seek needs-satisfying activities. Second, the study primarily relied on self-reports, which may pose concerns about common method variance (Podsakoff et al., 2003). However, the constructs under investigation, such as energy, flow, and needs satisfaction, are all subjective experiences that make them difficult to be measured in any other way. Nevertheless, the use of MCFA to establish construct validity and the temporal separation between the variables reduce the likelihood of common method variance having a problematic impact (Podsakoff et al., 2003). Besides, interaction effects are difficult to detect in case common method variance represents an issue (Siemens et al., 2010). That being said, future studies might benefit from utilizing observer ratings for the other construct, such as employees' behavioural investment, including task performance and OCB-I.

New avenues of research can be drawn from this research. First, integrating the theory of needs satisfaction and the investment principle highlights the need for future researchers to further disentangle some of the complexity inherent in the theoretical descriptions of COR's investment principle. Investigating further boundary conditions can advance our understanding of the different strategies people use to invest resources and maximize gain. Furthermore, the study recommends further investigation of boundary conditions that could help us understand when OCB-I is beneficial for energetic resources. Additionally, future studies might also consider investigating a suitable investment strategy for those who start the workday with low rather than high levels of energy. Understanding

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investment strategies would not only help employees sustain their energy during the day but also help break the resources loss cycle (Hobfoll et al., 2018).

11.7.4 Conclusion

In conclusion, the present study adopted an experience sampling design to investigate daily energetic resource generation processes at work. Our findings unpack the underlying mechanisms of the resource gain process, which include psychological (flow) and behavioural processes (TP, OCB-I, and CPE). Additionally, results suggest that needs satisfaction acts as a boundary condition of the behavioural mechanism linking energy in the morning and psychological mechanisms to energy in the evening. By highlighting the role of needs satisfaction, we deconstruct some of the complexity of COR's investment principle and show when investment in certain work behaviours is more likely to occur. We encourage researchers to adopt a more nuanced perspective on the study of energetic resource generation processes to further support employees in their journey towards energy sustainability at work.

12 Study 2: Is work-family integration detrimental to employee wellbeing and work effectiveness? A work-home resources perspective

12.1 Abstract

Drawing on the work-home resources model, we expand the work-home literature by conceptualising work-family integration as a dynamic contextual demand that can have a detrimental effect on employees' wellbeing (i.e., subjective vitality) and effectiveness (i.e., task performance and innovative performance). Furthermore, we argue that work-related flow and its dual function as a resource-demanding and resource-generating state represents a psychological mechanism that explains how a loss of resources due to work-family integration is perpetuated to negatively impact employees' wellbeing and work effectiveness. We also posit that positive affect acts as a contingency factor and plays a crucial role in mitigating the resource depletion process triggered by work-family integration. Results of an experience sampling study (N=85s person, n=505 occasions) supported our predictions. Specifically, daily work-family integration efforts were negatively related to subjective vitality, task performance, and innovative performance via work-related flow. Furthermore, daily positive affect buffered the negative indirect effects of work-family integration on employee wellbeing and effectiveness. Theoretical and practical implications for the work-home resources model and employees' everyday efforts to achieve work-home balance are discussed.

Keywords: work-home resources model, work-family integration, flow experience, wellbeing, work effectiveness.

12.2 Introduction

In times of work intensification and increased organizational competition, employees in contemporary workplaces often find it challenging to successfully balance their work and home lives (Casper et al., 2018). To facilitate the attainment of the desired work-home balance, organizations increasingly offer flexible working policies, such as the option for employees to fully or partly work from home (Allen et al., 2013; Wayne et al., 2020). The utility of such organizational policies is clear as research suggests that working from home allows for greater flexibility and autonomy (Golden et al., 2006; Kossek et al., 2006), which facilitates employees' job performance (Allen et al., 2015; Gajendran & Harrison, 2007; Greer & Payne, 2014), and thus seemingly effectively promotes work-life balance. The popularity and prevalence of hybrid or remote work have also gained further popularity since the COVID-19 pandemic (Kniffin et al., 2021).

Yet, at the same time, working from home also represents an extreme version of work-family integration, which refers to the extent to which the boundaries between the two domains are flexible (i.e., the ability and the capacity to dissolve work and family boundaries to attend to the other domain's demand) and permeable (i.e. the degree to which interruptions behaviours from one domain cross to the other domain; Ashforth et al., 2000; Clark, 2000) in managing one's work and home domains. Research suggests that work-family integration is associated with a higher prevalence of cross-domain interruptions and distractions (Bulger et al., 2007; Kossek et al., 2006; Matthews et al., 2010), which can prevent employees from being fully engaged with their work role (Olson-Buchanan & Boswell, 2006), thereby reducing employee effectiveness (Desrochers et al., 2005; Smit et al., 2016).

To date, existing research on work-family integration has primarily focused on its consequences for the home domain. Specifically, this stream of research has examined issues

such as conflict and enrichment between work and home domains (e.g., Hunter et al., 2019; Kossek et al., 2012; Liao et al., 2016; Olson-Buchanan & Boswell, 2006; Paustian-Underdahl et al., 2016; Smith et al., 2021), and has mainly adopted a macro-level perspective that assumes the permeability between work and home boundaries is stable and unchanging (Delanoeije et al., 2019; Hecht et al., 2022; Smit et al., 2016). As an example, this research has identified individual boundary management preferences (e.g., Kreiner, 2006) and styles (e.g., Bulger et al., 2007; Kossek et al., 2012) as predictors of work-home effectiveness. Although this work has furthered our understanding of general work-home phenomena concerning the integration of work and home domains, it has largely neglected the dynamic nature of work-family integration behaviours (Delanoeije et al., 2019) and its impact on employees (Smit et al., 2016). In other words, we currently lack a clear understanding of how employees juggling work and home obligations on a given day might impact their daily wellbeing and effectiveness on said day. We argue that without a more nuanced and dynamic perspective on work-family integration, organizational efforts at devising policies to promote work-family balance by facilitating work-family integration will fall short of their intended target.

To develop our dynamic perspective on work-family integration, we draw from the work-home resources model (W-HR; ten Brummelhuis & Bakker, 2012) which is an extension of the Conservation of Resources theory (COR; Hobfoll et al., 2018). More specifically, we build our theorizing on the resource-draining proposition between home and work domains, which suggests that demands from the home domain, such as multitasking and completing household chores alongside work tasks, drain employees' personal resources like concentration, attention, time, and energy, leading to negative consequences that include diminished wellbeing and work effectiveness. Applied to our research, we conceptualise

work-family integration as a contextual demand that requires employees to simultaneously carry on work tasks and family obligations (Delanoeije et al., 2019; Myrie & Daly, 2009), which leaves employees with fewer personal resources. A lack of personal resources can prevent employees from entering work-related flow (i.e., an enjoyable state of optimal experience and development; Csikszentmihalyi et al., 2014). Given that flow represents a psychological state that requires both availability and investment of resources (Debus et al., 2014), we posit that it acts as an underlying mechanism that perpetuates the resource-draining process initiated by work-family integration efforts. Consequently, without experiencing flow, employees should experience diminished wellbeing in the form of reduced subjective vitality (i.e., a temporary state of wellbeing and motivation characterized by feelings of energy, activity, and productivity; Ryan & Deci, 2008) as well as hampered work effectiveness, such as reduced task (i.e., a set of tasks and behaviours that are essential for reaching organisational goals; (Motowidlo & van Scotter, 1994) and innovative performance (i.e., creating, adopting, and /or implementing useful ideas; Scott & Bruce, 1994).

Based on our theoretical argument, the question becomes how employees can effectively deal with the loss of resources that might arise from work-family integration in order to experience flow and avoid detrimental work-related consequences. The W-HR model highlights that employees' resource availability is crucial to buffer the draining process and protect their resources to ensure wellbeing and work effectiveness. Here, we argue that experiencing daily positive affect could buffer the daily draining process triggered by work-family integration by energizing employees and enabling them to enter work-related flow. This is because positive emotions broaden employees' momentary thoughts-action repertoires, expanding attention and cognition as well as building further resources

(Fredrickson, 2001; Fredrickson & Branigan, 2005). On days when employees experience higher positive affect, they should thus be equipped with the cognitive flexibility and endurance to engage with their work despite engaging in work-family integration efforts. Our theoretical model is depicted in Figure 3.

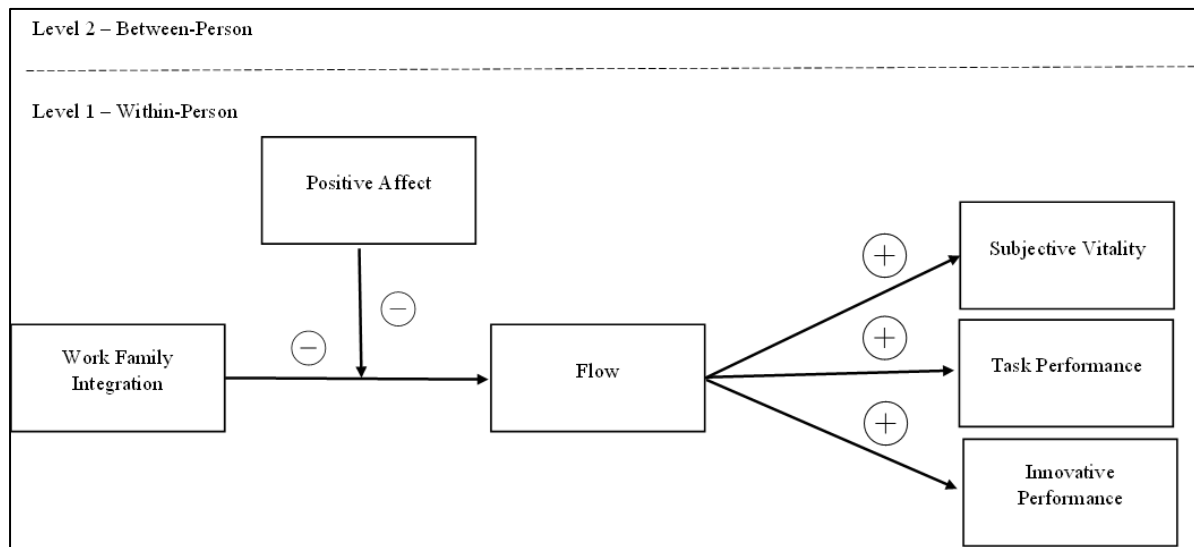


Figure 3. Theoretical Model

We aim to contribute to the work-home literature in three ways. First, we establish work-family integration as a dynamic phenomenon that is exercised by employees on a daily basis. In doing so, we complement earlier work on work-family integration that has thus far employed a more static, macro-level approach, examining traits and styles that predispose employees to have different preferences when it comes to managing their work and home lives (e.g., Vega et al., 2015). Relatedly, our work also highlights the importance of conceptualising work-family integration as contextual demand at home, which is a novel stressor considering that teleworking has gained further prevalence in recent years (Kniffin et al., 2021; Robinson, 2022). Second, our research seeks to expand the W-HR model by elucidating the underlying psychological mechanism that explains how work-family integration can lead to a resource-draining process by investigating flow as a psychological resource conduit. In doing so, we advance our understanding of how the spillover of

resources occurs between home and work domains in the context of work-family integration. Third, considering positive affect as a moderator that buffers the draining process expands the W-HR model by understanding the dynamic role of micro and volatile resources, such as affect, in the draining process that was heretofore neglected in extant work-home literature.

12.2.1 Theory and hypotheses development

According to the W-HR model, the processes of resource depletion between work and home domains occur bidirectionally, as outlined in the first and third propositions of the model. The first proposition states that contextual work demands, which refers to any emotional, physical or mental stressors that require sustaining mental or physical effort, drain employees' personal resources and subsequently diminishes home outcome (Ten Brummelhuis & Bakker, 2012a). Personal resources refer to the resources that are inherently close to oneself and comprise individual characteristics and energies that help one attains goals (Halbesleben et al., 2014; Ten Brummelhuis & Bakker, 2012a). Furthermore, personal resources can be volatile, which they can be fleeting in that once they are used, they cannot be used for other purposes, such as time or energy, or temporal, such as mood or attention that are subject to change over time (Ten Brummelhuis & Bakker, 2012a). Home outcomes could include attitudinal outcomes such as wellbeing. W-HR model's third proposition suggests that contextual home demands have a detrimental effect on work outcomes through the draining of personal resources. The model further suggests that work outcomes could include work effectiveness.

Attending to home demands during working hours necessitates the reallocation of work resources to the home domain, which results in a loss of employees' personal resources

such as time, energy, and attention (Grandey & Cropanzano, 1999). For example, helping one's child with their homework or helping a spouse prepare a meal while working from home would take away employees' time and energy that were supposed to be invested at work. Furthermore, research has shown that switching between tasks comes with a cost on employees' resources (Jett & George, 2003; Leroy, 2009; Leroy et al., 2020). Disengaging from a task to engage in another task is a cognitively exhausting process because it requires the reconfiguration of cognitive resources (Monsell, 2003). Switching back and forth between work tasks and home tasks would require activating goals and strategies relevant to each task while the cognition about the previous task would still be active (Kudesia et al., 2022). Still being cognitively attached to the previous task while performing the next task means that some of their cognitive resources are still allocated to the previous task preventing employees from fully allocating the available resources to the task at hand (Leroy, 2009).

In support of this theoretical argument, prior research has shown that task switching was associated with an increase in emotional exhaustion, anxiety (Lin et al., 2013) and mental fatigue (Kudesia et al., 2022). More relevant to our study, previous studies have indicated that juggling home duties simultaneously with work duties drains employees' work resources due to the reallocation of work resources to the home domain (Demerouti et al., 2007; Eddleston & Mulki, 2017; Kinnunen et al., 2016; Sullivan & Lewis, 2001). Thus, employees who engage in task switching between house chores such as doing laundry and work tasks lose personal resources in the process. Therefore, we argue that daily work-family integration represents a contextual demand that drains employees' personal and volatile resources that are necessary to attend to work duties and encumber their ability to immerse themselves in work (Ashforth et al., 2000).

Flow experiences are characterised by full absorption and deep concentration on the task at hand, a sense of control and intrinsic rewards (Nakamura & Csikszentmihalyi, 2014; Norsworthy et al., 2021). Although flow is intrinsically rewarding and enjoyable, it tends to occur in tasks that are challenging and require employees to exert effort to apply their skills that match the challenging activity (Csikszentmihalyi, 1996a). Hence, to be able to engage in flow, employees must have sufficient energy (Csikszentmihalyi, 1996a; Nakamura & Csikszentmihalyi, 2014), as they must continuously invest attentional and cognitive resources to enter and sustain experiencing flow (Nakamura & Csikszentmihalyi, 2009; Van der Linden et al., 2021). Empirical studies have indeed supported the assumption that flow demands the initial availability of employees' personal and volatile resources. For example, a study has shown that employees who start their day with higher mental and physical energy are more capable of engaging in flow during the day (Debus et al., 2014). On the other hand, employees who endure energy-draining experiences due to aversive commuting to their work find it harder to engage in flow on that day (Gerpott et al., 2021).

Consequently, drawing from the theoretical and empirical evidence presented, we propose that engagement in work-family integration undermines the employees' capacity to fully attend to their work tasks, leading to a decreased likelihood of experiencing the demanding state of flow

H1: Employees' daily work-family integration behaviours are negatively related to daily flow experiences

Despite flow being a resource-demanding state, during flow, one experiences intrinsic motivation making it inherently pleasurable and enjoyable without external rewards (Nakamura & Csikszentmihalyi, 2009, 2014). The literature suggests that experiencing intrinsic motivation during an activity has the potential to restore and replenish employees'

energy (Parker et al., 2021; Ryan & Deci, 2000; Tóth-Király et al., 2021; Trougakos & Hideg, 2009). Therefore, experiencing an enjoyable and positive state of flow during the day would help employees restore resources at the end of the day (Demerouti et al., 2012). This proposition has also been empirically supported, as studies have shown that flow is positively related to higher wellbeing (Csikszentmihalyi, 1999), an increase in subjective vitality, a decrease in ego depletion (Rivkin et al., 2018) and an increase in positive affect (Cseh et al., 2015). In support of our argument that flow acts as a conduit of resources, another study has also shown that flow plays a critical role in explaining the relationship between employees' affective commitment and their wellbeing (Rivkin et al., 2018). Furthermore, the resources generated during flow should enable employees to excel at their work, as flow is considered a peak performance state (Norsworthy et al., 2021). Similarly relevant to employee performance, research has shown that flow explains the relationship between the demands of adverse commuting and performance outcomes (Gerpott et al., 2021).

Drawing on the above argumentation as well as the W-HR model, we propose that work-family integration is a stressor that drains employees' resources, preventing them from entering flow at work, thereby leading to detrimental consequences for their wellbeing and resource-demanding work outcomes. More specifically, the inability to experience flow would lead to a decline in employees' subjective vitality. Moreover, hindering flow diminishes employees' resources demanding outcomes. In the present study, we focus on task performance as a core dimension of organisational effectiveness that mandates the availability of resources (Hagger et al., 2010; Quinn et al., 2012) and innovative performance that also is essential for organisations' success while demanding a great

investment of resources (Kark & Carmeli, 2009; Montani et al., 2018; Schweitzer et al., 2022).

Accordingly, we propose that work-family integration negatively impacts employees' wellbeing and hinders their task performance and innovative performance through the decrease in experiencing flow.

H2: Daily flow experiences mediate the relationships between daily work-family integration and a) subjective vitality, b) task performance and c) innovative performance.

12.2.2 The moderating role of positive affect

The Work-Home Resources (W-HR) model posits that employees who possess key and stable resources can effectively utilize such resources to alleviate and protect against the depletion process experienced in one domain caused by demands from the other (Ten Brummelhuis & Bakker, 2012a). To illustrate, an employee of a higher socio-economic status may opt to employ a domestic worker to perform household chores while working remotely, thereby allowing for the allocation of all work-related resources toward work tasks. However, the model did not take into account the role of personal and fluctuating resources in alleviating the resources depletion process. These resources, despite being less stable, can be dynamically mobilized as needed, which is in line with the COR theory (COR), on which the W-HR model is based (Hobfoll, 1989; Hobfoll et al., 2018). Extending this argument, we propose that employees' personal resources can play a pivotal role in mitigating the adverse impact of work-family integration on flow experiences. To be more precise, employees could leverage their positive activation state to energize their re-immersion into work and concentration on tasks, thereby serving as a buffer against the effect of work-family integration behaviours.

Experiencing high positive affect expands their momentary thought-action repertoire and broadens their attentional and cognitional resources (Fredrickson, 2001; Fredrickson & Branigan, 2005). Despite the loss of resources due to work-family integration, positive affect enables employees to cope better with such loss (Fredrickson et al., 2003; Fredrickson & Joiner, 2002) and endows them with the cognitive flexibility and resilience to effectively immerse themselves back in work tasks (Fredrickson, 2001). Based on this, we expect that employees with high levels of positive affect can mobilize their resources to engage with their work, thus entering flow despite the loss of resources incurred while juggling family and work responsibilities during the workday.

Prior empirical studies have demonstrated that employees can mobilise positive affect as volatile personal resources even when facing a loss of energy to facilitate their re-immersion with their work tasks and experiencing flow. For instance, a cross-sectional study found that positive affect broadens employees' thought-action repertoires which facilitates experiencing flow (Tobert & Moneta, 2013). Furthermore, a lab study found that a high state of positive affect is positively related to experiencing flow during a creative performance (Cseh et al., 2015). The literature also has supported the moderating role of positive affect in buffering employees' depletion process and facilitating their absorption at work. For instance, Schweitzer et al. (2022) have found that positive affect protects employees' regulatory resources from self-control demands leading to higher absorption in their work as indicated by higher work engagement.

Therefore, we posit that while work-family integration has a negative impact on flow experiences, the presence of high levels of positive affect can mitigate these detrimental effects. Consequently, employees with high levels of positive affect are better equipped to

maintain their resources, thereby enabling them to better manage the demands of work-family integration and enhance their flow experiences as a result.

H3: Daily positive affect moderates the relationship between work-family integration and daily flow experiences such that the relationship will be weaker on days when positive affect is higher.

Integrating H1-H3, we propose the following set of hypotheses:

H4: Daily positive affect moderates the indirect relationship between daily work-family integration a) subjective vitality, b) task performance and c) innovative performance via flow such that the relationship will be weaker on days when positive affect is higher.

12.3 Methods

12.3.1 Participants and procedure

We conducted a daily diary study to examine the proposed moderated mediation model. Before conducting the study, ethical approval was obtained from the Ethics Commission at [name of institution removed to maintain anonymity] following established ethical guidelines. The participants were recruited through Prolific Academic, which allows for high-quality data collection (Palan & Schitter, 2018; Peer et al., 2017), during the first full COVID-19 lockdown in the UK between April and May 2020. All participants were working from home during the study.

First, each participant gave their consent to take part in the study in a pre-survey that measured the basic demographic characteristics. After completing the pre-survey, we sent the participants daily surveys for 10 workdays (two consecutive weeks), starting from Monday in the first week and finishing on Friday in the second week. Participants received

3 surveys per day. Based on the information provided in the pre-survey, the first survey was sent one hour before the start of their workday. The second survey was sent one hour before the end of their workday. The final survey was sent two hours after the end of their workday. The average completion times for the surveys were: 08:36, 16:42, and 18:42 for the first, the second survey, and the third daily surveys, respectively. Participants received a reminder after an hour after each survey release time. The survey was disabled if not completed within the given time window of two hours. Participants were awarded for each survey they completed (£0.5 per survey). Additionally, participants who completed all the surveys for 7 out of 10 days received a bonus of £9.0.

The total number of participants who completed the pre-survey was N=105. Out of these, 80 participants completed the daily surveys in the study (person-level response rate: 76%), and the rest were excluded. On average, participants completed 6 out of 10 days of surveys (N=505; day-level response rate: 63%), which corresponds with the previous daily diary studies (Fisher & To, 2012). Employees worked in different sectors (17% in teaching and education, 11% in finance and insurance, 9% in public administration, 10% in IT and communications, 7% in retail and wholesale, and 46% in other sectors). Most of the participants reported that their work involves either computer work (indicated by 53% of all participants) or interacting with customers (indicated by 37% of all participants). The majority of the participants identified themselves as “female” (indicated by 71% of the participants). The sample age ranged between 22 and 65 years old ($M = 34.79$; $SD = 8.88$).

12.3.2 Measures and control variables

All surveys were adapted for daily assessment.

In the morning and one hour before the start of the workday, *positive affect* was measured with six positive affect items from the Positive and Negative Affect Schedule (PANAS “active,” “interested,” “excited,” “strong,” “inspired,” and “alert”; Watson et al., 1988), which participants rated on a Likert scale ranging from “1= not at all” to “5=extremely”.

One hour before the end of the workday, *work-family integration* was measured with four items (Eddleston & Mulki, 2017). A sample item is “Today, I was often distracted when working from home”. Participants rated each item on a Likert scale ranging from “1 = strongly disagree” to “7 = strongly agree”. At the same time, participants’ *flow experience* was measured using the Flow-Short-Scale (Engeser & Rheinberg, 2008). A sample item from the scale is “Today, I was totally absorbed in what I was doing.”. The scale consists of ten items, which participants rated on a Likert scale ranging from “1=not at all” to “7=great deal”.

One hour after the end of the workday, *subjective vitality* was measured with seven items (Ryan & Frederick, 1997). An example is “Right now, I feel alive and vital”. Participants rated each item on a Likert scale ranging from “1 = strongly disagree” to “5 = strongly agree”. *Task performance* was measured using four items (Goodman & Svyantek, 1999a). Participants' level of engagement in their core job activities on a 5-point Likert rating scale (1 = *not at all*; 5 = *a great deal*). An example is ‘Today, I did my tasks well.’ Participants’ *innovative job performance* was measured with four items (Janssen, 2001). An example is “Today, I created new ideas for improvement”, which participants rated on a Likert scale ranging from “1=not at all” to “5=great deal”.

12.3.3 Control Variables

The literature has suggested that positive and negative affect might influence each other and, therefore, it is recommended to model them simultaneously (Watson et al., 1999). Furthermore, scholars suggested that it is important to control for negative affect especially when the model includes positive affect and wellbeing indicators (Judge et al., 2000). To that end, we controlled for negative affect for predicting flow using six items from (PANAS; (“distressed,” “upset,” “irritable,” “nervous,” “jittery,” and “afraid”). Watson et al., 1988), which participants rated on a Likert scale ranging from “1= not at all” to “5=extremely”.

12.3.4 Analytical procedure

Due to the nested nature of the conceptual model in which level-1 (day-level) variables were nested in level-2 (person level) clusters, we tested the proposed 1-1-1 moderated mediation model using multilevel structural equation modelling and the recommended procedure by Preacher and colleagues (2010). The hypothesized model was tested using Mplus 8.2 (Muthén & Muthén, 1998-2017) using maximum likelihood estimation with robust standard errors and fixed slopes for all hypothesized paths. On the within-level, we specified a direct path between work-family integration and flow experience. Second, subjective vitality, task performance and innovative performance were predicted by flow experience. Finally, the moderation effect of positive affect was modelled by adding a direct path from positive affect to flow and another path from the interaction (product term) of positive affect and work-family integration to flow. As our study is exclusively testing the model on the within-person level, we applied group-mean centring to all exogenous variables (Enders & Tofighi, 2007).

To test relationships involving mediation and moderated mediation, we applied the Monte Carlo method to estimate confidence intervals around the respective effects (Preacher & Selig, 2012). Bias-corrected 95% confidence intervals based on 20,000 re-samples were computed using the software provided by Selig and Preacher (2008). For testing moderated indirect effects, we followed Hayes and Preacher's (2010) recommendation and computed conditional indirect effects, at lower (-1 SD), and higher ($+1$ SD) levels of positive affect. Confidence intervals that do not include zero indicate the presence of a (conditional) indirect effect (Preacher et al., 2007).

12.3.5 Measurement model

We conducted a series of multilevel confirmatory factor analyses (MCFAs) to test the distinctiveness of our study variables. All of the items, including the control variables, were group-mean-centred because the study focuses exclusively on within-person level relations (Enders & Tofighi, 2007). In doing so, analysing the daily fluctuations within an individual becomes feasible while controlling for any confounding factors that may vary between individuals. We evaluated the goodness of fit based on the benchmarks suggested by Hu and Bentler (1999) for the following fit indices: Root Mean Square Error of Approximation (RMSEA) of less than .08, Tucker-Lewis Index (TLI) greater than .90, Comparative Fit Index (CFI) greater than .90, and Standardized Root Mean Square Residual (SRMR) of less than .06.

First, the proposed model in which all items load on their respective factors shows a good fit (6-factors model; $\chi^2 [758] = 1592.09$; RMSEA = 0.038; TLI = .92; CFI = 0.926; SRMR = .046). Comparing our proposed model; with a reduced model in which flow and positive affect were specified as a single factor (5-factors model; $\chi^2 [764] = 3440.14$;

RMSEA = .068; TLI = .745; CFI = 0.762; SRMR = .1) shows that the theoretically predicted factor model fits the data better (S-B scaled $\chi^2 \Delta (6) = (1272.14.50)$, $p < .001$). Finally, we compared the proposed model with a reduced model in which task performance and innovative performance were specified as a single factor (5-factors model; $\chi^2 [764] = 2908.88$; RMSEA = .061; TLI = 0.796; CFI = 0.81.; SRMR = .075), and the results showed that the proposed model fits the data significantly better than the reduced model (S-B scaled $\chi^2 \Delta (6) = (476.84)$, $p < .001$).

12.4 Results

Before testing our hypotheses and ensuring the appropriateness of multilevel modelling, we examined the within-person variance of all variables in the study. The results suggest that all daily variables exhibit substantial within-person variance (positive affect = 48%, negative affect 44%, work-family integration = 59%, flow experience = 67%, subjective vitality= 55%, task performance= 62%, innovative performance = 62%), thus justifying the appropriateness of multilevel modelling to test our hypotheses. Descriptive statistics, including means, standard deviations, and intercorrelations of all examined variables, are presented in Table 5. Multilevel modelling results and tests involving indirect effects are presented in Table 6.

Hypothesis 1 suggests that work-family integration is negatively related to flow experiences. Our results support a negative and significant relationship between daily work-family integration and daily flow experiences supporting hypothesis 1 ($\gamma = -.132$, $p < .05$). Hypothesis 2a predicted that flow mediates the indirect relationship between work-family integration and subjective vitality. The results of the 95% confidence interval supported hypothesis 2a (subjective vitality: $\gamma = -.025$, $p < .05$; 95% CI $[-.05, -.006]$), as CI does not include zero. Hypothesis 2b predicted that flow experiences mediate the indirect relationship

between daily work-family integration and task performance. The results of the 95% confidence interval supported hypothesis 2b (task performance: $\gamma = -.056$, $p < .01$; 95% CI [-.097, -.017]). Hypothesis 2c predicted that flow mediates the indirect relationship between daily work-family integration and innovative performance. Our results of the 95% confidence interval also supported hypothesis 2c (innovative performance: $\gamma = -.019$, $p < .01$; 95% CI [-.038, -.005]). Therefore, hypotheses 2a to 2c fully supported our predictions that flow mediates the relationship between work-family integration and employee well-being and work effectiveness.

Table 5*Means, Standard Deviations, Internal Consistencies (Cronbach's Alpha) and Intercorrelations*

Variable	1	2	3	4	5	6	7	8	9
1. Positive Affect	.92-.95	-0.31	0.12	-0.03	0.26	0.07	0.05		
2. Negative Affect	-0.19	.81-.94	-0.11	0.09	-0.22	-0.18	0.01		
3. Flow	0.48	-0.03	.88 - .97	-0.19	0.33	0.57	0.17		
4. Work-Family Integration	0.06	0.08	-0.27	.75 - .91	-0.20	-0.18	0.02		
5. Subjective Vitality	0.65	-0.06	0.56	0.08	.84 - .97	0.28	0.15		
6. Task Performance	0.31	-0.08	0.52	-0.26	0.35	.84-.97	0.18		
7. Innovative Performance	0.24	0.15	0.21	-0.18	0.29	0.20	.86-.96		
8. Age	0.25	-0.08	-0.10	0.16	0.22	-0.08	0.12		
9. Gender	0.11	0.05	0.11	0.02	0.08	-0.04	-0.14		
M	2.60	1.41	4.27	3.01	2.52	3.83	1.77	1.29	34.79
SD	0.78	0.53	0.83	1.26	0.64	0.79	0.71	0.46	8.88

Note. Cronbach's alpha values for day-level variables represent the lowest and highest values across all measurement days. Correlations below the diagonal are person-level correlations ($N = 80$). Correlations above the diagonal are day-level correlations ($N = 505$). Numbers in bold $p < .05$

Table 6*MSEM model with unstandardized coefficients*

	Flow			Subjective Vitality			Task Performance			Innovative Performance		
	Estimate	SE	z	Estimate	SE	z	Estimate	SE	z	Estimate	SE	z
Within-level												
Work-Family Integration	-0.132	0.047	-2.811**	-0.068	0.023	-2.919**	-0.041	0.036	-1.141	0.032	0.032	0.972
Positive Affect	0.156	0.056	2.803**	0.203	0.042	4.851*	-0.001	0.054	-0.01	0.037	0.079	0.466
Work-Family Integration X Positive Affect	0.205	0.079	2.596**									
Flow				0.184	0.045	4.061**	0.425	0.056	7.564*	0.143	0.035	4.053*

Note. Estimates are unstandardized, resulting from one overall analysis including the prediction of all outcomes in one model.

* $p < .05$. ** $p < .01$.

Table 7
Indirect effects: Moderated Mediation

Table 1. Mediation and Moderation Effects of Positive Affect on the Relationship between Flow and Performance												
Mediator: Flow	Moderator: Positive Affect								Difference			
	High		Low		High		Low		High		Low	
	Estimate (SE)	p	LLCI	ULCI	Estimate (SE)	p	LLCI	ULCI	Estimate (SE)	p	LLCI	ULCI
Subjective Vitality	-.002(.014)	.946	-.0327	.0237	-.081(-.020)	.000	-.0810	-.0202	.045(.019)	.010	.0114	.0861
Task Performance	-.001(.032)	.946	-.0624	.0630	-.110(.029)	.000	-.1709	-.0558	.108(.046)	.010	.0248	.2038
Innovative Performance	-.001(.011)	.946	-.0229	.0209	-.037(.014)	.000	-.0668	-.0142	.037(.017)	.010	.0073	.0752
Indirect Effects												
Mediator: Flow	Estimate (SE)		p		95% CI indirect effect:							
					LL 95% CI		UL 95% CI					
Subjective Vitality	-.025 (.011)		.005		-0.050		-0.006					
Task Performance	-.056 (.020)		.005		-0.097		-0.017					
Innovative Performance	-.019 (.009)		.005		-0.038		-0.005					

Hypothesis 3 predicted that daily positive affect moderates the relationship between daily work-family integration and daily flow experiences. More specifically, we predicted that the relationship would be weaker on days with higher compared to lower positive affect. The results suggest that the interaction between daily work-family integration and positive affect predicts flow ($\gamma = .21, p < .05$). To illustrate the patterns of the interactions, we plotted the within-person relations at conditional values of positive affect (± 1 SD; Cohen et al., 2002). The interaction plot in Figure 4 supports our predictions showing that on days when employees experience higher positive affect, the effect of daily work family-integration on flow experiences becomes nonsignificant. In contrast, work-family integration has a negative relationship with flow on days when employees experience lower positive affect.

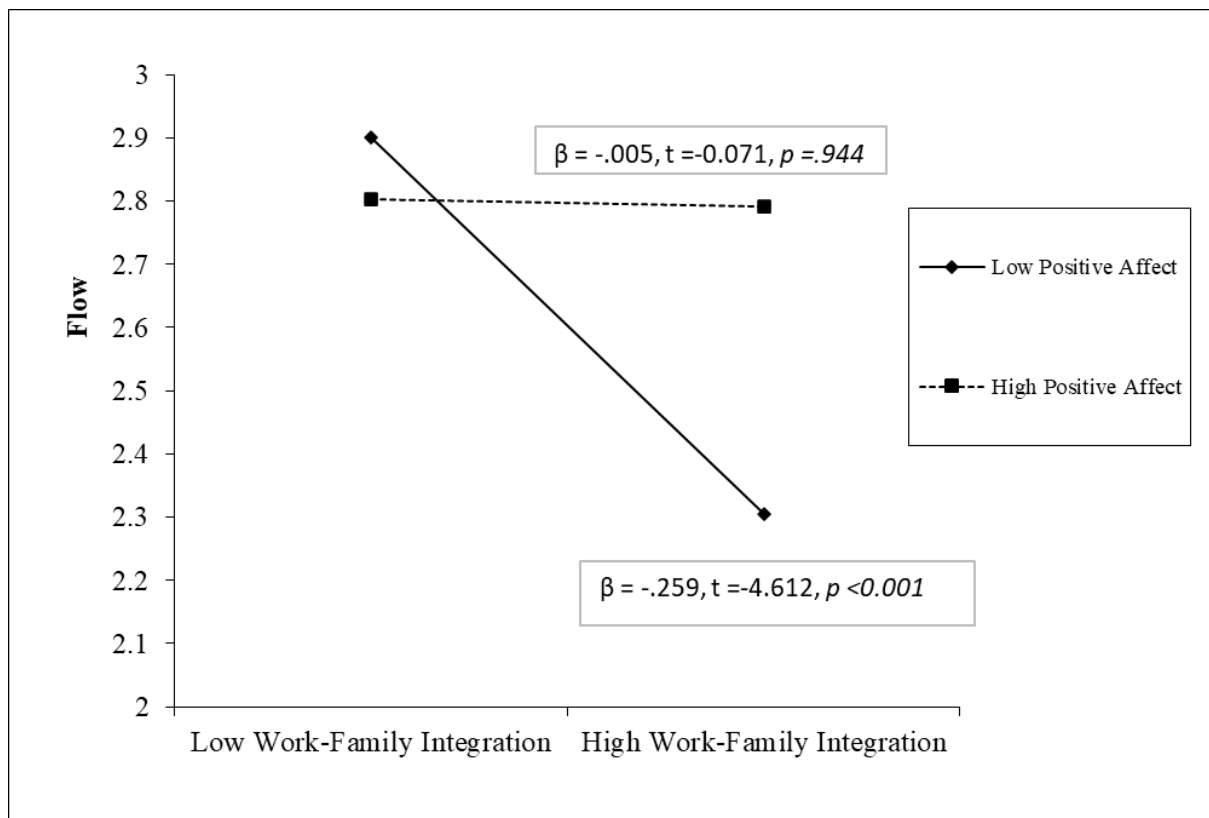


Figure 4. The moderating effect of positive affect on the relationship between work-family integration and flow

Hypotheses 4a to 4c predicted that daily positive affect moderates the indirect relationships between work-family integration and a) subjective vitality, b) task performance and c) innovative performance via flow. More specifically, the indirect relationship becomes weaker on days when positive affect is higher. The interaction pattern of the proposed moderation is plotted at conditional values of positive affect in Figure 2 (± 1 SD; Cohen et al., 2002). The results show that positive affect moderates the indirect relationships as indicated by the 95% confidence interval for the difference in the conditional indirect effect (γ); subjective vitality: $\gamma = .045$, $p < .05$; 95% CI [.0114, .0861]; task performance: $\gamma = .108$, $p < .05$; 95% CI [.0248, .2038]; innovative performance: $\gamma = .037$, $p < .05$; 95% CI [.0073, .0752). As all CIs do not include zero, the results then suggest that the indirect relationship between work-family integration and employees' wellbeing and work effectiveness via flow are contingent on positive affect.

12.5 Discussion

Despite employers' and employees' best intentions to facilitate greater attainment of work-life balance through the implementation and use of flexible working policies, our understanding of the dynamic nature of the resulting work-family integration has been limited (Delanoeije et al., 2019) and its potential consequences for employees' work-related outcomes underresearched (Smit et al., 2016). Our work, therefore, aimed to shed light on the underlying psychological mechanism through which and the conditionality by which work-family integration affects employees' wellbeing and effectiveness. To this end, we drew on the work-home resource model (Ten Brummelhuis & Bakker, 2012a) to offer a more nuanced and comprehensive perspective on the repercussions of dynamic work-family integration efforts and what can be done to mitigate their detrimental effects.

More specifically, our research posits that the draining process of employee resources is triggered by the daily demands of work-family integration that require the reallocation of resources between work tasks and home responsibilities, leading to a decrease in available resources (Matthews et al., 2010, 2014; Ten Brummelhuis & Bakker, 2012a). Consequently, experiencing flow, a resources-demanding psychological state (Debus et al., 2014; Nakamura & Csikszentmihalyi, 2014) during the day, becomes challenging. On the other end, hindering flow, an experience that replenishes and regenerate resources (Demerouti et al., 2012; Nakamura & Csikszentmihalyi, 2014; Salanova et al., 2006), diminishes employees' wellbeing and work effectiveness. Finally, our integrative model offers a buffering effect to the dynamic short-term depletion process using a personal and volatile resource which has long been neglected by the initial H-WR model. More specifically, we identified positive affect as a personal resource that can broaden and build employees' resources (Diener et al., 2019; Fredrickson, 1998; Fredrickson & Joiner, 2002), enabling them to re-engage in their work and experience the state of flow. Hereby, daily positive affect plays an important role in buffering the draining process that is triggered by daily work-family integration.

12.5.1 Theoretical Implication

Our study offers several theoretical implications that complement and extends research on the work-home interface. First, our study examined the effect of the daily dynamic of work-family integration on employees' effectiveness and wellbeing, which provides a deeper insight into the dynamic spillover processes between work and home domains. Most of the previous studies have examined the work and family interface utilizing a macro approach, such as stable boundary preferences and styles (Delanoeije et al., 2019; Hecht et al., 2022; Smit et al., 2016), whereas less attention has been paid to the daily

dynamics of work-family integration (Hecht et al., 2022) and an important but so far neglected outcome that is employees' performance (Smit et al., 2016). For that reason, we relied on the W-HR model, which allows for theoretical predictions concerning the role of time in the context of cross-domain depletion and enrichment processes, to conceptualise work-family integration as a daily contextual demand (Ten Brummelhuis & Bakker, 2012a). Our study supported the theoretical proposition that work-family integration is a dynamic phenomenon which exhibited substantial within-person variation across days (59%). Our findings indeed showed that daily work-family integration is a contextual demand that triggers a short-term depletion process across a working day that leaves employees with fewer personal resources and has a detrimental effect on their wellbeing, task performance and innovative performance. The dynamic conceptualising of work-family integration as a contextual demand has allowed us to appropriately examine the daily work-family integration in a sample of teleworkers during the pandemic, which might not have been possible before due to the difficulty of fully integrating both domains that are less flexible and permeable (Ashforth et al., 2000; Kossek et al., 2021). Since the workforce is moving more towards telework and hybrid work (Kniffin et al., 2021; Robinson, 2022), we believe that our study would open further venue of research to further understand how the dynamic of work-family integration shapes employee and organisational outcomes. Furthermore, while our findings might appear inconsistent with previous studies that showed flexible working policies might promote performance (Allen et al., 2015; Gajendran & Harrison, 2007; Greer & Payne, 2014), our study showed that on the day-level work-family integration depletes employees' resources leading to poor performance. This highlights the importance of adopting a more micro and nuanced approach to work and home interface research to

further advance our understanding of how the two domains interact with each other through depletion or enrichment processes.

Second, our findings which showed that daily flow experiences mediate the relationships between daily work-family integration and employees' subjective vitality, task performance and innovative performance, indicate that flow acts as an underlying psychological mechanism in the draining process within the W-HR model that links the two domains. The W-HR model suggests that a contextual demand leaves employees with fewer personal resources that are necessary for positive outcomes (Ten Brummelhuis & Bakker, 2012a). While prior studies have mainly investigated affective and cognitive pathways as spillover mechanisms between the work and home domains (Du, Derks, & Bakker, 2018; Heller & Watson, 2005; Offer, 2014), they exclusively conceptualised them as resource-demanding pathways. Therefore, there is still a need for a theoretical framework that can incorporate a psychological mechanism that integrates both resource-demanding and resource-replenishing aspects involved in the spillover mechanism. Drawing on flow research, we proposed and investigated work-related flow as the underlying psychological mechanism that explains the draining spillover between contextual home demand and work outcomes.

Third, we examined the moderating role of positive affect on the depletion process between the home and work domains. Our findings showed that volatile personal resources, such as positive affect, play a crucial role in buffering the short-term depletion process between domains across a working day. The W-HR model acknowledges the role of time for both the enrichment and the depletion process (Ten Brummelhuis & Bakker, 2012a). More specifically, the model posits depletion and enrichment processes that are similar to the COR theory gain and loss cycles (Hobfoll et al., 2018) in a way that both can develop

over short and long time frames (Ten Brummelhuis & Bakker, 2012a). However, while the model has highlighted the role of stable and key resources in attenuating the short-term depletion process, there seems to be a lack of acknowledgement in the model that volatile personal resources can play a similar role in short-term spillover between the two domains. Hence, our study shows that employees can leverage momentary and volatile resources to cope with daily contextual demands from one domain to protect their personal resources and utilise them to function in the other domain. This is also consistent with COR theory which highlights the role of dynamic and volatile resources in protecting employees' resources from possible depletion process (Hobfoll et al., 2018). In doing so, we advance the W-HR model by adopting a comprehensive dynamic model of the interplay between different types of volatile resources on a daily basis.

12.5.2 Practical implications

Our study shows that work-family integration impairs employees' wellbeing and work effectiveness by depleting their resources and hindering their engagement in the flow state. To that end, teleworkers and hybrid employees are encouraged to minimise integrating their work and family life while working from home, as previous a previous study has indicated that establishing and successfully managing boundaries between the two domains allow employees to immerse themselves in work tasks (Kalliath et al., 2022). Employees can manage home and work boundaries by designating working an area at home and establishing a routine that separates the two domains either mentally, physically or both (Myrie & Daly, 2009). Organisations could also benefit from mindfulness training to foster employees' ability to concentrate on their tasks while engaging in daily work-family integration, as a recent study found that mindfulness intervention enables individuals to protect their

resources from potential loss of cognitive resources due to multitasking (Kudesia et al., 2022).

In addition, our study showed that positive affect plays a role in buffering the depletion effect that is triggered by work-family integration. Employees can foster positive affect at work and at home in a variety of ways. For example, previous studies have shown sleep quality (Rivkin et al., 2021) and low-effort activity and evening relaxation (Hur & Shin, 2020) could improve employees' positive affect on the next day. Another study has shown that positive interventions such as watching a funny video could foster positive affect to help employees cope with resources loss (Schweitzer et al., 2022). Finally, a meta-analysis has found physical activities have a positive relationship with positive affect and mood (Reed & Ones, 2006). Therefore, organisations could benefit from intervention and training programmes for their teleworkers and hybrid employees before moving them from working from the office to working from home as part of the induction.

12.5.3 Limitations and suggestions for future research

Although our research offered important theoretical contributions and implications, there are still some limitations that future research could address. First, our study design mainly focused on the within-level depletion process of work-family integration. Previous research suggested that the benefits or detriments of work-family integration can be contingent on employees' preference for integration (Kreiner, 2006; Liao et al., 2016). Additionally, the W-HR model proposes that individuals' characteristics (e.g. preference for integration) are key resources that could moderate the depletion or enrichment process between the two domains (Ten Brummelhuis & Bakker, 2012a). Furthermore, previous research has shown that non-work interruption during the COVID-19 lockdown has

increased (Leroy et al., 2021). They have also shown that having a designated area for work at home is associated with fewer non-work interruptions. However, the present study did not control for previous working-from-home experiences or having a separate place for work at home. Therefore, future research may benefit from examining between-person variables such as previous working-from-home experience, having a designated working area and the preference for integration as a cross-level moderator that mitigate the depletion process triggered by work-family integration.

Second, our design did not include a measurable construct for the decrease in resources due to work-family integration. However, following the moderation-of-process method suggested by Vancouver and Carlson (2015), which suggests that a moderator that affects the link between the predictor (work-family integration) and the mediator (flow) can explain the mediation process without the need to include another mediator between work-family integration and flow. Our study has shown that a high positive affect as a resource block the negative effect work-family integration has on flow. In our case, the argumentation that the link between work-family integration and flow is resource-based in line with the W-HR model is, therefore, permissible.

Third, all the constructs were measured and collected based on self-report, which may posit some common method variance (Podsakoff et al., 2003). However, the use of an experience-sampling method that includes temporal separation of the measurement points and the demonstrated construct validity through MCFA make common method biases unlikely in our analysis (Podsakoff et al., 2003). Furthermore, capturing experiencing psychological states such as flow and wellbeing indicators such as subjective vitality using self-report deem appropriate (Hektner et al., 2007), as it would be difficult to measure them using other methods. Nevertheless, future research can use alternative sources of data, such

as objective measures for task performance and innovative performance (e.g., supervisor rating) or manipulated measures (e.g., inducing positive affect).

13 Study 3: Your Flow got Interrupted? Do not Get Upset: When Flow Interruption Hinders Employees' Daily Flow Experiences and Functioning

13.1 Abstract

Integrating the COR theory with Flow theory, we empirically conceptualise and investigate flow interruption and its implications on employees' functioning (i.e., creative process engagement and subjective vitality). Furthermore, we argue that employees' post-interruption investment of resources in daily flow experiences is influenced by the threat to their resources generation process. That is, the detrimental effect of flow interruption on employees' daily flow experiences is conditional on their affective reaction after the interruption, which hinders creative process engagement and poor subjective vitality. We examined the proposed within-person moderated mediation in a 10-day diary study (N=72 persons, n=593 occasions). Results of multilevel analysis supported our predictions that the negative relationship between flow interruption and employees' functioning via flow is conditional on high negative affect. We discuss the theoretical implication of flow theory.

Keywords: Flow, Interruption, Flow Interruption, Creative process engagement, COR theory, Negative affect

13.2 Introduction

Have you ever found yourself nodding off while doing a boring and easy task? Interruptions can help break that monotony, resume, and concentrate on the interrupted dulling task (Jett & George, 2003). However, when it comes to complex and challenging tasks, interruptions can be a major hindrance to your motivation to get back and concentrate on the task (Zijlstra et al., 1999). So, what happens when you get interrupted when you are

absorbed in a pleasant activity that strikes the optimal balance between challenge and skills? These activities are usually associated with flow, which refers to an enjoyable psychological state that occurs when one is intrinsically motivated and immersed in an activity where the perceived challenge and skills are optimally balanced (Nakamura & Csikszentmihalyi, 2014). Flow is a state of optimal experience and development that holds immense potential for fostering employees' wellbeing and functioning (Csikszentmihalyi et al., 2014; Demerouti et al., 2012; Ilies et al., 2017; Salanova et al., 2006).

Prior research has mainly adopted a task-oriented approach to examine the consequences of interruptions (for review, see; Jett & George, 2003; Leroy et al., 2020). While this stream of research has informed our understanding of task interruption (e.g., time pressure; Leroy & Glomb, 2018), task complexity; Speier et al., 2003), interruption type; Leroy et al., 2021), the literature has yet to adopt a psychological state approach to interruption. To extend the current state of knowledge, we aim to examine interrupting flow which is a psychological state that captures many facets (Bakker, 2008; Csikszentmihalyi et al., 2014), which the task-oriented approach alone cannot capture.

Flow research shows that flow is easily disrupted and that any distraction can terminate the experience (Csikszentmihalyi, 1975; Nakamura & Csikszentmihalyi, 2014; Xanthopoulou, 2017). Distractions and interruptions also prevent entering flow states, as they require intense concentration and full absorption in the task at hand (Csikszentmihalyi et al., 2014; Norsworthy et al., 2021). Furthermore, flow has been described as a short-term peak experience that may arise during an activity at work (Bakker, 2008). The flow literature has mainly focused on flow's antecedents, the psychological experiential during flow, and its outcomes (see Norsworthy et al., 2021; for a review). Although this research has informed our understanding of the nature of flow being a momentary peak (Bakker, 2008)

and fragile experience (Xanthopoulou, 2017), there is still a lack of understanding of the implication of flow interruptions. To this end, our study aims to investigate how and when interrupting flow at work affects employees' experiences of flow during the day, as well as how this relates to employees' functioning.

We delineate our theoretical model by integrating the COR theory (COR; Hobfoll, 1989; Hobfoll et al., 2018) and flow theory (Csikszentmihalyi, 1990; Nakamura & Csikszentmihalyi, 2009). COR theory suggests that individuals strive to maintain and protect their resources, which are anything that helps them achieve their goals. To gain resources, individuals must invest their current resources (Hobfoll et al., 2018). On the other hand, flow theory proposes that achieving a state of flow requires an initial investment of resources (Debus et al., 2014; Nakamura & Csikszentmihalyi, 2009), but once individuals are in the state of flow, they experience intrinsic motivation and through that gain resources (Bakker, 2008; Van der Linden et al., 2021). According to COR theory, individuals are more likely to invest their resources when they perceive that it will result in a gain of resources (Halbesleben et al., 2014). This means that employees would be more willing to invest their resources towards tasks that induce flow, as they experience intrinsic rewards and gain more resources during the activity itself (Bakker, 2008). However, if they fail to gain resources or lose resources after investing, they experience stress, which puts them in a resource conservation mood (Halbesleben et al., 2014). This leads to them being less likely to invest further as they try to protect their remaining resources from further loss (Hobfoll, 1989).

Flow interruption refers to situations where the state of flow and associated resource gains are disrupted. We ask the question of whether flow interruption has a detrimental effect on resources investment in work activities that may induce flow. We argue that the impact of flow interruption on daily flow experiences is contingent on employees' affective

reactions to the interruption. Based on COR theory, we suggest that flow interruption will only be detrimental to future resources investment activities that facilitate flow when it is viewed as a threat to the resources or a failure of potential gain following their investment manifested as a negative affect, a broad dimension of unpleasant emotional experiences, which includes anger, contempt, disgust, guilt, fear, and nervousness (Watson et al., 1988). Therefore, we suggest that when employees react with negative affect to flow interruption, it puts them in a resource preservation mood, which decreases their investment in flow experiences during the day. This, in turn, has a detrimental impact on their creative process engagement (CPE; i.e., engaging in a set of activities that are conducive to creative outcomes Zhang & Bartol, 2010) and wellbeing (subjective vitality, state of wellbeing and motivation characterized by feelings of energy, activity, and productivity; Ryan & Deci, 2008). Our theoretical model is depicted in Figure 5.

Through conducting a 10-day diary study to investigate flow interruption, our study contributes to the literature in three important ways. First, to the best of our knowledge, our study is the first to conceptualize and empirically examine flow interruption. In doing so, we advance our understanding of the flow experience by investigating the impact of interrupting flow on employees' subsequent engagement in flow experiences during the day. This is highly relevant in today's dynamic work environment, where interruptions are becoming increasingly common (Leroy et al., 2021; Leroy & Glomb, 2018; Mark, 2015; Puranik et al., 2021; Wajcman & Rose, 2011). Furthermore, we open a novel theoretical discussion about flow interruption and its implication, which is highly important considering the benefits of this experience.

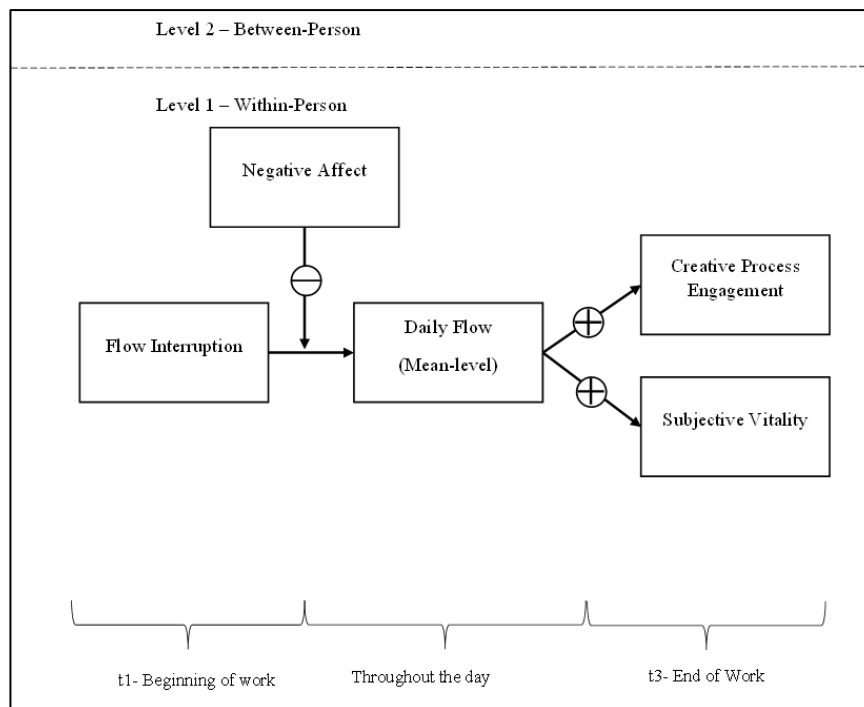


Figure 5. Theoretical Model

Second, we advance our understanding of flow interruption by demonstrating that the detrimental effect of flow interruption on employees' daily flow experiences is contingent on their affective reaction. This is an important insight because it shows that interrupting engagement in an intrinsically rewarding experience does not prevent one from seeking flow unless one reacts negatively to the interruption. Furthermore, this complements the current literature that focuses on the affective outcomes of interruptions rather than affect as a moderator (Leroy et al., 2020; Puranik et al., 2020). Therefore, capturing negative affect as a moderator adds to our understanding of the consequences of interruptions at work. Finally, we advance our understanding of interruption by investigating interrupting a psychological experience and its consequences throughout the day. While the previous interruption literature has mainly adopted a task-oriented approach that investigated the effect of interrupting either a very challenging or a very easy task on the primary task (see; Jett & George, 2003; Leroy et al., 2020; Puranik et al., 2020; for review). Our study adopted a psychological state approach to examine interrupting an experience that usually occurs when

there is a balance between the perceived task challenge and skills. In doing so, we advance our understanding of interruption outcomes by showing how and when interrupting a psychological state that captures intrinsic motivation, level of engagement and autonomous regulation has a detrimental effect. This complements the task-oriented approach by capturing employees' engagement and motivation (i.e. flow) but has yet to examine (Leroy et al., 2020).

13.3 Theory and hypotheses development

Flow research suggests that flow at work is a peak motivational state that energises employees (Demerouti et al., 2012). This is because experiencing flow is associated with intrinsic motivation (Bakker, 2008). Engaging in activities that are intrinsically motivating and practising autonomous self-regulation in flow can enhance an individual's affective and energetic resources as they find these activities enjoyable and aligned with their values and interests (Ryan & Deci, 2008). As employees recognize the benefits of investing in flow, they tend to gravitate towards it because the returns are worth the investment.

Furthermore, flow theory assumes that interrupting flow ends the experience (Xanthopoulou, 2017). However, we argue that interrupting flow refers to a situation in which a person has initiated flow and was experiencing flow but exited it due to an interruption. Accordingly, there was an initial investment of resources to enter flow. The investment of psychological energy is necessary for initiating flow, as work activities that trigger flow tend to be challenging and require the application and stretching of existing skill sets (Csikszentmihalyi, 1996b; Nakamura & Csikszentmihalyi, 2009). Empirical evidence supports this idea, as studies have shown that employees are more likely to experience flow during mornings when they have sufficient energetic resources (Debus et al., 2014), and conversely, low levels of energetic resources reduce the likelihood of experiencing flow

(Mäkikangas et al., 2010a). Additionally, employees are less likely to experience flow when they start their day with low energetic resources due to an aversive morning commute (Gerpott et al., 2021).

Research on flow indicates that once a person enters the state of flow, they can realize a return on their investment, which manifests in resource gains (Norsworthy et al., 2021). Nakamura and Csikszentmihalyi (2014) have described flow as an “autotelic” experience meaning that the experience in itself is intrinsically rewarding. Furthermore, Bakker’s (2008) studies have found that intrinsic motivation is a core dimension of flow at work. In other words, employees experience inherent pleasure during flow-related activity. Furthermore, there is psychophysiological evidence that indicates flow-related activity activates the dopaminergic brain reward systems, which are associated with enjoyment and high energy (Ulrich et al., 2014; Van der Linden et al., 2021) and reduces the activities in the amygdala, which is associated with negative emotions (Ulrich et al., 2019; Van der Linden et al., 2021). Therefore, the empirical and the theoretical evidence indicate that the gain of resources can be realised once the person enters flow and during it until the interruption occurs.

According to the COR (COR) theory, individuals are motivated to acquire and maintain resources that they perceive will help them achieve their goals (Hobfoll, 1989, 1998; Hobfoll et al., 2018). However, the investment principle posits that for employees to acquire more resources, they must invest their currently available resources (Hobfoll et al., 2018). The theory suggests that individuals’ investments in work can be driven by the perception or experience that such investment leads to a gain of resources (Halbesleben et

al., 2014; Halbesleben & Wheeler, 2015). Flow, a state of complete immersion that requires employees to keep persisting with a challenging task without giving up or getting distracted, mandates investment of energy for initiating flow (Debus et al., 2014; Gerpott et al., 2021; Nakamura & Csikszentmihalyi, 2009).

13.3.1 When does flow interruption affect employees' investment in flow?

COR theory suggests individual investment decisions can be conditional on resource loss or failure in resources gain (Halbesleben et al., 2014). Resources threaten with loss cause stress and put employees in a resources conservation state to protect their current resources from potential loss leading to less investment (Hobfoll, 1998, 2002). Accordingly, we argue that flow interruption would lead to the COR indicated by a decreased engagement in subsequent flow experiences only when they experience flow interruption as a threat to their resource generation process. More specifically, we suggest that flow interruption has a detrimental impact on future flow experiences only on days when employees exhibit negative affective reactions after the interruption.

Negative affect captures subjective distress and aversive moods such as nervousness and irritability (Watson et al., 1988). Experiencing negative emotions reduces employees' cognitive flexibility by narrowing and limiting their thought-action repertoires (Fredrickson, 1998). Such a reduction in cognitive resources would hinder employees' ability to engage in flow as it requires an initial investment of cognitive resources (Nakamura & Csikszentmihalyi, 2009). Furthermore, negative affect is associated with rumination, worrying and negative self-talk (Nolen-Hoeksema et al., 2008), which makes it difficult to concentrate on the task and get in the flow.

Prior empirical evidence has lent support to our prediction that experiencing negative affect can negatively impact employees' future investment in flow. For example, a cross-sectional study has reported that employees' high negative affect leads to decreases in flow experiences (Tobert & Moneta, 2013). In a similar vein, indirect empirical study suggests that negative affect hinders employees' motivation to pursue their goals and invest at work. For instance, experimental studies have shown that when participants were primed by implicit negative affect nonconsciously decreased the desire for the goal and the motivation to pursue it (Aarts et al., 2007). Furthermore, a meta-analysis on the between-person level has shown that individuals high in negative affectivity tend to exhibit low job performance, low organisational citizenship behaviour and withdrawal behaviour (Kaplan et al., 2009). Accordingly, the empirical evidence is consistent with COR's assumption that when employees experience negative affect, they are more likely to be in a conservation mood and less likely to continue investing at work, leading to a decline in daily flow experiences.

Accordingly, we hypothesized:

H1: Negative affect moderated the negative relationship between flow interruption in the morning and daily mean-level flow. That is, the relationship is conditional on high negative affect.

13.3.2 Daily flow experiences outcome

During the state of flow, an individual experiences intrinsic motivation, which is inherently pleasurable and enjoyable (Nakamura & Csikszentmihalyi, 2009, 2014). Existing literature suggests that such intrinsic motivation restores and replenishes employees' energy (Parker et al., 2021; Ryan & Deci, 2000; Tóth-Király et al., 2021; Trougakos & Hideg, 2009). Consequently, experiencing flow during the day can help employees regain their

resources at the end of the day (Demerouti et al., 2012). Furthermore, Flow is a highly positive and enjoyable experience that is associated with positive emotions, expanded cognitive resources, and facilitates creative outcomes. The positive emotions associated with flow can broaden an individual's thought-action repertoire, resulting in greater cognitive flexibility and the expansion of cognitive resources and improved thinking (Fredrickson, 2001). Accordingly, experiencing flow would have a positive effect on daily creative process engagement and subjective vitality. While the literature shows that creativity is essential for organisational effectiveness (Amabile et al., 2005), we focused on the creative engagement process as it encompassed measurable work behaviours that are conducive to creative outcomes (Zhang & Bartol, 2010).

Several indirect and direct empirical studies support the notion that flow fosters creative outcomes. Flow, as a state of peak performance (Norsworthy et al., 2021), is a functional state that motivates employees to excel at work and perform well (Engeser & Rheinberg, 2008). Furthermore, an experimental study has found that engaging in flow is positively related to creativity (Cseh et al., 2015). Similarly, employees are more likely to report higher creative performance on days when they experience high flow (Stollberger & Debus, 2020). Additionally, empirical studies have supported our proposition, showing that flow is positively related to higher well-being (Csikszentmihalyi, 1999), an increase in subjective vitality, a decrease in ego depletion (Rivkin et al., 2018) and an increase in positive affect (Cseh et al., 2015). Therefore, it is expected that a higher daily mean level of flow predicts creative process engagement and subjective vitality at the end of the day.

In support of our argument that daily flow acts as a mediator, another study has also shown that flow plays a critical role in mediating the relationship between employees' affective commitment and their wellbeing (Rivkin et al., 2018). More relevant to employees'

performance, a recent study has shown that flow mediates the relationship between the demands of adverse commuting and work-related performance outcomes (Gerpott et al., 2021). Based on the presented argument and capitalising on COR theory, we propose that employees enter a state of resource protection when they exhibit a negative affective reaction to flow interruption, which in turn hinders their subsequent experiences of flow during the day leading to a detrimental effect on their creative process engagement and subjective vitality.

H2: Negative affect moderates the indirect relationship between flow interruption and a) subjective vitality and b) creative process engagement via flow. That is, the mediation is conditional on high negative affect.

13.4 Methods

13.4.1 Sample and Procedure

We conducted a diary study to investigate how flow interruption affects flow variability across the day. To do this, we used an experience sampling design where participants reported their flow experiences throughout the day. We recruited participants through Prolific, a provider of high-quality research data (Peer et al., 2017). Participants were compensated up to £33.50 for completing all surveys. As our research did not involve invasive procedures and was survey-based, it did not require ethical approval according to the authors' institutions' policies at the time. However, the research protocol was developed in line with the APA Ethical Principles.

We used online surveys to collect all our data. After registering, participants were given a link to an informed consent form which explained the survey and how we would handle the data. Participants then completed a pre-survey that collected information about

their demographics. The experience sampling period began on the following Monday and lasted for two consecutive weeks (i.e., ten working days). Participants were asked to estimate the time they would start and finish work each day from Monday to Friday during the two weeks. Based on their estimated start and finish times, participants received four surveys per day, which were sent in two-hourly intervals: survey 1 was sent two hours after starting work, survey 2 was sent four hours after, survey 3 was sent six hours after, and survey 4 was sent eight hours after. If participants did not respond to a survey within the first hour, they were sent a reminder.

At the start of the study, 84 participants completed the pre-survey, but we had to exclude 12 participants who did not complete any daily surveys. This resulted in a final person-level sample of 72 participants (86% person-level response rate), who had an and completed a total of 544 daily surveys (60% day-level response rate). These response rates were similar to those of previous daily diary studies (Fisher & To, 2012). The daily surveys were completed at an average time of 11:53 for survey 1, 13:52 for survey 2, 15:56 for survey 3, and 17:56 for survey 4. The study participants worked in various industries, such as teaching, health, manufacturing, and information technology. Our sample was 48% female, with an average age of 37.65 years s ($SD = 9.47$) and an average job tenure of 8.20 years ($SD = 6.99$) in their current organization.

13.4.2 Measures

Participants' flow interruption was assessed 2 hours after arriving at work using the adopted version of the Flow-Short-Scale (FSS) developed by Engeser and Rheinberg (2008). The FSS consists of ten items, and participants were asked to rate the extent to which they were interrupted while experiencing the following thoughts/feelings. One example of an

item is, " In the last few hours at work, I was interrupted when my thoughts/activities run fluidly and smoothly." Participants rated their responses on a Likert scale that ranged from "1=not at all" to "7=great deal". At the same time, *positive affect* was measured with six positive affect items from the Positive and Negative Affect Schedule (PANAS; ("distressed," "upset," "irritable," "nervous," "jittery," and "afraid"). Watson et al., 1988), which participants rated on a Likert scale ranging from "1= not at all" to "5=extremely".

Daily flow (mean-level) was measured by computing the mean of employees' experience of flow three times during the day; 4, 6, and 8 hours after arriving at work. For each measurement point, flow experiences were measured using the Flow-Short-Scale (FSS) developed by Engeser and Rheinberg (2008).

Participants' subjective vitality was measured 8 hours after arriving to work utilizing the 7 items of the subjective vitality scale (Ryan & Frederick, 1997). A sample item is "Right now, I feel alive and vital". Participants rated each item on a Likert scale ranging from "1 = strongly disagree" to "5 = strongly agree". Finally, participants' *creative processes engagement* was measured 8 hours after arriving at work using items from the CPE scale (Zhang & Bartol, 2010a). The scale aims to measure the extent to which participants engaged in behaviours that are conducive to creative outcomes (To et al., 2012). The original scale contains eleven items that measure *problem identification, information searching, and encoding and idea generation*. To reduce the response burden, following To and colleagues (2012), we selected six items (two items per behaviour) that can vary between days. An exemplary item is "In the few hours at work I was trying to devise potential solutions that move away from established ways of doing things." Participants responded to each item on a scale ranging from "1= strongly disagree" to "5= strongly agree".

13.4.3 Control Variables

To demonstrate that the variance in flow variability is explained by flow interruption, we controlled for flow experience at the same time using the same scale (Engeser & Rheinberg, 2008). Similarly, the literature has suggested that positive and negative affect might influence each other and, therefore, it is recommended to model them simultaneously (Watson et al., 1999). To that end, we controlled for positive affect for predicting flow using six items from

(PANAS “active,” “interested,” “excited,” “strong,” “inspired,” and “alert”; Watson et al., 1988), which participants rated on a Likert scale ranging from “1= not at all” to “5=extremely”.

13.4.4 Analytical Strategy

To test our conceptual model, we conducted multilevel analyses in which day-level variables were nested within person-level clusters. To do this, we used multilevel structural equation modelling and followed the recommended procedure outlined by Preacher et al. (2010) for testing mediation models. We specified our proposed model using Mplus 8.2 (Muthén & Muthén, 2017), with MLR estimation and tested it using a 1-1-1 mediation model, as recommended by Preacher et al. (2010). We specified direct paths linking flow interruption and daily flow (mean-level), creative process engagement, and subjective vitality. Finally, the moderation effect of negative affect was accounted for by adding a direct path from negative affect to daily flow (mean-level) and another path from the interaction (product term) of negative affect and flow interruption to daily flow (mean-level). We control for flow in the morning and positive affect by specifying a direct path from flow and positive affect to daily flow (mean-level).

To estimate confidence intervals for the proposed (1-1-1) mediation model, we utilized the Monte Carlo method of re-sampling, as the indirect effects are not normally distributed, and bootstrapping cannot be used. We calculated bias-corrected 95% confidence intervals for the indirect effects based on 20,000 re-samples as recommended by (Preacher & Selig, 2012) using an R-package provided by Tofighi and MacKinnon (2011). As recommended by Enders and Tofighi (2007), we centred all exogenous variables at the person mean, which allowed us to investigate within-person variation.

13.5 Results

Before testing our hypotheses and confirming the appropriateness of using multilevel modelling, we first examined the variability of all variables within individuals in our study. Our findings indicate that all the daily variables have a reasonable level of within-person variance with flow interruption at 62%, flow in the morning at 49%, negative affect at 58%, positive affect at 42%, daily flow (mean-level) at 30%, creative process engagement at 41% and subjective vitality at 46%. Descriptive statistics, including means, standard deviations, and intercorrelations of all variables in Table 7. Additionally, the results of the multilevel model and indirect effect are presented in Tables 8 and 9, respectively.

Hypothesis 1 predicted that daily negative affect moderates the relationship between daily flow interruption and daily flow experiences (mean-level). More specifically, we predicted that the relationship would be conditional on days with higher compared to lower negative affect. The results suggest that the interaction between flow interruption and negative affect predicts daily flow experiences (mean-level) ($\gamma = -.115, p < .05$). To illustrate the patterns of the interactions, we plotted the within-person relations at conditional values of negative affect (± 1 SD; Cohen et al., 2002). The interaction plot in Figure 6 supports our

predictions showing that on days when employees experience higher negative affect, the effect of daily flow interruption on flow experiences (mean-level) becomes significant. This suggests that flow interruption has a negative relationship with daily flow experiences only on days when employees experience higher negative affect.

Table 7*Means, Standard Deviations, Internal Consistencies (Cronbach's Alpha) and Intercorrelation*

	1	2	3	4	5	6	7	8	9	10	11	12
1. Flow Interruption - Morning	.97- .98	-0.01	-0.02	0.04	-0.05	0.00	0.00	- 0.02	0.02	-0.03		
2. Flow experience - Morning	-0.28	.88- .96	0.54	-0.31	0.44	0.36	0.21	0.45	0.08	0.08		
3. Positive Affect - Morning	-0.20	0.47	.89 - .94	-0.39	0.37	0.21	0.12	0.31	0.11	0.24		
4. Negative Affect - Morning	0.32	-0.56	-0.47	.82 - .92	-0.28	-0.17	-0.10	- 0.25	-0.02	-0.12		
5. Flow experiences - Noon	-0.38	0.86	0.41	-0.49	.88 - .95	0.37	0.26	0.74	0.12	0.23		
6. Flow Experience - Afternoon	-0.30	0.87	0.37	-0.47	0.88	.91- .96	0.46	0.80	0.11	0.24		
7. Flow experience - End of work	-0.26	0.78	0.24	-0.42	0.77	0.91	.91- .95	0.74	0.12	0.36		
8. Daily flow experiences (Mean-level)	-0.33	0.88	0.36	-0.48	0.93	0.98	0.94	-	0.15	0.36		
9. Creative Process Engagement - End of work	-0.01	0.11	0.31	0.04	0.02	0.15	0.12	0.10	.88- .94	0.10		
10. Subjective Vitality - End of work	-0.28	0.31	0.71	-0.47	0.34	0.37	0.37	0.38	0.20	.88- .93		
11. Gender	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
12. Age	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
M	2.3	4.83	3.08	1.34	4.69	4.7	4.69	4.69	2.65	2.62	1.51	37.14
SD	0.98	0.89	0.76	0.43	0.9	0.92	0.94	0.87	0.91	0.66	0.5	9.54

Note. Cronbach's alpha values for day-level variables represent the lowest and highest values across all measurement days. Correlations below the diagonal are person-level correlations (N = 72). Correlations above the diagonal are day-level correlations (N = 593). Numbers in bold $p < .05$

Table 8
MSEM model with unstandardized coefficients

	Daily Flow (mean-level)			Creative Process Engagement End of Day			Subjective Vitality End of day		
	Estimate	SE	z	Estimate	SE	z	Estimate	SE	z
<i>Within-level</i>									
Flow Interruption (morning)	-0.011	0.018	-0.611	0.025	0.023	1.113	-0.008	0.02	-0.415
Negative Affect (morning)	-0.096	0.06	-1.586	0.073	0.049	1.481	-0.015	0.044	-0.331
Flow Interruption X Negative Affect	-0.115	0.041	-2.817*						
Daily Flow (mean-level)				0.194	0.073	2.653*	0.42	0.075	5.568**
Control Variables									
Flow (morning)	0.269	0.042	6.413**	-0.021	0.039	-0.537	-0.168	0.042	-3.997**
Positive Affect	0.075	0.051	1.486	0.107	0.052	2.051*	0.233	0.053	4.392

Note. Estimates are unstandardized, resulting from one overall analysis including the prediction of all outcomes in one model.

* $p < .05$. ** $p < .01$.

Table 9
Indirect Effect moderated mediation model

Moderator: Negative Affect		Low				High				Difference			
Mediator: Daily Flow (Mean-level)	Estimate (SE)	<i>p</i>	LLCI	ULCI	Estimate (SE)	<i>p</i>	LLCI	ULCI	Estimate (SE)	<i>p</i>	LLCI	ULCI	
Creative Process Engagement	.007(.006)	.156	-.0025	.0221	-.011(.007)	.035	-.0267	-.0005	-.019(.010)	.014	-.0416	-.0027	
Subjective Vitality	-.016(.010)	.095	-.0367	.0028	-.025(.012)	.027	-.0499	-.0027	-.041(.017)	.005	-.0770	-.0111	

Hypotheses 2a and 2b predicted that daily negative affect moderates the indirect relationships between flow interruption and a) creative process engagement and b) subjective vitality via daily flow (mean-level). More specifically, the indirect relationship is conditional on days when negative affect is higher. The interaction pattern of the proposed moderation is plotted at conditional values of negative affect in Figure 6 (± 1 SD; Cohen et al., 2002). The results in Table 3 show that negative affect moderates the indirect relationships as indicated by the 95% confidence interval for the high negative affect conditional indirect effects (creative process engagement: $\gamma = -.011$, $p < .05$; 95% CI $[-.0268, -.0007]$; subjective vitality: $\gamma = -.025$, $p < .05$; 95% CI $[-.0503, -.003]$). As all CIs do not include zero, the results then suggest that the indirect relationship between flow interruption and employees' creative process engagement and subjective vitality via flow are contingent on high negative affect.

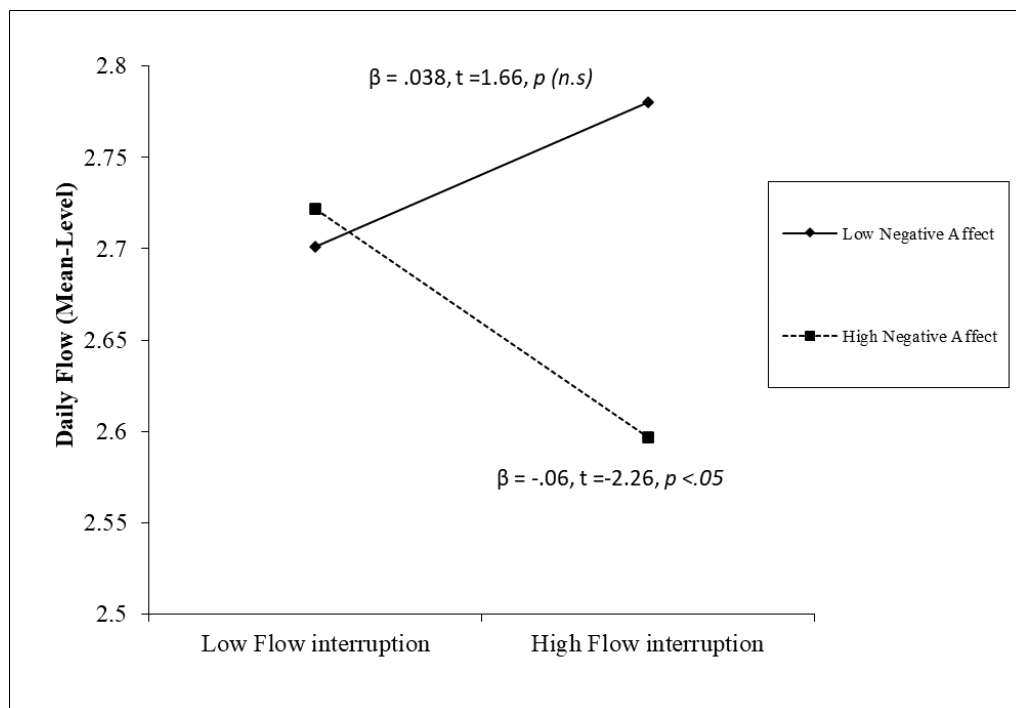


Figure 6. The moderating effect of negative affect on the relationship between flow interruption and daily flow (mean-level)

13.6 Discussion

Previous interruption literature has mainly adopted a task-oriented approach that demonstrated task interruption has different implications depending on task complexity. Interrupting difficult and complex tasks makes it difficult to go back to the primary task because it requires more information processing. While interrupting easy task, which requires less information processing, facilitates re-engagement and concentration on the primary task. However, we sought to adopt and investigate the implication of interruption, a phenomenon that is characterized by perceived challenge-skills balance, effortless concentration, intrinsic rewards, and performance fluidity. To do so, we tested a moderated mediation model that links flow interruption, creative process engagement and subjective vitality. Our results supported our hypothesized model. More specifically, our data showed that flow interruption hinders employees' flow experiences only during the day when they experience negative affect after the interruption. Furthermore, our model shows daily flow (mean level) leads to higher creative process engagement and subjective vitality. Finally, the serial moderated mediation model showed that the negative relationship between flow interruption and subjective vitality through daily flow experiences and both creative process engagement and subjective vitality is conditional on negative affect.

13.6.1 Theoretical Implications

Our study has important theoretical implications. First, we extend the flow literature by investigating the implications of flow interruption. To the best of our knowledge, our research is first to theoretically and empirically examine flow interruption and its implication. In doing so, our research sheds light on an important yet neglected part of the flow of the literature. Furthermore, our study empirically demonstrates that flow interruption does not have a direct effect on employees' engagement in flow experiences during the day.

This is consistent with flow theory that suggests the experience in itself is intrinsically rewarding (Bakker, 2008; Nakamura & Csikszentmihalyi, 2014). This implies that flow interruption does not necessarily frustrate employees' motivation to seek the experience again. As previous studies illustrate that engaging in flow motivates them to seek out the activities associated with the flow as they find them inherently satisfying (Bakker, 2005, 2008; Engeser & Rheinberg, 2008). This also supports our argument that interrupting flow indicates that one has already initiated and engaged in flow. Our research also answers a call to investigate the effect of interruption considering the level of engagement and energy (Leroy et al., 2020). Adopting the psychological state approach allowed us to capture both, as flow represents an energetic state of high engagement (Csikszentmihalyi et al., 2014). However, our research shows that forcing employees out of the flow experience could have a detrimental impact when they try to experience it again.

Second, our research shows that the negative effect of flow interruption is conditional on employees' affective reactions. While previous interruption research has mainly focused on affective reaction as a mediation (Leroy et al., 2020; Puranik et al., 2020), our study demonstrates that affective reaction plays a critical role in determining the consequences of interruption. This answer calls (Leroy et al., 2020) to investigate moderators that determine how interrupting employees determines the allocation of their resources. In light of COR theory, our research shows that when an interruption is perceived as a threat to employees' resources generation process, employees tend to protect their resources and withdraw from allocating them to their work.

Finally, considering the benefits of flow experiences for employees and organisations alike (Csikszentmihalyi et al., 2014; Demerouti et al., 2012; Gerpott et al., 2021; Ilies et al., 2017; Salanova et al., 2006; Stollberger et al., 2021; Stollberger & Debus, 2020), our study

paves the way for research on flow interruption and its implications which is particularly important in the contemporary dynamic workplaces that are highly prone to interruptions (Leroy et al., 2021; Leroy & Glomb, 2018; Mark, 2015; Puranik et al., 2021; Wajcman & Rose, 2011).

13.6.2 Practical Implication

Given that workplace interruption is almost inevitable in the current modern workplace, better management of workplace interruption is rather crucial for employees' functioning. Our study gives insight into how workplace interruption might hinder employees' functioning. More specifically, we showed that flow interruption leads to a decline in their daily flow experiences and creative process engagement and vitality only when employees react negatively to the interruption. This highlights the importance of emotional regulation (Koole, 2009; Koole & Jostmann, 2004; Koole & Veenstra, 2015). Employees might benefit from intervention programmes on emotional regulation and interruptions management. Second, the significance of experiencing flow in the workplace is underscored by the study, which shows that flow is a pivotal experience that for employees' energy and creativity. It is thus advisable for organizations to create jobs and tasks that facilitate flow by assigning tasks with explicit objectives, giving frequent feedback, and equipping employees with the skills required for challenging tasks (Demerouti, 2006).

13.6.3 Limitations and future research

Despite the strength of running a within-person multilevel analysis with multiple points of measuring flow, our study still has a few limitations. First, all variables were measured through self-report. Although most of the constructs are psychological

experiences that can only be captured through self-report, future research might benefit from conducting a randomised controlled experimental design in which interruption during high-flow intensity experiences is controlled for. Additionally, the self-report measure might be more susceptible to common method biases. However, the use of an experience-sampling method that includes temporal separation of the measurement points makes common method biases unlikely in our analysis (Podsakoff et al., 2003). Third, previous research suggests that there are different types of interruption, such as intrusion from other people (Leroy et al., 2020; Puranik et al., 2020). Our study did not control for the kind of flow interruption. Additionally, flow research has shown that flow can be self-interrupted as well (Nakamura & Csikszentmihalyi, 2014). For example, when one starts doubting themselves during flow, they are no longer in flow. Therefore, future research might benefit from investigating the implication of a different kind of flow interruption and self-interruption on employees' flow experiences and functioning. Fourth, although positive affect was controlled for in the model, previous research has shown that affective shift has implications on employees' engagement and work outcomes (Bledow et al., 2011; Yang et al., 2016). Therefore, future research might benefit from integrating positive and negative affective as an affective shift that can predict employees' engagement in flow experiences. Finally, while the internal consistency of the scale used in the present study for flow interruption is high, the scale has not been empirically validated. Therefore, we recommend validating a scale to measure flow interruptions.

14 Integration and Summary of The Studies

On the basis that employees must sustain high levels of energy to meet the demand and expectations of the complex contemporary workplace (Loehr & Schwartz, 2006), the main aim of the current work is to identify and understand the underlying psychological mechanism for employees' energy sustainability. Drawing on the COR theory (Hobfoll, 1989; Hobfoll et al., 2018), which suggests that gain cycles can develop and sustain employees' energetic resources, whereas loss cycles can deteriorate and deplete them, the present thesis investigated the underlying psychological mechanism of both processes. All three studies predicted that flow experiences at work (Csikszentmihalyi, 1990) act as a psychological mechanism that underlies employees' energetic gain and loss cycles. Each study examined the proposed mechanism and its relation to employees' energy at the end of the day.

The first study examined flow as the underlying psychological mechanism for employees' daily energetic gain cycle. Consistent with previous research suggests that, on the one hand, flow experiences require energy (Csikszentmihalyi, 1996b; Debus et al., 2014; Nakamura & Csikszentmihalyi, 2009); on the other hand, it restores energy (Csikszentmihalyi, 1999; Rivkin et al., 2018), the first study provides convincing evidence that flow acts as a psychological mechanism for employees energy sustainability. That is, employees' energy investment in flow experiences generates further energy. Furthermore, the study demonstrated that energetic resources gain cycles could develop within a working day contributing to employees' daily energy sustainability.

Moreover, drawing on the COR theory (Hobfoll, 1989; Hobfoll et al., 2018) and the Work-Home Resources model (Ten Brummelhuis & Bakker, 2012a) theoretical proposition that employees' energy can deteriorate through the depletion process, we proposed that flow

would also act as a psychological mechanism underlying the depletion process. Therefore, study 2 examined daily flow experiences as a mechanism that explains how daily demands drain employees' energy by hindering their everyday flow experiences. Thus, Studies 1 and 2 provide robust evidence that daily flow experiences significantly contribute to employees' energy sustainability as a psychological mechanism underlying gain and loss cycles at work and while working from home.

Furthermore, drawing on the theoretical assumption that threatened resource loss puts employees in a resources protection mood that makes them less likely to invest their resources (Hobfoll, 1989; Hobfoll et al., 2018), we examined in study 3 the implication of flow interruption. The study provides preliminary evidence that flow interruption could hinder employees' daily flow experiences. Flow interruption could disturb the psychological mechanism underlying employees' energy sustainability. Indeed, the results showed that employees' inability to experience flow was negatively associated with employees' energy at the end of the day. Therefore, study 3 results further support our proposition that flow experience is vital for employees' energy sustainability.

Since resource investment is critical for energy sustainability, in study 1, we disentangled the complex investment principle within the COR theory (Hobfoll, 1989; Hobfoll et al., 2018). We draw on the theoretical proposition that employees have a natural inclination to satisfy their basic psychological needs (i.e., autonomy, competence and relatedness (Ryan & Deci, 2017) to propose that unmet needs direct employees' investment into needs-compensatory work behaviours. The results of study 1 supported our predictions that unmet needs motivate employees to invest in particular work behaviour. More specially, that flow as a mechanism for energy replenishment only promotes task performance, organisational citizenship behaviour, and creative process engagement on days with low

competence, relatedness, and autonomy need satisfaction, respectively. Stud 1 results demonstrated that the investment in task performance and creative process engagement lead to high energy at the end of the day. However, the result did not support our prediction that organisational citizenship behaviour predicts employees' energy at the end of the day.

In study 2, we aimed to explore a potential personal volatile resource that can buffer the depletion process proposed by the Work-Home Resources model (Ten Brummelhuis & Bakker, 2012a), yet has been overlooked in the model. Drawing on the COR theory that argues employees can invest dynamic and volatile personal resources to offset the resources depletion process, we propose that positive affect can buffer the negative relationship between work-family integration and daily flow experiences. Experiencing positive affect expands one's attentional and cognitive resources (Fredrickson, 2001; Fredrickson & Branigan, 2005). Additionally, it fosters cognitive flexibility and resilience, enabling employees to immerse themselves in work tasks and cope better with resources loss (Fredrickson, 2001). The study supported our prediction and demonstrated that teleworkers leverage their daily positive affect to mitigate resources loss and protect the underlying psychological mechanism of energy sustainability leading to high energy at the end of the day. Furthermore, the moderating effect of positive affect has also improved teleworkers' functioning, including task performance and innovative performance.

Building on studies 1 and 2 that underscore the critical role of flow as an underlying psychological mechanism for energy sustainability, we aimed in study 3 to investigate this phenomenon further. Drawing on the COR assumption that employees are less likely to invest their resources in flow when they fail to gain after an investment (Hobfoll, 1989), we argued that the detrimental effect of flow interruption on employees' investment is conditional on negative affective reactions. Flow research suggests that flow experiences are

associated with real-time intrinsic rewards and resources gain (Csikszentmihalyi & Nakamura, 2014; Norsworthy et al., 2021; Ulrich et al., 2014; Van der Linden et al., 2021). Therefore, employees' resources gain in flow even if interrupted. Study 3 supported our prediction and showed that flow interruption hinders employees' flow experiences only during the day when they experience negative affect after the interruption. The results further demonstrated that the adverse consequences of flow interruption on employees' energy sustainability and employees' creative process engagement are conditional on employees' negative affect reaction to flow interruption.

15 Theoretical Implications of the Studies

The present thesis offers several theoretical contributions to the literature on the COR theory, flow theory and employees' wellbeing and functioning. First, it identifies daily flow experiences as the psychological mechanism underlying the daily energetic resources cycle. While the COR theory (Hobfoll et al., 2018) assumes that the investment of current energetic resources generates a gain process of energetic resources, it does not explain the mechanism of how such an investment of energy leads to further energy. However, previous research on flow has demonstrated that initiating flow requires an investment of current energetic resources (Debus et al., 2014; Nakamura & Csikszentmihalyi, 2009). On the other hand, engaging in flow generates energetic resources (Demerouti et al., 2012; Nakamura & Csikszentmihalyi, 2014; Salanova et al., 2006). In line with the researchers' findings that energy can be an antecedent and outcome of flow, we proposed that flow is the missing link that explains the energy cycle. To that end, we integrated the COR theory and flow theory to identify flow as a psychological mechanism explaining the energetic resources' gain cycle. Thus, our research demonstrates that investing in flow generates a positive net gain of energetic resources contributing to employees' energy sustainability and functioning.

Furthermore, our research suggests that gain cycles might not be as slow as the COR theory assumes (Hobfoll et al., 2018). Despite the convincing theoretical and empirical evidence that illustrates that resources and wellbeing indicators can fluctuate within a day (Halbesleben & Wheeler, 2015; Rivkin et al., 2018; Xanthopoulou et al., 2009), previous research has mainly investigated gain cycles within months or years (e.g., de Cuyper et al., 2012; Hakanen et al., 2008; Salanova et al., 2011). Thus, our work complements current research demonstrating that gain cycles develop within a day and challenges the common assumption in the COR theory that gain cycles are slow. As a result, our contribution leads to a more detailed understanding of the temporal dynamics of energy sustainability within the workplace.

Second, we disentangled some of the complexity of the investment principle by identifying unmet needs as a condition that determines employees' resources investment strategy at work. We did so by integrating the investment principle and self-determination theory, which suggests that unmet needs motivate one to seek satisfying experiences (Ryan & Deci, 2017; Sheldon & Gunz, 2009). This integration of basic psychological needs satisfaction with the investment principle enhances our comprehension of the investment process by showing that needs satisfaction is a contingency in deciding the allocation of resources towards specific work behaviours. The study demonstrates that when employees' basic psychological needs are unmet, they naturally tend to invest in compensatory work activities that correspond to the unsatisfied need. This finding aligns with existing research, suggesting that unmet needs can potentially direct individuals towards needs-compensatory activities (Ryan & Deci, 2017; Sheldon, 2011; Sheldon & Gunz, 2009). Furthermore, our study demonstrates that the level of needs satisfaction directs employees' investment of

resources towards work behaviours (task performance and creative process engagement), contributing to employees' energetic resources gain cycle.

Third, complementing our understanding of flow as a psychological mechanism for energy sustainability, we also investigated its role in the loss cycle. As most of the workforce moved to telework, this allowed us to explore the underlying mechanism for the loss cycle of energetic resources between the two domains (work and family). Building on our first study, we integrated the Work-Home Resources model (Ten Brummelhuis & Bakker, 2012a) with flow theory to propose that flow would also act as an underlying psychological mechanism for the spillover depletion process. The W-HR model posits that a home contextual demand leaves employees with fewer personal resources leading to poor work outcomes. Previous research has mainly investigated demanding mechanisms that explain the spillover depletion process (Du, Derks, & Bakker, 2018; Heller & Watson, 2005). Therefore, we argued that integrating flow as a psychological mechanism representing both the resources-demanding and the resources-generation processes would advance our understanding of the spillover depletion mechanism. Indeed, our research demonstrated that daily flow experiences act as an underlying psychological mechanism that explains *how* home contextual demands have an adverse effect on employees' energy at the end of the day. Therefore, demonstrating its role in both resource gain and loss cycles, our work provides convincing evidence that flow is a psychological mechanism underlying employees' energy sustainability.

Fourth, we investigated the role of positive affect in moderating the depletion process between work and home domains. The W-HR model (Ten Brummelhuis & Bakker, 2012a) highlights the role of time in the depletion and the enrichment process, similar to the COR theory's gain and loss cycles (Hobfoll et al., 2018). However, the W-HR model primarily

emphasises the significance of stable and key resources in attenuating the short-term depletion process but overlooks the role of personal and volatile resources. Therefore, building on the COR theory's assumption that employees can mobilise dynamic and volatile resources to offset the depletion process, we argued that positive affect could buffer the short-term spillover depletion process. Our results demonstrated the role of volatile personal resources, such as positive affect, in buffering the depletion process. Therefore, our study shows that employees can use momentary and volatile resources to cope with daily contextual demands and protect their personal resources, consistent with the COR theory (Hobfoll et al., 2018). In doing so, we expand the W-HR model by integrating a comprehensive dynamic model that considers the role of volatile resources in sustaining employees' daily energy and functioning.

Finally, our work provides convincing evidence that flow is a crucial experience for employees' energy sustainability. Therefore, we aimed to further understand flow by investigating the implication of flow interruption. While flow theory suggests that interruption ends flow (Xanthopoulou, 2017), we argued that flow interruption implies one has engaged in flow. Accordingly, there might be some implications that have not yet been investigated. To the best of our knowledge, this study is the first to examine flow interruption theoretically and empirically. Our study provides initial empirical evidence that flow interruption does not directly affect employees' engagement in flow experiences throughout the day, which is consistent with flow theory's proposition that the experience is intrinsically rewarding (Bakker, 2008; Nakamura & Csikszentmihalyi, 2014). The results suggest that interrupting employees during flow does not necessarily frustrate their motivation to seek flow again during the day. However, drawing from COR theory, our study shows that when employees perceive an interruption as a threat to their resource generation process, they are

likely to protect their resources and withdraw from allocating them to their work. Our work suggests that affective reaction manifested as negative affect is a crucial moderator in determining the consequences of interruption. Therefore, our studies further expand our understanding of flow and its role as a psychological mechanism underlying energy sustainability.

16 Limitations and Future Research

Although the present work makes important theoretical and empirical contributions, it must acknowledge that some limitations apply to all the studies included. These limitations should be discussed to provide a more comprehensive understanding of the research.

First, all three studies primarily used self-report measures to collect the data. Accordingly, our findings might be susceptible to common method bias (Podsakoff et al., 2003). In other words, there may be an increase in the associations between variables measured using the same method simultaneously, resulting in inflation (Podsakoff et al., 2003). However, using an experience-sampling method that includes temporal separation of the measurement points for most of our variables and the demonstrated construct validity through MCFA makes common method biases unlikely in our analysis (Podsakoff et al., 2003). Furthermore, most of our variables represent subjective psychological experiences, such as flow, subjective vitality, and positive and negative affects. Therefore, it is appropriate to use self-reporting (Hektner et al., 2007), as measuring them using other methods would be difficult. Additionally, our studies included interaction effects which are less likely to be a product of common method variance (Siemens et al., 2010). However, future research might benefit from utilising observer ratings for employees' performance outcomes (e.g., task performance, innovative performance, organisational citizenship behaviour), such as supervisors' or colleagues' ratings.

A second limitation of the present thesis is the issue of causality (Cliff, 1983). For example, in study 2, daily flow experiences and work-family integration were measured simultaneously, making it difficult to establish a casual relationship. Contrary to our argument that work-family integration hinders daily flow experiences, it is possible that engaging in flow blocks all distractions, including home chores. Due to the design and lack of time lags in some measurements, it is hard to draw a causal relationship between most of the measured constructs in this work (Iida et al., 2012). Unlike cross-sectional design, diary design allowed us to separate measurement points such as subjective vitality to flow and flow to subjective vitality. This gives us more confidence in most established relationships' potential causal mechanisms (Eschleman & LaHuis, 2014). However, the relationships established in this work can only be interpreted as correlations. Therefore, future research might benefit from utilising experimental to examine flow, flow interruption and its relations to energy indicators.

Another limitation of our research is that we mainly focused on investigating the underlying mechanism for resources development on the within-person level. Previous research suggests that there is an inter-individual variation in how people manage and develop their resources. For example, (Halbesleben et al., 2014) have suggested that people with a promotion focus might have better resources investment strategies to maximise resources' gain and minimise resources' loss. Furthermore, a study has found that conscientious employees experience less work-family interference due to being too engaged at work (Halbesleben et al., 2009). Their results suggest that conscientiousness could contribute to resource investment management. These studies indicate a between-person difference in how people manage the investment of their resources. Accordingly, investigating gain and loss cycles through cross-level design that takes into account

individual differences such as promotion focus or conscientiousness might be fruitful for future research. Moreover, a previous study suggests that personality traits play a role in how frequently people experience flow (Johnson et al., 2014). The authors reported that individuals high in extroversion are more likely to experience flow. This implies that individual differences could shape daily energetic resources sustainability. Therefore, future research might benefit from controlling for personality traits as well. Similarly, Previous research suggested that the benefits or detriments of work-family integration can be contingent on employees' preference for integration (Kreiner, 2006; Liao et al., 2016). Therefore, future research may benefit from examining the preference for integration as a cross-level moderator that mitigate the depletion process triggered by work-family integration.

Another limitation of the present thesis is the predominant focus on the Conservation of Resources (COR) theory's corollaries and the investment principle. It is important to note that the COR theory offers a broader theoretical framework that encompasses additional principles, such as the primacy of loss, gain paradox, and desperation principles (Hobfoll et al., 2018). In order to achieve a more comprehensive theoretical understanding of energy sustainability, future research could greatly benefit from integrating these other COR principles. However, it is crucial to acknowledge that this integration may pose challenges due to the increased complexity in terms of both theory and methodology.

To address this challenge, it is recommended to undertake a series of studies that collectively form a comprehensive model of energy sustainability based on the COR framework. This approach would allow for a more nuanced exploration of the interplay between COR's various principles and their impact on energy sustainability. By conducting multiple studies that build upon each other, researchers can gradually develop a more holistic understanding of the complex dynamics involved. Such an approach would enable the

exploration of intricate relationships and provide valuable insights into the practical implications of the COR theory in the context of energy sustainability.

17 Practical Implications

Considering the critical importance of maintaining energy levels in the workplace, our study holds significant practical implications for practitioners. Broadly speaking, our findings suggest that employees can promote energy sustainability by cultivating a state of flow during work and nurturing their personal resources. Furthermore, the implications extend beyond these general insights and are particularly relevant to contemporary work settings, such as hybrid work arrangements and remote work formats. In the following sections, we will explore the potential implications for both managers and employees, providing practical recommendations for each group.

Our study suggests that a key factor for energy sustainability is starting the day with high energy levels, which allows employees to engage fully in their work and perform effectively, leading to a greater likelihood of feeling energised at the end of the day. Therefore, employees need to establish healthy daily habits that promote starting the day with high energy, such as getting adequate rest at night (Diestel et al., 2015; Rivkin et al., 2021). Furthermore, psychological detachment during the evening can help employees recover their energetic resources on the following day (Sonnentag et al., 2017). Employees could benefit from socialising and connecting with friends and family during the evening as it is also related to positive energy indicators (Ten Brummelhuis & Bakker, 2012b; Ten Brummelhuis & Trougakos, 2014).

The study emphasizes the significance of achieving a state of "flow" during work, revealing that it can completely alter the way work is perceived from exhausting to

invigorating. This highlights the need for organizations to create job roles and tasks that enable workers to enter flow. To achieve this, managers can assign tasks with clear objectives, provide regular feedback, and ensure employees have the required skills to tackle challenging tasks (Demerouti, 2006). Furthermore, employees can be proactive and create their optimal flow experience. Employees can experience higher levels of absorption and dedication at work when they actively seek out daily challenges (Petrou et al., 2012) and find them more enjoyable (Tims et al., 2014).

Furthermore, interruptions are inevitable in today's modern workplace, making effective interruption management crucial for employees' energy sustainability and functioning. Our research found that flow interruption decreases employees' daily flow experiences, creative process engagement, and vitality, but only when employees react negatively to the interruption. The results underscore the importance of emotional regulation (Koole, 2009; Koole & Jostmann, 2004; Koole & Veenstra, 2015). Accordingly, to help employees cope with interruptions and regulate their emotions, intervention programs focused on emotional regulation and interruption management may prove beneficial.

Regarding telework, our study demonstrates that combining work and family responsibilities can negatively impact daily flow experiences and energy sustainability. As a result, telecommuting and hybrid workers are advised to limit the integration of work and family activities when working from home. Previous research has suggested establishing and effectively maintaining boundaries between workspace and family space workers to immerse themselves in work-related tasks (Kalliath et al., 2022). Employees can develop these boundaries by setting up a designated work area at home and establishing a routine that effectively separates work and family responsibilities, either mentally, physically, or both (Myrie & Daly, 2009). Companies could provide mindfulness training to promote their

teleworkers' focus on work-related tasks while balancing their family obligations. Such intervention can help employees preserve their cognitive resources in the face of multitasking (Kudesia et al., 2022).

Furthermore, our research also demonstrated that positive emotions could mitigate the adverse effects of home demands. Employees can cultivate positive emotions at work and home in various ways. For instance, studies have indicated that good sleep quality (Rivkin et al., 2021), low-intensity activities, and relaxation in the evening (Hur & Shin, 2020) can enhance positive emotions the next day. Additionally, watching humorous videos can boost positive emotions and help employees cope with resource depletion (Schweitzer et al., 2022). Finally, physical activities could improve positive emotions and mood (Reed & Ones, 2006). Consequently, companies may want to implement intervention and training programs for their telecommuting and hybrid employees as part of their induction process before transitioning them from office-based to remote work to help them cope with the challenges of work-family integration.

18 Reference

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