Developing and Testing an Episodic Model of Work Breaks

A thesis submitted to the University of Manchester for the degree of

Doctor of Philosophy

In the Faculty of Humanities

2021

Maximiliano Escaffi-Schwarz

Alliance Manchester Business School

Division of People, Management, and Organisation

List of Contents

Word count: 63,669

List of Figures

List of Tables

Abstract

The aim of this thesis is to develop, test, and present a more comprehensive and integrated account of work breaks. Specifically, this thesis develops the Episodic Model of Work Breaks and tests some of its key assumptions in a laboratory experiment, online vignette experiment, field experiment, and event contingent diary study. The thesis addresses three theoretical issues and one empirical issue present in work breaks research. The first theoretical issue is that it remains unclear why workers take breaks. It is generally assumed that workers take breaks to rest from work, but empirical evidence does not confirm this assumption and suggests that this picture is partial. The second theoretical issue is that research about work breaks usually adopts a recovery perspective to describe the activities workers engage in during the break. However, empirical evidence suggests that workers normally engage in break behaviours that should be detrimental for well-being and performance, yet these behaviours do not appear to have negative impact on these workers. The third theoretical issue is that research about breaks has scarcely considered how breaks are related to other episodes of the workday. To address these three theoretical issues, the Episodic Model of Work Breaks proposes that the performance episodes before and after the break influence whether workers take breaks and what they do during these breaks. Moreover, the Episodic Model of Work Breaks proposes that to understand break effectiveness, it is important to examine the fit between the break, the worker's goals, and the performance episode immediately after the break. Regarding the empirical issue, this thesis argues that research about breaks often suffers from endogeneity which inhibits causal inferences. To address this issue, this thesis mostly adopts more robust research designs that are causally identified. The results reported in this thesis support many of the hypotheses and reinforce the need for an episodic approach to study work breaks.

Declaration

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Acknowledgements

First, I would like to acknowledge my supervisors Professor David Holman and Dr David Hughes of the Alliance Manchester Business School at The University of Manchester, whose constant support, mild and harsh feedback, and critiques were instrumental for the completion of this thesis and without whom this thesis would not have existed. I am especially grateful for their friendship and collegiality throughout this process and hopefully in the years to come. I also want to thank both Davids for taking the time to not only supervise me but also for going beyond their duties and help me develop as an academic. Among the many things David (Holman) did for me, he invited me to participate in a research project, sent me to Germany to work with colleagues and learn new valuable statistical techniques, and supported my attempts to publish journal articles. In turn, David (Hughes) helped develop my critical thinking, suggested that I take advanced research method modules that were instrumental to my PhD, and pushed me to pursue more robust research designs. Having worked with them made me a better researcher and for that I will be forever grateful.

Second, I would like to thank my wife, Rita, who is doing her PhD at the same time as myself but dedicated her time to read this thesis. She is the reason the grammar is somewhat sound. Through many insightful conversations she, without a doubt, made this thesis better (for example, by fixing this sentence). Rita also supported me in difficult times and loved me when I was being cranky, and forced me to take the amazing occasional holiday. The PhD journey, and living away from my family and friends, was definitely easier because you were here.

Third, I need to thank my colleagues Dr Héctor Madrid and Dr Cristian Vásquez for their valuable support and advice. They were always available when I needed help, was struggling with a research idea, or needed pilot participants. You guys definitely made this process easier.

Fourth, I want to thank my close friend Alejandro Hirmas, who is pursuing his PhD studies in behavioural economics at the Universiteit van Amsterdam. Alejandro helped develop better research designs and protocols and, in many cases, made this process more difficult but better.

Fifth, I would like to thank my other friends who did not provide substantial support academically speaking, but were instrumental for my well-being. Specifically, my close school and university friends with whom I spent hours relaxing and unwinding via computer mediated games and parties. Although I missed hanging out in person, I always felt accompanied by them despite the distance.

Sixth, I need to express my gratitude to my family: my mother Elke, my father Roberto, and my two brothers Cristian and Esteban. They supported me emotionally and academically. Without you I would not have been able to complete this enormous project.

Seventh, I have to thank the Agencia Nacional de Investigación y Desarrollo (ANID) in Chile for granting me the necessary funding to conduct my studies.

Eight, I want to express my gratitude to Sandra and Kristin, admins at the AMBS, as their support was essential to be able to complete this thesis.

Finally, I have the need to mention my cats, Anubis and Loki. We got Anubis right before the beginning of the pandemic and thanks to him and his very strict schedule, I was able to maintain focus and continue to work as normal. The thesis started progressing much faster once we got Loki (who is undeniably very naughty) since he mediated Anubis and his afternoon threatening-to-jump-off-the-railing times. Both Anubis and Loki gifted me many hours of happiness and joy. Without them, my well-being would have suffered more during the pandemic.

Chapter 1
Introduction

Breaks at work are usually conceptualised as enforced or voluntary interruptions of the workflow when work tasks are neither required nor expected (Trougakos & Hideg, 2009; Wendsche et al., 2016). Breaks are ubiquitous in organisations, with many employees interrupting their work for brief or long periods of time to address physiological needs (e.g., eating, going to the bathroom, or drinking coffee) or psychological needs (e.g., chatting informally with colleagues, relaxing, or seeking advice from more experienced co-workers) (Fritz et al., 2011). Although some employers and supervisors may perceive breaks as procrastination, or a means of wasting time (Fritz et al., 2011), breaks have been proven effective in reducing work-related fatigue, stress, and accident risk (Tucker, 2003; Wendsche et al., 2016; Zhu et al., 2018). Unsurprisingly, many countries now legally require that employers grant their employees at least one long break during their shift, usually called lunch break (Wendsche et al., 2016).

The study of work-breaks can be traced back as early as 1900 when scholars sought to understand why employee performance declined throughout the work-day and how to control this decline (Kraepelin, 1902; Wendsche et al., 2016). According to early studies in the late 1800s, work-breaks were found to be a worthy candidate to control this performance decline and thus researchers set to the tasks of understanding how different break schedules and lengths impacted well-being and performance in a various of tasks (Wendsche et al., 2016). Nevertheless, Kraepelin (1902) already noted in 1902 that the influence of break length on performance was not linear, and argued that the relationship between breaks and performance is more complex than just giving workers rest time in-between work tasks. Following this, most

research on breaks aimed to understand how break characteristics could be modified to control the human factor and increase productivity, a tradition that was championed by ergonomics researchers (Fritz et al., 2011; Trougakos & Hideg, 2009).

Ergonomics research on breaks focuses on the optimal design of breaks concerning length, frequency, time of day, and content (i.e., what workers do during breaks) and how these factors alleviate work-related fatigue and musculoskeletal discomfort (Fritz et al., 2011). This *ergonomics perspective* on breaks, however, has sometimes been critiqued because it is primarily concerned with identifying the optimal break and less so with why breaks are effective (Fritz et al., 2011; Trougakos & Hideg, 2009; Tucker, 2003). Specifically, Trougakos and Hideg (2009) argued that previous research on work breaks was not concerned with the underlying mechanisms that explain break effectiveness, thus limiting the knowledge of the process of breaks.

To overcome some of the limitations of break research, Trougakos and Hideg (2009) proposed that since work breaks necessarily require to momentarily interrupt work during working time, the same processes that explain recovery after work can serve to explain why breaks are effective. Briefly, this means that breaks are effective because when people work, they build up fatigue and exhaust relevant resources (e.g., energy, concentration regulation) and the only way to reduce this fatigue and restore these exhausted resources is by not working and allowing for the natural restoration of mental resources, such as attention capability, working memory, and energy (Sonnentag et al., 2017). Although the *recovery perspective on breaks* has been crucial to further develop our understanding of breaks at work, there are some inconsistent empirical results, omissions, and research design issues that are unresolved.

First, it is still unclear why workers take breaks. The recovery perspective assumes that breaks are taken principally in response to work-related fatigue (Zhu et al., 2018). This

assumption is questionable for two reasons. Empirical evidence suggests that employees do not only take breaks at work to recover from fatigue but also take breaks to reward themselves (Bosch & Sonnentag, 2019), for example, grab a coffee with a colleague after completing a task. In addition, the recovery perspective does not account for the fact that people sometimes engage in anticipatory coping strategies to prepare for difficult or complex events that will happen in the future, and breaks could be such as strategy as well (DiStaso & Shoss, 2020; Monat et al., 1972). Therefore, a reasonable but as yet untested assumption is that workers may not only take a break in response to what they have done but also in anticipation of what they will be doing later at work. Considering both performance episodes is necessary for a full understanding of employee's motivation for taking breaks.

Second, when considering why breaks are effective, the recovery perspective usually assumes that workers have to engage in activities and experiences that help individuals unwind from work-related efforts as this reduces fatigue, increases resources, fosters well-being, and will eventually lead to higher levels of performance (Sonnentag et al., 2017; Steed et al., 2019; Zhu et al., 2018). Specifically, the recovery perspective argues that behaviours and experiences during non-working times that foster relaxation and mental disengagement from work are essential to foster positive employee-related outcomes because of recovery-related processes (Bosch et al., 2017). From this perspective, engaging in *any* form of work-related behaviour while on a break will continue to increase fatigue, impair recovery processes, and lead to negative employee outcomes such as poorer well-being and performance (Sonnentag et al., 2017). However, evidence indicates that workers do engage in work-related behaviours while on breaks and this does not seem to impair, nor benefit, well-being (Berman & West, 2007), although past research has seldom considered why this may be the case. Moreover, empirical research on work-related rumination *after work* has shown that thinking about work at home is not necessarily harmful and can even be beneficial for well-being and performance (Cropley

& Zijlstra, 2011; Vahle-Hinz et al., 2017). Therefore, universally assuming that employees need to disengage from their work during their breaks may be overly simplistic and, in some cases, incorrect (Vahle-Hinz et al., 2017).

Third, most studies focus on how activities and experiences during the break influence outcomes after the break (e.g., Bosch et al., 2017; Fritz et al., 2011; Hunter & Wu, 2016; Kim et al., 2018; Trougakos et al., 2008). Fewer studies have considered how tasks before and after the break can affect what workers do during the break and the effectiveness of that activity or experience (Bosch et al., 2017; Kim et al., 2018). Focusing only on the relationship between the break activities and the outcomes after the break is problematic because when breaks match workers' needs, that is, when breaks' goals supplement workers' goals, break effectiveness is maximised (Venz et al., 2019). Considering that different events require different resources, skills, and affective dispositions (Beal et al., 2005), the effectiveness of a break activity or experience should not be studied in isolation of other events, but in relation to what employees need from the break to be able to meet their goals for a specific task episode.

Finally, and on top of the above theoretical issues, the research designs typically used within the research on breaks as recovery perspective are unable to provide reliable causal claims on the effects of breaks on employee-related outcomes. In general, most studies utilise either cross-sectional or experience sampling methodology designs without considering common endogeneity biases. As Hughes and colleagues (2018, p. 558) describe it:

> "…endogeneity refers to an instance when a predictor variable (whether classed as predictor, mediator, or moderator) is correlated with the error term of the outcome variable (see Antonakis et al., 2010, 2014 for details). In other words, an endogenous predictor is related to the measured outcome variable in two or more ways, usually in the way theorized (e.g., as a meaningful cause), but also in some unanticipated way(s) (e.g., common method bias, reciprocal effects, relationship with a common cause)."

The consequence of endogeneity bias can be substantial and make it difficult to draw causal conclusions because it is impossible to know whether and to what degree the estimate of interest represents the theorized relationship (i.e., the causal effect) or the unanticipated relationship (i.e., endogeneity bias). The problem of endogeneity in breaks research will be discussed in more detail in Chapter 4 which corresponds to the methodology section.

Overall, the four issues outlined above limit the theoretical understanding of why workers take breaks, which break behaviours are functional, and how breaks relate to other events at work. Furthermore, even when some studies shed light on some of these questions, research designs do not usually allow for causal inferences, thus limiting our capabilities to influence policy and make suggestions as to how to take or create appropriate break schedules at work. Considering the centrality of breaks in organisational life and the importance that they have in fostering well-being, health, and performance (Tucker, 2003; Wendsche et al., 2016), refining our knowledge of breaks is of utmost importance for theoretical and practical reasons.

To overcome the above challenges, in this thesis I develop a more comprehensive model of work breaks that moves beyond the recovery perspective and test it with research designs that address endogeneity problems. This model, which I call the 'Episodic Model of Work Breaks', builds on the ideas by Beal and colleagues (2005) who proposed that our workdays are organised in multiple performance episodes with clear beginnings and ends (Beal et al., 2005), distinct performance goals, and that employees engage in break-episodes in between performance episodes that help alleviate work-related fatigue and increase performance (Trougakos & Hideg, 2009). Therefore, work breaks in this model are studied in the context of the broader workday, with pre-break episodes, expectations of post-break episodes, and actual post-break episodes as elements to consider in understanding why workers take breaks, why workers engage in different break activities during the break, which break activities are functional, and why breaks are effective. Notwithstanding, and in contrast to

Trougakos and Hideg (2009), the model does not assume that the primary function of breaks is to restore resources and reduce work-related effort, thus, moving away from the recovery perspective. This thesis makes three contributions, two of which are theoretical and one is methodological.

First, in conceptualising work breaks as episodes within the workday, the Episodic Model of Work Breaks broadens and extends our theoretical understanding of employee motivation for taking breaks, what they do during breaks, and the effects of breaks in relation to the context in which breaks are taken (i.e., what employees were doing before the break, what they expect to do after the break, and what they actually do after the break). Considering the work activities before and after the break is important because workers may shape their breaks to address their specific needs (Venz et al., 2019) and helps understand the contradictory results that have sometimes been observed in empirical studies concerning break antecedents (e.g., need for recovery not being a relevant antecedent) and break activities (e.g., work-related behaviours being beneficial for well-being).

Second, in moving away from the recovery perspective on breaks, this model provides a better understanding of break effectiveness. Specifically, the Episodic Model of Work Breaks considers other processes, aside from energy restoration and fatigue reduction, to understand how work events before and after the break influence break effectiveness. Looking at break effectiveness from an episodic perspective is important because different performance episodes call for different affective states, skills, and knowledge, but also result in different affective states after completing the performance episode (Beal et al., 2005; Warr et al., 2014). Assuming that recovery processes will universally explain break effectiveness is problematic because past research has shown that when there is a fit between the break and the environment (e.g., task, goal, etc.), break effectiveness increases (Venz et al., 2019). This fit effect between the person and the break occurs because workers can obtain *what they need* from the break to continue to

cope with their workday, such as upregulate or downregulate their affective states to match the required one for the task (de Jonge et al., 2012; Venz et al., 2019; Zijlstra et al., 2014). As an example, workers could engage in problem-solving pondering during the break, which should impair recovery processes (Cropley & Zijlstra, 2011), but still lead to beneficial results if problem-solving pondering was functional for the worker's goals (e.g., solve a difficult task that will be performed after the break). Consequently, the Episodic Model of Work Breaks proposes that when break behaviours match a desired goal or state, break effectiveness should be maximised. Alternatively, when there is a lack of fit between the break behaviour and the desired goal, break effectiveness should decrease. This complexity is seldom discussed in breaks research.

Third, by combining this new theoretical approach with more robust research designs, this thesis can provide stronger causal claims to the underlying mechanisms that explain break effectiveness. Specifically, in this thesis, I combine multiple research designs, such as laboratory, online randomised experiments, and experience sample methodologies to control for endogeneity issues and provide an ecological examination of the model. This is an important contribution as few studies have actually attempted to do so.

Considering the ubiquity of work breaks in the organisational life and their capacity to foster relevant employee-related outcomes such as increased well-being and performance, having a more nuanced understanding of breaks that goes beyond the recovery perspective has important practical value. For example, Feyer and Williamson (1995) found that break effectiveness is maximised when breaks are taken at the *right moment*. The right moment, however, varies according to the perspective under which breaks are scrutinised. If a recovery perspective is taken, then the right moment is when fatigue levels are neither too high nor too low (Bosch & Sonnentag, 2019; Feyer & Williamson, 1995). If, however, an episodic perspective is taken, the *right moment* will depend on the performance episodes before and

after the break. Understanding the right moment for taking a break is important because when workers are externally interrupted, even if it is for a work break, their well-being is impaired (Boucsein & Thum, 1997; Jett & George, 2003).

Taking an episodic perspective to understand what workers do during the break is also important. Specifically, researchers usually intervene breaks using a recovery approach (e.g., Blasche et al., 2018; Steidle et al., 2017) which is helpful in some cases, but can be detrimental in other cases. Specifically, combining an episodic perspective with fit research, one can argue that if the break does not match the worker's needs, then break effectiveness will be impaired. Moreover, past research has shown that when workers lack autonomy to decide what to do during the break, breaks are negatively related to positive employee related outcomes (Trougakos et al., 2014). Thus, understanding why workers may decide to engage in different break behaviours, some of which unrelated to recovery experiences (e.g., Berman & West, 2007) will help develop better organisational interventions that focus on a more comprehensive examination of the workday, as opposed to recommending organisations to facilitate workers to take breaks when they fell fatigued (e.g., Bosch & Sonnentag, 2019).

1.1 Outline of this thesis

This thesis is divided into seven further chapters. In Chapter 2, I introduce the concept of breaks in more detail and provide a theoretical and empirical review of the literature on breaks. I focus on ergonomics and recovery, as these are the two main lenses in breaks research that focus on the relationship between breaks with well-being and performance. With the empirical evidence, I also raise unresolved issues in both perspectives. I finish this chapter with a presentation of the Episodic Model of Work Breaks, which is then discussed in Chapter 3.

Chapter 3 presents the theoretical model that I developed, focusing on its component, interrelations, and underlying theoretical frameworks. I also provide an explanation of how this model aims to resolve the identified problems in breaks research. Throughout this chapter, I also raise three research questions that emerge from the model itself. This paves the way to Chapter 4, where I outline the methods used to explore these three research questions.

Chapter 4 describes the research methodology I adopted to empirically examine the research questions posited in Chapter 3. Specifically, I first state my research approach and then describe two important methodological issues in quantitative research: causality and endogeneity. Following this, I describe the research methods I use to design the empirical studies. This thesis is composed of four empirical studies with different designs: a laboratory experiment, an online vignette experimental design, a field experiment, and a diary study. In this chapter, I provide descriptions, advantages, and disadvantages of all these methods. Moreover, I also describe the main statistical techniques that I will be using to analyse the data generated by the studies.

Chapters 5 to 7 correspond to my empirical chapters and follow a similar structure. In all chapters, I first provide a brief theoretical framework together with the hypotheses that will be tested. I then justify the research design, describe the protocols, measures used, and the data analysis strategy. After this, I present and discuss the results, together with the limitations of the study. All studies aim to explore and test different fragments of the model that I developed in this thesis.

Chapter 5 is composed of two studies. The first study is a randomised laboratory experiment that was developed to understand whether workers take breaks because of what they have done, or because of what they will be doing. Unfortunately, due to Covid-19 restrictions to collect data in person, I could not complete data collection for this study.

Therefore, I designed a randomised online vignette experiment that explores the same research questions as the laboratory study. This type of design also overcomes some of the limitations of the laboratory study by providing a fictional, more ecological context to participants. Chapter 6 is a field experiment developed to understand whether when taking a break, shifting the focus of on the task immediately before the break or the one immediately after the break influences what workers do during the break. Chapter 7 finalises the empirical section with a daily diary study that aims to understand, ecologically, how workers' behaviours during their breaks relate to different post-break employee-related outcomes, such as well-being and creativity.

Chapter 8 is the final chapter of this thesis and a general discussion of the findings. I first describe the theoretical contributions of this thesis and how the thesis addresses the problems identified in past research about work breaks. I then provide a summary of the findings that support the new theoretical approach to understand work breaks. Then, I outline the strengths and limitations together with future research guidelines. I finish Chapter 8 and this thesis with some concluding remarks.

Chapter 2
Literature Review

In this chapter, I provide a literature review of breaks at work. I first review the ergonomics literature on breaks and outline its limitations. I then follow with a literature review of breaks from a recovery perspective, where I first introduce the main theoretical foundations that have often been utilised to explain break effectiveness, and then follow with an empirical review on breaks as recovery opportunities. I then raise some unresolved issues of the recovery perspective and finalise this chapter outlining my proposed theoretical model which addresses the identified unresolved issues, that will then be covered in the next chapter.

2.1 The ergonomic study of work-breaks

Ergonomics as a field aims to improve the performance of systems by optimising the interaction between humans, machines, and work tasks (Bridger, 2003). Such optimisation can be achieved by designing better interfaces that make the task and user more compatible in three ways: by changing the work environment to make it safer and more resistant to human errors, by modifying the task to make it more compatible with user characteristics, or by varying the way work is organised to accommodate for employee needs (Bridger, 2003). Breaks research from the ergonomic perspective, in particular, focuses on the last point and seeks to understand how to make breaks more effective in terms of length, schedule, time of day, and content to reduce work-related strain.

Ergonomic research on breaks is mostly based on laboratory and field experiments. Based on these results, the ergonomics field has shown that there is a causal relationship between having breaks typically with increased performance and well-being, and lower

accident risks (Galinsky et al., 2000; Tucker, 2003; Wendsche et al., 2016). Despite these important results regarding the benefits of breaks, finding an optimal break schedule in terms of frequency, length, time of the day, and content remains elusive, as there is still much debate and contradictory empirical evidence on the topic (Tucker, 2003).

Some research suggests that less frequent and longer breaks are preferred by employees, and better promote well-being and increased performance (Dababneh et al., 2001; Lim et al., 2016; Lim & Kwok, 2016; McLean et al., 2001). Nevertheless, longer breaks seem to also be related to steeper performance declines in subsequent performance blocks due to workers usually exerting extra effort to make up for the time lost during the break (Lim et al., 2016; Lim & Kwok, 2016). Indeed, others show that shorter and more frequent breaks may be better for employee-related outcomes (Balci & Aghazadeh, 2003) as shorter breaks taken during the morning and early afternoon seem to be better in reducing physical and emotional strain (Boucsein & Thum, 1997). Yet, in the specific case of long-haul drives, other studies have found that break length is unrelated to accident risk (Lisper & Eriksson, 1980). In general, these differences can be explained by different research settings (Tucker, 2003), such that in some cases, the samples comes from industrial settings (e.g., Dababneh et al., 2001), clerical work (e.g., Boucsein & Thum, 1997), or long-haul drivers (e.g., Lisper & Eriksson, 1980).

Some studies have also argued that break effectiveness is maximised when workers can take breaks when their fatigue starts to build up (Feyer & Williamson, 1995). For example, past research in neuroscience suggests that the longer people work on a demanding task before taking a break, the longer it takes for the brain to restore its efficiency (Breckel et al., 2013). Therefore, being able to take breaks when needed seems to be important (Feyer & Williamson, 1995). However, research has also shown that workers are not particularly good at regulating themselves, usually working past their fatigue levels, thus reducing break effectiveness (Tucker, 2003). Given that both longer and shorter breaks, and more frequent and less frequent

breaks have provided inconsistent results, and that employees may not take breaks if left to their discretion, some argue that companies should pre-plan short frequent breaks into workers' schedules (Tucker, 2003). Nevertheless, having more enforced frequent shorter breaks can also be negatively associated with motivation and increased perception of fatigue and pain because work is more frequently externally interrupted (Boucsein & Thum, 1997). Further, workers are less likely to take breaks if they feel that they will interrupt and negatively impact their work (Henning et al., 1994). It has also been suggested that to maximise break effectiveness, short breaks should be enforced at some point during the day but only to compensate for lack of sufficient autonomous recovery, but in many jobs is difficult to determine when there is insufficient recovery (Henning et al., 1994, 1997).

The effectiveness of various break activities is also subject to controversy. Research often recommends active over passive breaks (Dababneh et al., 2001; Henning et al., 1997), where active breaks usually entail a form of physical activity (e.g., high-intensity exercise, stretching, etc.) and passive breaks usually entail a form of relaxation (e.g., meditation, deep relaxation activities, watching funny videos, etc.). However, attempts to elucidate which one is better have shown no difference between passive and active breaks (Blasche et al., 2018; Scholz et al., 2017; Steinborn & Huestegge, 2016). This can be explained by differences in research designs and samples. For example, some argue that active breaks are preferred to maintain good levels of well-being and performance (e.g., Henning et al., 1997). However, when the work requires physical effort, employees prefer passive breaks (Dababneh et al., 2001).

To sum up, current empirical evidence provided by the ergonomic perspective on breaks supports the importance of work breaks. Nevertheless, how to best craft a break remains elusive with long and short breaks, frequent and infrequent breaks, enforced and self-initiated, passive or active breaks being shown to be both beneficial and detrimental.

Some are emphatic that an important reason for this lack of agreement is that studies are usually conducted in varied settings that impose different demands on individuals (Tucker, 2003). For example, most laboratory experimental research uses student samples and monotonous tasks that are unrelated to real-work environments (e.g., arithmetic tasks, odd-ball tasks) and participants usually lack the autonomy to decide when to take a break, therefore their results are not directly applicable to many real job scenarios (Fritz et al., 2011; Trougakos & Hideg, 2009). Further, most research done with working samples is conducted in either real or simulated long-haul driving tasks or in real or simulated industrial settings, which are very different from each other (Tucker, 2003), thereby limiting the ecological validity, generalizability, and comparability across different studies and to other fields (Scholz et al., 2017; Wendsche et al., 2016). The limited focus and all of the above variations in study design may explain why a general model of break effectiveness has remained obscure. In response, researchers began to invest greater resources in examining the when and why breaks are effective, rather than searching for the parameters of a single optimal break (Fritz et al., 2011). Most research that examines when and why breaks are effective adopts a recovery perspective on breaks.

2.2 Work breaks as recovery opportunities

In their theoretical presentation, Trougakos and Hideg (2009) argued that breaks research from an ergonomics perspective was not concerned with the underlying mechanisms that explain break effectiveness, thus limiting our knowledge of the process of breaks. To address this limitation of ergonomics research, they drew on recovery research to propose that breaks could be understood as 'within-work momentary recovery opportunities', suggesting

that the same mechanisms that explain recovery processes also serve to explain break effectiveness (Trougakos & Hideg, 2009).

Recovery is the study of "unwinding and restoration processes during which a person's strain level that has increased as a reaction to a stressor or any other demand returns to its pre-stressor level" (Sonnentag et al., 2017, p. 2). When this idea is applied to breaks, the resulting conclusion is that breaks allow workers to immediately cope with job demands and the resulting work-related fatigue by momentarily stopping all work-related efforts (Trougakos & Hideg, 2009). Congruent with recovery research, breaks research draws from recovery's main theoretical frameworks to explain break effectiveness, namely the Effort-Recovery Model (ERM; Meijman & Mulder, 1998), Conservation of Resources theory (COR; Hobfoll, 1989), and Ego Depletion theory (EDT; Baumeister et al., 1998). Since knowledge of these frameworks is essential to understand breaks recovery research, the following section broadly describes each one of them.

2.2.1 Breaks as recovery opportunities: key theoretical frameworks

The first theoretical framework that is commonly used in breaks research is the ***Effort-Recovery Model***. The Effort-Recovery Model posits that when workers are confronted with a job stressor, they need to exert effort and engage in strategies and behaviours to deal with the stressor. The specific strategy that employees utilise to deal with the job stressor depends on three determinants: work-demand characteristics (i.e., formal aspect of the job), decision latitude (i.e., how much autonomy the worker has), and work-potential (i.e., how much skill and energy are required and available). From an Effort-Recovery Model perspective, addressing job stressors requires exerting effort, which results in a short-term psychophysiological reaction that arouses the psychophysiological system, inducing a state that is usually characterised as a stress reaction (Meijman & Mulder, 1998).

The arousal of the system is thought to directly affect the work-potential since willingness to expend effort to cope with the demand is directly related to the load on the system and fatigue levels at that particular moment (Meijman & Mulder, 1998). To return to pre-stressor levels, the load on the system needs to cease, which usually means to stop working. Within the Effort-Recovery model, the process of stopping work and returning to pre-stress or baseline levels is called recovery (Meijman & Mulder, 1998). Failure to return to pre-stressor levels over long periods can lead to permanent health impairment. In sum, the Effort-Recovery model argues that when workers are confronted with job stressors, they exert effort to cope with them. This arouses the system, which influences the willingness to further exert effort and the quality of the job done. If stressors are not removed eventually, the system cannot return to pre-stressor levels and permanent psychological and physiological harm (e.g., burnout and injuries, respectively) will occur (Meijman & Mulder, 1998).

The second theoretical framework that is commonly used in breaks research is the ***Conservation of Resources theory***. One of the main assumptions of Conservation of Resources is that people strive to protect and obtain valuable resources (Hobfoll, 1989). Stress reactions happen when these resources are threatened or lost. Resources in this theory are ill-defined and encompass a variety of possible elements, such as physical (e.g., money), social (e.g., friendship), and personal (e.g., energy, self-efficacy, self-image), among others (Halbesleben et al., 2014). Regardless of the type of resources that are looked into, they must be considered in context. In this sense, they have to be central for survival, major goal attainment, and common across large groups of individuals (Hobfoll et al., 2018). The main proposition of the Conservation of Resources model engenders four principles.

First, the primacy of loss principle (*principle 1*) states that resource loss is more salient than resource gain, which essentially means that when resources are threatened or exhausted, this will have a stronger impact on increasing stress than resource gain on reducing stress.

Second, the resource investment principle (*principle 2*) argues that people must invest resources to protect themselves against resource loss, recover lost resources, and gain new resources. This principle suggests that resources can either be depleted, or recovered and created as long as people have sufficient resources to do so. Third, the gain paradox principle (*principle 3*) states that resource gain is more salient in contexts of resource loss. This means that when resources are being lost, gaining resources is more important and hence resources become more valuable. Finally, the desperation principle (*principle 4*) claims that when resources are outstretched and exhausted, people enter into a defensive mode to preserve what little is left. This means that when people feel that they do not have enough resources to invest, they might withdraw their efforts to protect themselves, act aggressively, or become irrational (Hobfoll et al., 2018).

Finally, the third theoretical model commonly used in breaks research is the ***Ego Depletion Theory***. Ego Depletion, similar to Conservation of Resources, is also a resource-based approach, suggesting that there is only one relevant well-defined resource that people draw from to perform different tasks: the Self (Baumeister et al., 1998). The Self is conceptualised as a muscle that is 'flexed' every time people exert any act of self-regulation, such as deciding what to eat or suppressing negative emotions at work (Baumeister et al., 1998). In the same way as muscles can get fatigued when overused, the Self can get exhausted if used frequently or intensively (Baumeister et al., 1998). When the Self is exhausted, people become unable to regulate themselves, thus abandoning the task at hand in pursuit of something less taxing to do (Baumeister et al., 1998). To restore the Self, people usually have to either momentarily stop its consumption and allow for its natural restoration or engage in activities that elicit positive emotions as these activities both limit the strain of the Self and have also the potential to restore it (Fredrickson, 2004; Tice et al., 2007). However, Ego Depletion Theory has recently come under intense scrutiny because the primary empirical findings have failed to

replicate when studied rigorously, which has also led to criticism of the conceptual definition (Hagger et al., 2016; Lurquin & Miyake, 2017).

The three aforementioned theoretical frameworks are the ones that are most commonly applied in recovery research. However, there is a number of other frameworks that also attempt to explain how people in general, and workers in particular, unwind from effort. In general, all frameworks have in common the idea that to recover, the effort that led to the exhaustion has to cease. For example, the Attention Restoration Theory (ART, Kaplan, 1995) proposes that attention is a limited resource that gets gradually depleted when used. When attention is not in use, it gets gradually recovered. According to the Attention Restoration Theory, one effective way to restore attentional resources is through exposition to nature, as nature is 'easy to watch', thus stopping resource consumption (Kaplan, 1995). As an example of this line of research, Lee and colleagues (2015) found in an experiment that when participants are exposed to 'green images' (e.g., forest) during a break, as opposed to 'grey images' (e.g., buildings), they perform better in attentional tasks after the break. Regardless of the theoretical approach, recovery research proposes that to restore the resource reservoir, it is important to stop tapping into that reservoir (Sonnentag et al., 2017). In the context of work, this means that to restore work-relevant resources, it is important to stop consuming those resources for a period of time.

2.2.1.1 Application of theoretical framework to recovery research

Drawing on the Effort-Recovery Model, Conservation of resources, and Ego Depletion Theory, the recovery process has been conceptualised as a dual process (Bennett et al., 2017; Steed et al., 2019). On one hand, workers have to engage in activities and experiences that allow for unwinding and natural resource restoration. On the other, workers can engage in activities and experiences that may drain resources but will help speed resources restoration or create new ones, thus having an overall positive balance on well-being and performance. Based

on this, Sonnentag and Fritz (2007) defined four recovery experiences that explain recovery processes and, it can be noted that a key feature of these recovery experiences is the need to engage in non-work experiences as they allow for resource restoration. *Psychological detachment* refers to being mentally disengaged from work, namely, not thinking about work while not working; *relaxation* refers to engaging in leisure and low-activated activities while not working, namely, engaging in activities that foster low energy positive affect; *mastery* refers to learning new skills that are unrelated to the work to gain new resources, like, for example, learn to play a musical instrument; *control* refers to the degree of agency that workers have over their leisure time. More recent approaches sometimes consider other recovery experiences, such as *relatedness* (i.e., engaging in pleasant social activities), however, the four initial recovery experiences have usually shown the most consistent effects on recovery (Sonnentag et al., 2017). Importantly, people usually engage in a combination of recovery experiences while not at work (Bennett et al., 2016).

Overall, past meta-analytical studies have shown consistent positive effects of recovery experiences on employee-related outcomes (e.g., well-being) across multiple research designs, such as cross-sectional, longitudinal, daily diary studies, and experimental research (Bennett et al., 2017; Steed et al., 2019; Wendsche & Lohmann-Haislah, 2017). Further, consistent with the dual processes described above, Bennett and colleagues (2017) found in their meta-analysis that relaxation and psychological detachment were more strongly related to unwinding and restoration processes while mastery and control were more strongly related to acquisition of resources.

Among the four recovery experiences, psychological detachment has been described as fundamental to trigger the recovery processes (Bennett et al., 2017; Sonnentag & Fritz, 2015; Wendsche & Lohmann-Haislah, 2017). Specifically, Sonnentag and Fritz (2015) argued in their review that psychological detachment both mediates and moderates the relationship

between job demands and impaired well-being. According to the ERM, COR, and EDT described above this is because, for recovery to happen, the events that led to increased fatigue and reduced resources need to be removed to initiate recovery, namely, the job demands. Indeed, Bennett and colleagues (2017) found in their meta-analysis that when comparing the four recovery experiences and their relationship with fatigue, psychological detachment had the strongest effect.

To sum up, this section aimed to provide an overview of the main theoretical arguments that guide recovery research in general, and breaks as recovery opportunities in particular. In terms of breaks research, most studies argue that engaging in non-work related activities fosters well-being and performance because they help the person to relax, restore the self, prevent resource consumption, and foster resource acquisition (e.g., Bosch et al., 2017; Hunter & Wu, 2016; Trougakos et al., 2008; Zhu et al., 2018). The next section reviews the empirical evidence for this perspective about work breaks and raises unresolved issues that will be analysed in more detail in the following section.

2.2.2 Empirical research about breaks as recovery opportunities

Studies about breaks that draw on recovery perspectives fall into two broad categories. The first set of studies pertains to the question of why employees proactively engage in breaks while at work. Some argue that breaks can serve as energy management strategies, in that when employees feel fatigued or low on energy, they take breaks to help them keep vigorous and energetic at work (Fritz et al., 2011; Op den Kamp et al., 2018). As such, the main motivation for taking breaks from this perspective is thought to be the need to rest, reduce fatigue, and increase energy (Bosch & Sonnentag, 2019; Zhu et al., 2018). An early study with a student

sample supports this idea, finding that one of the most common reasons for students to take breaks from studying is fatigue (Strongman & Burt, 2000).

The second group of studies tries to understand why breaks are effective. In general, two approaches are taken: an activity-approach and a process-approach. The activity-approach focuses on the specific activities that workers do while on breaks and how these relate to employee-related outcomes. In an initial cross-sectional study, Fritz et al. (2011) explored how workers can engage in different strategies while at work to help them stay energetic throughout the workday. One of the strategies they explored is what they called micro-breaks (i.e., short interruptions of the work usually lasting less than 5 minutes). They found that when taking micro-breaks, most employees would address some sort of physiological need such as drinking water, going to the bathroom, or eating snacks. Surprisingly, micro-breaks were associated with increased fatigue, contrary to what was expected (Fritz et al., 2011). Building on this study, and considering that cross-sectional designs are suboptimal to establish causality, Zacher et al. (2014) conducted a diary study to better understand the momentary effect of micro-breaks on vitality and fatigue. In addition to the different research designs, they also grouped different activities into broader categories to understand their joint effects. These categories were: private activities (e.g., check personal messages), prosocial activities (e.g., show gratitude to someone at work), organising (e.g., make a to-do list), and reflecting on the meaning of work. They found that, at the daily level, engaging more in micro-breaks in general, and prosocial and reflection activities, in particular, was related to increased levels of vitality after the break. These studies support the idea that certain activities are better than others at fostering the recovery of energy.

Although the activity-approach described in the previous paragraph has informed the understanding regarding what workers do during their breaks, it has also been critiqued because knowing which activities foster recovery is not the same as knowing *why* those activities

promote recovery processes, well-being, and performance (Bosch et al., 2017; Sonnentag et al., 2017). This question has been scrutinised from a process approach. In one of the first studies that took a recovery perspective to understand the underlying mechanisms that explain break effectiveness, Trougakos et al. (2008) drew from Ego Depletion Theory to argue that when employees engage in activities that they prefer during breaks, as opposed to chores, break effectiveness will be maximised. This is because preferred activities during the break are not self-regulated, and this should stop the consumption of the Self while also eliciting positive affect (Trougakos et al., 2008). Importantly, experiencing positive affect during the break fosters recovery, well-being, and performance after the break (Tice et al., 2007; Trougakos et al., 2008). In contrast, Trougakos et al. (2008) argued that engaging in chores during breaks requires extra effort to focus on the task at hand (e.g., going to the bank, or plan a family event). This should continue to exhaust workers because it requires more self-regulation, resulting in lower levels of well-being and worse performance after the break. In support of their hypotheses, they found that engaging in preferred activities during breaks was related to increased positive affect and positive affective displays in a service-related job. In contrast, engaging in chores during breaks was related to increased negative affect after the break but unrelated to any form of affective display due to, probably, affect regulation strategies (Trougakos et al., 2008). Therefore, they concluded that breaks have the potential to be effective because they help to restore and protect the Self as long as the activity that is being done during the break is preferred.

Building on Trougakos et al. (2008)'s empirical study and Trougakos and Hideg (2009)'s theoretical presentation, as well as the theoretical frameworks presented above, other scholars aimed to replicate and expand our knowledge of breaks at work. For example, some studies have shown that workers experience increased levels of energy, motivation, and concentration after the break when they engaged in preferred activities during breaks (Hunter

& Wu, 2016), consistent with Ego Depletion and Conservation of Resources theories. Moreover, a field experiment conducted over four weeks showed that engaging in breaks, as opposed to not engaging in breaks, increases resources in the form of positive affect after the break (Steidle et al., 2017). Further, and consistent with the upward spiral of resources proposed by Conservation of Resources, those in the experimental group in this field experiment (i.e., having breaks) reported an increase in their general baseline level of resources when comparing pre- and post-intervention resource levels (Steidle et al., 2017)s. This essentially means that engaging in breaks increases personal resources and this effect seems to be long-lived.

When studying specific recovery experiences during breaks, such as relaxation, psychological detachment, enjoyment, and relatedness during breaks, it is observed that they relate to increased well-being, performance, concentration, self-efficacy, and feeling recovered (Bosch et al., 2017; Kim et al., 2017, 2018; Sianoja et al., 2017). Further, recovery experiences during the break also buffer the negative consequences of job demands on well-being because they allow for fatigue reduction and resource restoration (Bosch et al., 2017; Kim et al., 2017, 2018; Sianoja et al., 2017). For example, Bosch and colleagues (2017) conducted a diary study and found that engaging in relaxation during breaks is associated with feeling recovered after the break.

Expanding on the above empirical evidence, some have argued that the context in which breaks are taken also shapes break effectiveness (Venz et al., 2019). In particular, experiences of autonomy to decide what to do during breaks has been found to be essential, as this experience can either increase break effectiveness or completely thwart it. When workers have autonomy over their breaks, they can tailor them to address their specific needs (Venz et al., 2019). This is because they will be able to engage in breaks that restore the specific resources that they have already exhausted or will need in the future (Venz et al., 2019). On the contrary,

lack of autonomy over breaks can turn them into harmful experiences because workers will need to engage in more self-regulation processes, which will exhaust the Self and lead to higher fatigue levels (Trougakos et al., 2014). For example, having lunch with colleagues should be beneficial for well-being because social breaks foster the experience of relatedness, and this is usually a positive experience (Deci et al., 2017; Quinn et al., 2012). Notwithstanding, this only occurs if employees have high levels of autonomy over their breaks. Otherwise, social breaks are associated with more fatigue at the end of the day because, due to social norms, employees have to self-regulate to seem friendly even if they do not want to be there, thus exhausting the Self and increasing fatigue (Trougakos et al., 2014).

Who is present during the break also has the potential to shape break effectiveness (von Dreden & Binnewies, 2017). For example, when lunch breaks are taken with colleagues, workers usually talk about both personal issues and work-related topics (von Dreden & Binnewies, 2017). In contrast, when supervisors are present during lunch breaks, conversations usually are about work-related issues and this impairs experiences of psychological detachment (von Dreden & Binnewies, 2017). Nevertheless, and contrary to what one would expect from a recovery perspective, lower levels of psychological detachment during lunch breaks is not associated with lower levels of energy, and in fact, having lunch with supervisors is related to experiencing higher levels of energy after the break (von Dreden & Binnewies, 2017). Moreover, having lunch with supervisors is also associated with higher levels of fatigue at the end of the day, suggesting a steeper resource decline compared to having lunch with just colleagues (von Dreden & Binnewies, 2017). From this review, it is possible to argue that the context of the break (e.g., with whom the break is taken, and the boundary conditions of the break) is as important as the activities workers engage in during the break.

Overall, empirical research on breaks as recovery opportunities has shown that recovery mechanisms can explain the effects of breaks on different employee outcomes, such as energy,

fatigue, and performance. In particular, momentarily stopping work in the form of breaks and engaging in non-work-related tasks and recovery experiences is usually related to higher levels of resources and lower levels of fatigue, consistent with the Effort-Recovery Model, Conservation of Resources, and Ego Depletion Theory. Nevertheless, there are still some unresolved issues that warrant further examination. In fact, some empirical studies find results that are inconsistent with the recovery thesis, suggesting that, although recovery could be a useful theoretical lens to understand breaks, this picture is partial. These issues are raised in the following section with the corresponding empirical evidence.

2.3 Unresolved issues in breaks research

In the previous section, I outlined the recovery perspective on breaks which asserts that workers primarily take breaks in order to rest and manage their levels of energy and resources. However, supporting empirical evidence for that assertion typically comes from student samples and when applied to organisational settings support is lacking. Neither increased fatigue nor reduced vitality strongly predicts whether workers take breaks or not (Zacher et al., 2014), and a study examining break antecedents found that need for recovery (i.e., a subjective state of needing rest) was also unrelated to taking breaks (Bosch & Sonnentag, 2019). In contrast, the dislike of the task being performed before the break and wanting to get a reward seem to predict taking a break (Bosch & Sonnentag, 2019). In trying to make sense of these results, Bosch and Sonnentag (2019) proposed that the need for recovery is a state that unfolds over time and cannot be fully addressed while at work, therefore even if employees feel fatigued, they will not take breaks because ‘they know’ it is better to continue working and then go home. Therefore, needing rest apparently may not be the key reason why employees decide to take a break. If this is the case, then the question of what motivates workers to take breaks remains unanswered.

A further assumption of the recovery perspective is that breaks are effective because workers engage in non-work related activities and recovery experiences to restore previously spent resources and unwind from job demands (Sonnentag & Fritz, 2015). However, research on work-related rumination during- and after-work hours suggests that this may not always be the case. Cropley and Zijlstra (2011) differentiated between two types of work-related rumination: affective rumination (i.e. intrusive and reiterative negative thoughts about work events) and problem-solving pondering (i.e. mental scrutiny about work-related problems). They proposed that affective rumination is negatively related to well-being because it prolongs negative affective experiences and that, under certain conditions, problem-solving pondering can promote well-being because it prevents affective rumination and facilitates finding solutions to work-problems (Cropley & Zijlstra, 2011). For example, when studying after-work recovery experiences, Bennett et al. (2016) found that workers who typically engage in relaxation together with work-related problem-solving pondering during the non-working time also report higher levels of well-being. These results have been replicated with different research designs and samples (e.g., Firoozabadi et al., 2018b; Kinnunen et al., 2017). Some studies have even found that problem-solving over time promotes work-related creativity and that this, in turn, promotes recovery processes in the future, suggesting that recommending workers to stop thinking about work to improve recovery and well-being is too simplistic (Vahle-Hinz et al., 2017). The idea that thinking about work outside of work may be beneficial is not new, and is, in fact, a well-known phenomenon in mind-wandering research (McMillan et al., 2013).

Although most research on work-related rumination has focused on rumination after working hours, there is evidence that employees engage in similar cognitive processes while at work and that this is not necessarily harmful (Berman & West, 2007; von Dreden & Binnewies, 2017). For example, Berman and West (2007) reported that some employees decide to take a

break from their current tasks to gain distance and reflect on how to better perform them. Importantly, Berman and West (2007) do not find either *a negative nor positive relationship* between thinking about work during breaks and well-being. Other studies have also found that pondering about work *after* work is either unrelated to well-being impairment (e.g., Cropley et al., 2012; Firoozabadi et al., 2018a; Hamesch et al., 2014; Querstret & Cropley, 2012) or beneficial for well-being (Firoozabadi et al., 2018b; Vahle-Hinz et al., 2017).

Further, research on recovery experiences during breaks shows that psychological detachment is not only difficult to attain (von Dreden & Binnewies, 2017), but a lack of detachment during breaks does not necessarily impair employee well-being or being recovered after the break (Bosch et al., 2017; de Jonge, 2019). As mentioned above, these results seem to contradict one of the main propositions of recovery research: disengaging from work during non-working leads to positive work-related outcomes and engaging in work-related activities during resting times prevents workers from unwinding from job demands, which impairs well-being. However, engaging in *some* work activities during resting time does not seem to be harmful, and it could even be beneficial. If work-related behaviours, which necessarily impede recovery are not always harmful, and can even be beneficial for employee-related outcomes, then recovery might not be the only theoretical lens through which break effectiveness can be studied. In other words, evidence from work-rumination problematises the importance of psychological detachment during non-working time by showing that thinking about work during non-working time does not always lead to negative employee-related outcomes. Therefore, it can be argued that although the recovery process can explain some empirical results observed in breaks research (e.g., relaxation during breaks associated with increased well-being after the break), this picture is partial as other processes seem to be at play. Thus, it is important to understand these 'other processes' that may be at play during breaks to provide

better recommendations as to how workers may use the break as a tool to maintain and improve their well-being.

There is a third issue regarding breaks research that has seldom been discussed, namely how breaks relate to other events at work. This is surprising considering that breaks as recovery opportunities were originally proposed as rest periods that exist in between different performance episodes (Beal et al., 2005; Trougakos & Hideg, 2009). A performance episode is a work event that has a clear beginning and an end and clear goals that differentiate an episode from other episodes (Beal et al., 2005; Zijlstra et al., 2014). One issue with breaks research is that scholars do not consider what has been done before the break (Zhu et al., 2018) and this is problematic because different events require different skills, resources, and affective dispositions (Beal et al., 2005). As an example, and based on the notion of person-break fit explored by Venz et al. (2019), it can be argued that the reasons for taking a break after a very emotionally demanding task, and the effectiveness of break activities, may not be the same as taking a break after simple boring tasks.

In addition, most research on breaks as recovery opportunities focuses on a break as a response to work activities by assuming that employees work, get exhausted, and take a break to unwind to continue to be effective at work. However, this may not always be the case, as research on anticipation, coping, and prospective thinking suggests that employees may anticipate workload and upcoming tasks, and engage in behaviours that might help them to better cope with these tasks (Casper & Sonnentag, 2020; DiStaso & Shoss, 2020; G. Feldman & Hayes, 2005; Kvavilashvili & Rummel, 2020). Moreover, in the same way that past performance episodes require different skills and affective dispositions, future performance episodes will also require specific resources, skills, and affective dispositions. For example, there is an association between experiencing high activated positive affective states (e.g., enthusiasm; Warr, 1990) and high levels of creative performance (e.g., coming up with new

and novel ideas that are useful; Amabile et al., 1996) (Warr et al., 2014). In light of this, some argue that scholars should consider breaks and their benefits in light of the performance episodes that follow the break (Bosch & Sonnentag, 2019; Kim et al., 2018).

Importantly, some researchers have also challenged the current notion of recovery entirely, arguing that recovery, as it is currently understood (i.e., unwinding from job demands), is inaccurate (Zijlstra et al., 2014). This is because recovery is usually studied as a static phenomenon as opposed to a dynamic one, and lack of job demands does not necessarily lead to the onset of the recovering process. In the context of breaks, Zijlstra et al. (2014) argue that recovery may not even be plausible, as complete disengagement from work while at work is often not possible and could even be undesirable. Zijlstra et al. (2014) suggest that to better understand the recovery process, researchers should draw on self-regulation theories to understand how recovery occurs. In their words, "recovery is the continuous process of harmonizing the 'actual state' with the 'required state'" (p. 250). The required state refers to the required arousal level for the specific event that is being performed and it depends on different features such as difficulty and motivational pull of the episode (Beal et al., 2005). In turn, the actual state refers to the person's arousal level and it depends on the time of the day (i.e., circadian rhythm), required state of the previous episode, and resource reservoir, among other aspects.

The definition of recovery proposed by Zijlstra and colleagues has two implications. First, it suggests that there is an optimal state for performing a task in terms of energy, affective dispositions, and motivations, and that it might sometimes differ from the actual state workers are currently experiencing. When deviations from this optimal equilibrium take place, efforts must be made to match them, otherwise, the mismatch between actual and desired state may increase fatigue levels and disturb performance in a given episode. These regulation efforts might come from downregulating or upregulating arousal levels to match the desired state

(Zijlstra et al., 2014). The second implication of this definition is that it suggests that break effectiveness depends on what is required after the break. As an example, imagine someone who has been performing a task that requires high levels of arousal and expects to perform a similar task after a break. Engaging in break activities that down-regulate arousal levels (e.g., relaxation, psychological detachment) could be detrimental for two reasons. First, the downregulation requires some effort, which will exhaust resources. Second, after the break, the individual will need to upregulate their arousal level to achieve the desired state. In this scenario, a break that maintains the arousal levels may actually be more effective.

In sum, the recovery perspective has proved useful in understanding break processes and effectiveness but it fails to account for numerous other findings. First, workers may not take a break solely due to fatigue. Second, recovery processes may not be entirely able to explain consistently why breaks are effective. In fact, recovery may not even be possible while at work because the complete removal of job demands is not possible or desirable. Third, break effectiveness may be a function of the work tasks before and after the break, together with what workers do during the break, as opposed to simply a process of resource restoration. For all of this, and drawing on Beal et al. (2005), I propose an 'Episodic Model of Work Breaks'. In this model, I position breaks as events that occur in between other performance events. Moreover, what workers do during breaks and break effectiveness in promoting positive employee outcomes is a function of what workers have done, what they expect to be doing, and, at a later stage, what they actually do after the break.

Chapter 3
The Episodic Model of Work Breaks

In this chapter, I describe the Episodic Model of Work Breaks which was developed to address the limitations of breaks research that were identified in the previous chapters. In short, these limitations are the failure of the recovery perspective on breaks: 1) to fully explain why workers take breaks; 2) to consider the full range of behaviours that workers engage in during breaks; 3) to consider breaks within the broader flow of work tasks, i.e., the tasks occurring before *and* after a break.

The chapter is structured as follows. First, the main theoretical framework that guides this model, the Episodic Performance Model (Beal et al., 2005), is discussed. Second, I present the Episodic Model of Work Breaks and explain the theoretical rationale behind it. Here, I explain its components, the relationships that guide this model, and how it addresses the identified issues. The chapter finishes with the specific research questions that will be addressed by each empirical study.

3.1 An episodic model of performance

The episodic model of performance proposes that a workday is organised in "relatively short episodes thematically organized around work-relevant immediate goals or desired end states" (Beal et al., 2005, p. 1055), which are called performance episodes. These episodes are different from other work-related subdivisions, such as tasks, in that episodes are time bounded. While employees can always return to a previous task (e.g., writing a manuscript), they can never return to a previous performance episode (e.g., writing a section of the manuscript before lunch). This is because, for example, one can never write the same section of a manuscript from scratch again, as available resources are unlikely to be the same, some insights have already

been gained, and affective experiences will differ across different episodes within the same task (Beal et al., 2005). Moreover, a task can be completed across multiple performance episodes. Imagine reading a journal article (the task), where you divide the subsections into reading the theoretical framework (first performance episode and goal) and reading the rest of the paper (second performance episode and goal). Alternatively, reading the journal article (task 1) and summarising it (task 2) could be a single performance episode. Regardless, the key aspects of a performance episode are that it has a clear goal and all the tasks that are in it are thematically relevant to that goal.

According to Beal and colleagues (2005), one of the key determinants of performance in a given performance episode is the capacity to regulate one's attention to the task at hand to achieve the performance goal. The best performance occurs when an employee can completely devote all their attentional resources and effort to perform the task (Beal et al., 2005). Attention regulation in an episode is a function of the task-specific attentional pull (i.e., motivation with a task), the off-task attentional demands (i.e., other things that demand people's attention), and the available regulatory resources (i.e., the degree to which people can force their focus on said task). In essence, if the task is engaging, individuals will need less effort to regulate their attentional focus. In contrast, if other demands pull the attention (e.g., planning an upcoming vacation), employees will need to exert extra effort to regulate their attention towards their current task. Regardless of the degree of regulation requirements, employees need to have enough regulatory resources at hand to be able to self-regulate their attentional focus (Beal et al., 2005).

Furthermore, performance episodes elicit emotions such as joy, anxiety, boredom, or calmness (cf. Weiss & Cropanzano, 1996), and these emotions directly influence the task and off-task attentional pull and available resources (Beal et al., 2005). If employees find a performance episode appealing (i.e., it generates positive affect), it will generate a natural

attentional pull, thus consuming fewer resources (Elliot et al., 2013). On the contrary, if employees dislike a performance episode (i.e., it generates negative affect), it will not have that natural pull, therefore workers will need to exert extra effort to focus during that performance episode, thus exhausting more resources (Harmon-Jones et al., 2013).

Past and future performance episodes also generate such influences (Beal et al., 2005). For example, if a past performance episode generated a strong negative affective reaction, workers are likely to think about it, thus diverting the attention from the current performance episode. On the contrary, if employees expect to engage in an interesting or stressful performance episode after the current performance episode, their minds may naturally wander towards it, either in anticipation or dread. Both situations will result in a stronger off-task attentional pull. Importantly, attention regulation is a limited resource in that people cannot focus on everything at the same time and sustained attentional effort is exhausting (Beal et al., 2005; Qi et al., 2019). This means that the amount of attention workers can devote to a given performance episode depends on the affective reaction that the specific performance episode elicits, the affective reaction that past and future performance episodes generate, and the extent to which workers have already engaged in self-regulation.

The above arguments suggest that looking at performance episodes in isolation can be a problematic perspective. This is because there are many external influences on the current performance episode that can influence the performance in that specific performance episode. This constitutes the cornerstone of the Episodic Model of Work Breaks, namely that both past and future performance episodes can influence how workers behave in the *current performance episode*. A key implication is that past and future performance episodes may influence whether employees take breaks, what they do during breaks, and how effective breaks are.

3.2 An Episodic Model of Work Breaks

In this section, I describe the Episodic Model of Work Breaks, which is depicted in Figure 3.1. The figure shows that previous and anticipated performance episodes exert an influence on the worker's decision to take a break and on the decision to engage in different break behaviours. Further, the break behaviours are related to employee well-being and performance in the following performance episode, but this relationship is moderated by the fit between the workers, the task, and the specific break behaviour. The Episodic Model of Work Breaks attempts to solve the theoretical problems identified in breaks research in three ways. First, the model utilises a dual pathway explanation of *why workers take breaks:* workers decide to engage in breaks either because of the previous performance episode or because of the performance episode that they anticipate in the future. Second, it also accounts for *what workers do during breaks* by identifying three groups of break behaviours (physiological behaviours, disengagement behaviours, and task engagement behaviours). Third, the model proposes that break effectiveness is a function of what workers do during breaks and the performance episode that takes place right after the break. Here, I draw from fit models to argue that break behaviours positively influence post-break outcomes when congruent with post-break requirements.

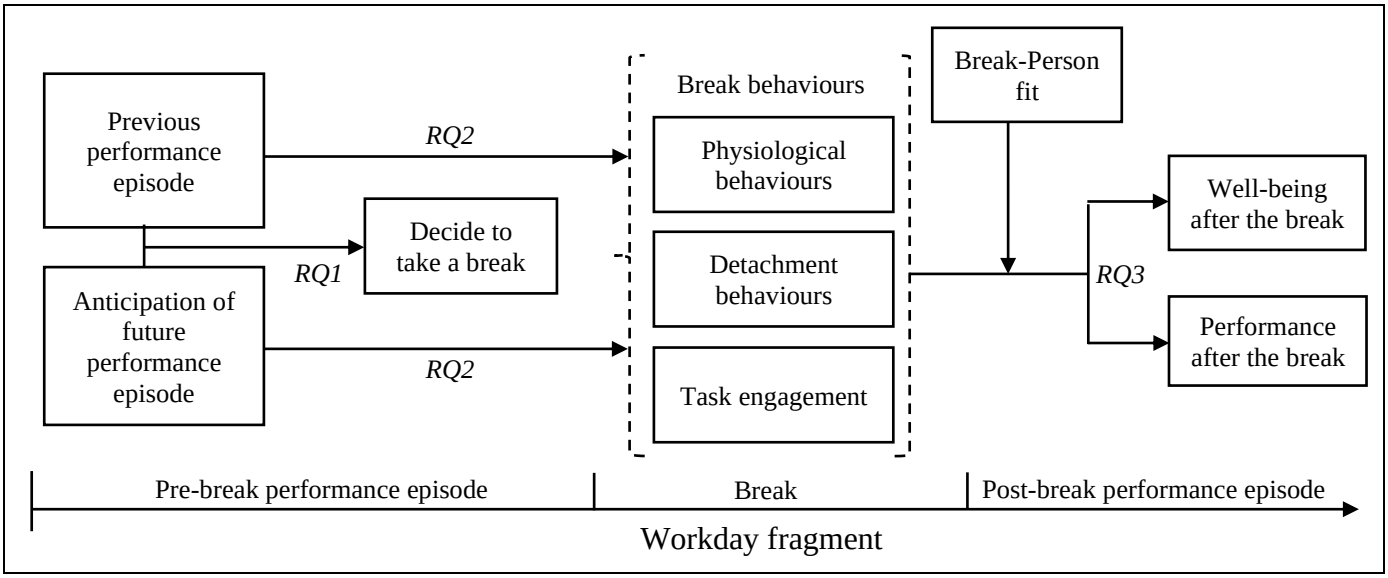

Figure 3.1. The Episodic Model of Work Breaks.

3.2.1 Why do workers take breaks?

As was previously outlined, the assumption that workers only take breaks in order to recover is questionable. For example, Bosch and Sonnentag (2019) found that the need for recovery was not associated with taking a break whereas wanting to reward oneself after finishing a disliked task was. To explain these results, in the Episodic Model of Work Breaks I propose a dual pathway that determines whether employees take breaks from work or not. The first path is reactive and represents the motivational influence of the current (or pre-break) performance episodes. The second path is proactive and concerns the motivational influences of anticipated post-break performance episodes. This section only offers insights when employees have sufficient autonomy to decide when to take breaks, and for self-initiated breaks. This is because when there are external forces that make workers take breaks, such as enforced mid-shift lunch breaks, this dual process is likely to have less influence on whether employees take breaks or not.

3.2.1.1 Reactive motivations for taking breaks

Bosch and Sonnentag's (2019) study provides important insights to understand reactive motivations for taking breaks. In their study, they proposed a dual mechanism that explains why workers take breaks. On one hand, workers take breaks as opportunities for self-reward, in which case breaks are considered as means to experience positive affect at work. On the other hand, workers take a break to address an emerging need for recovery and combat fatigue levels in which case breaks are considered recovery opportunities. Furthermore, Bosch and Sonnentag (2019) attempted to understand which job experiences may predict either need for recovery or desire for self-reward. They focused on task aversiveness as a negative work experience and satisfaction with one's performance as a positive work experience.

To test their hypotheses, Bosch and Sonnentag (2019) conducted an event reconstruction study. In this study, participants had to list all the performance episodes they engaged in during a day over five working days. Then, for each day, participants were requested to describe in detail one performance episode that was selected at random to make it salient. Then a survey concerned with this specific performance episode was presented, including measures of need for recovery, desire for self-reward, task aversiveness, and satisfaction with one's performance. Although this study suffers from many biases that inhibit causal estimation, such as common method bias and endogeneity, it is one of the few studies that attempts to understand why workers take breaks.

Bosch and Sonnentag (2019) found that a core predictor for taking breaks is a desire for self-reward. There was also an indirect effect, via desire of self-reward, of task aversiveness on taking breaks. Need for recovery and satisfaction with performance were unrelated with the mediators or the decision to take a break. From these results, Bosch and Sonnentag (2019) drew two conclusions. First, workers seem to take breaks because they feel they deserve a reward after completing a task that is disliked. Second, employees may not engage in micro-breaks for

recovery purposes as fatigue builds up over time and it can easily be carried over to future episodes.

Building on Bosch and Sonnentag's (2019) results, I propose that any form of negative task experience that elicits negative affect may prompt workers to take breaks as an attempt to improve their mood. In this sense, in addition to recovery opportunities, reactive breaks might act as emotion regulation strategies[1]. This conceptualisation of reactive breaks explains why, for example, fatigue experienced as a low-energy negative affective state (Warr, 1990) is often cited as a precursor to taking breaks but need for recovery, an emerging state that results from fatigue and precedes recovery (Sonnentag & Zijlstra, 2006), is not. Specifically, fatigue is one way to explain why workers take breaks but following an emotion regulation perspective opens a myriad of other precursors of breaks. For example, workers may take a break because they experience a work event that made them feel angry or frustrated and they just want to disengage from work, vent to a colleague, and try to feel better.

Past results on recovery experiences during breaks support the emotion regulation perspective on breaks. For example, psychological detachment from work is considered the key recovery experience to help unwind from work and recover exhausted resources (see Bennett et al., 2017; Sonnentag & Fritz, 2015; Steed et al., 2019). Nevertheless, psychological detachment from work during breaks is mostly unrelated to post-break outcomes (Bosch et al., 2017; de Jonge, 2019; Kim et al., 2017), unless enjoyment (i.e., experiences of positive affect) is crucial to the activity that is performed to detach from work, for example, reading a book for fun during a short break at work (Kim et al., 2018). In contrast, relaxation defined as a low-effort positive experience (Sonnentag & Fritz, 2007) has shown the most consistent positive effects on post-break outcomes (Bosch et al., 2017; Kim et al., 2017, 2018). This may be

[1] Emotion regulation refers to a process in which individuals engage in a series of strategies to modify their affective reaction to an event (Gross & Thompson, 2007)

because relaxation measures commonly used in breaks research (i.e., the recovery experience questionnaire; Sonnentag & Fritz (2007)) combines recovery processes with experiences of positive affect. Therefore, based on Bosch and Sonnentag's (2019) results, considering reactive breaks as emotion regulation strategies in addition to recovery opportunities could provide a more nuanced understanding of the process of the break.

For the Episodic Model of Work Breaks, Bosch and Sonnentag's (2019) results, together with the results concerning psychological detachment and relaxation during breaks, have two significant implications. First, past performance episodes *do* influence workers' decisions to take breaks, such that workers who finish a task that they dislike will be more likely to take a break. Second, recovery processes may not be the only mechanism that explains why workers take reactive breaks. Specifically, a desire of self-reward as an emotion regulation strategy that fosters positive affect and improve one's mood could be an alternative mechanism.

3.2.1.2 Proactive motivations for taking breaks

There is little direct empirical evidence that may be drawn from breaks research to understand proactive motivations for taking breaks. Nevertheless, workload anticipation research and coping theories provide theoretical arguments to propose that what workers expect to be doing later in the workday will indeed influence whether they take a break.

From a workload anticipation perspective, researchers have recognised that workload is a constant ebb and flow of different performance episodes that vary in difficulty (DiStaso & Shoss, 2020). Workers are not only able to recognise different performance episodes (Merlo et al., 2018), but also anticipate the levels of workload and stress that future performance episodes will impose on them (Casper et al., 2017). This workload anticipation can occur both at the daily level (Casper & Sonnentag, 2020) or in the long term (DiStaso & Shoss, 2020).

Workload anticipation has the potential to shape employees' reactions to work demands and the impact of those demands on employee well-being and performance (Brodsky & Amabile, 2018; Casper et al., 2017; Casper & Sonnentag, 2020; DiStaso & Shoss, 2020). For example, workers who anticipate idle time in the future may reduce their work rhythm to fill the void and reduce the idle time (Brodsky & Amabile, 2018). Further, there is an interaction between the current workload and anticipated future workload such that when the current workload is low, and the anticipated workload is high, current levels of emotional strain increase (DiStaso & Shoss, 2020). In contrast, when employees anticipate that workload will decrease in the future, there is no influence of workload on emotional strain (DiStaso & Shoss, 2020). At the daily level, worrying during the evening about the next day's workload is related to higher levels of exhaustion, especially when high levels of workload are anticipated (Casper & Sonnentag, 2020). These examples show that employees do anticipate their workload and this anticipation shapes their current behaviours.

Coping theories state that employees usually engage in different strategies to address stressful situations (Lazarus & Folkman, 1984). Coping is a conscious act to reduce stress reactions as a result of aversive conditions that can either be from the environment or psychological processes. This act can be either emotion-focused or problem-focused. Emotion-focused coping refers to focusing on one's affective experiences to try to address and reduce the anxiety that is elicited by specific events (Lazarus & Folkman, 1984). This form of coping usually emerges when individuals believe that *nothing can* be done to modify the harmful or challenging environmental condition (Lazarus & Folkman, 1984). Examples of emotion-focused coping strategies are cognitive reappraisal (i.e., change the meaning of an event), selective attention (i.e., focusing one's attention *away* from stressful events), just to name a few (Gross, 2013; Lazarus & Folkman, 1984). Problem-focused coping refers to an objective, analytic process of modifying an environment that is perceived as stressful, and usually

emerges when there is a belief that the environment *can* be modified (Lazarus & Folkman, 1984). An example of this is thinking about possible solutions to work problems.

Importantly, coping can target events that are happening right now, or events that may happen in the future (Lazarus & Folkman, 1984). This future-oriented coping strategy is named anticipatory coping and targets events that have not occurred yet but are appraised as potentially problematic to people's current goals (Lazarus & Folkman, 1984). During an anticipatory stage, the cognitive appraisal process evaluates whether an event can be prevented, minimised, postponed, or endured before *the impact* of the event (Lazarus & Folkman, 1984).

Past research suggests that employees engage in anticipatory coping strategies when they believe that their resources are not sufficient to cope with future demands (Monat et al., 1972; Vassilopoulos, 2008). At work, one such psychological aversive condition that warrants anticipatory coping is the anticipation of workload (Casper et al., 2017). For example, past research suggests that workers who anticipate high levels of workload are more prone to engage in problem-focused coping strategies, especially if they believe that stress can help individuals grow and develop (Casper et al., 2017).

By combining the insights of workload anticipation research (i.e., workers are able to recognise and anticipate changes in their own workload) and coping research (i.e., individuals engage in anticipatory coping strategies to reduce expected stress), one can derive that employees may engage in breaks as means of coping with the future workload. Specifically, employees may engage in breaks to prepare for future performance episodes in which they expect to perform complex or difficult, but manageable work. Alternatively, they may try to disengage from work as means to downregulate anxiety levels. This has two important implications. First, workers may take breaks because of what they anticipate being doing after a break. Second, the mechanism that explains why workers take proactive breaks can be

understood from an anticipatory coping perspective, namely, the reduction of negative affect that emerges from anticipated episodes.

3.2.1.3 Summary

Past research has argued that workers take breaks mainly for recovery purposes. However, combining breaks, emotion regulation, and coping research, I suggested a dual pathway that explains why workers take breaks. The two paths are depicted in Figure 3.2. In one path, employees may take reactively motivated breaks when they just finished a task that they dislike or which has caused fatigue. In this case, workers will take breaks as a self-reward to improve their mood or experience positive affect. In the other path, employees may take proactively motivated breaks when they expect to perform difficult tasks in the future. In this case, breaks will serve as an anticipatory coping strategy to ameliorate potential stress reactions that can occur in the future or to improve mood as a result of an expected negative performance episode. The dual pathway proposed here is theoretical, and most research focuses on what was defined as the reactive pathway. Consequently, there is no empirical evidence that suggests that workers can take breaks to proactively cope with anticipated performance episodes. Thus, it is not known whether there is such a thing a proactive pathway, or if one path is stronger than the other. Therefore, I propose the following first research question that emerges from the Episodic Model of Work Breaks:

Research Question 1: Why do workers take breaks? Is it because of what they have done, or is it because of what they expect to be doing after a break?

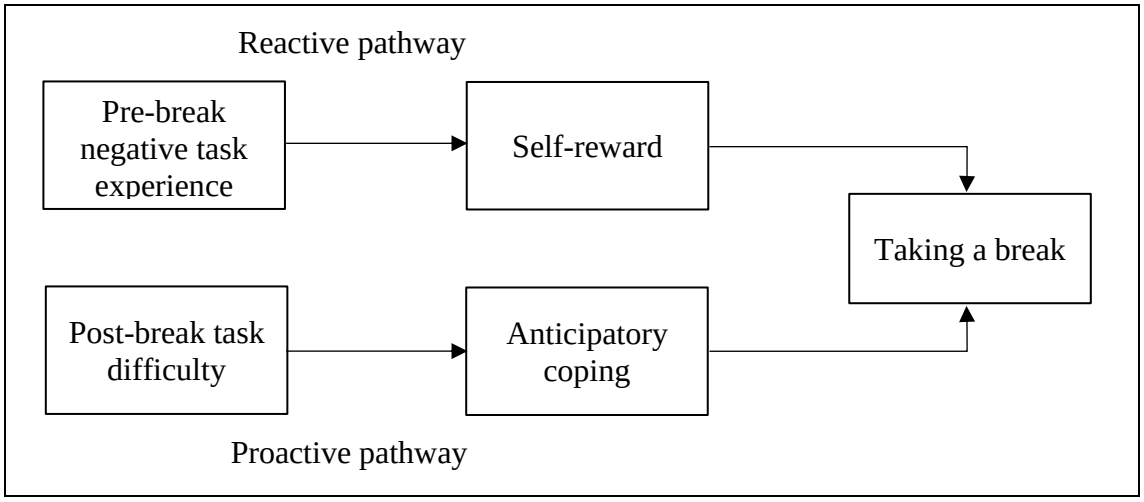

Figure 3.2. The dual pathway for taking breaks.

3.2.2 Break behaviours

In this section, I describe what workers do during breaks and why. As was previously outlined, employees engage in a variety of activities during breaks that lead to both positive and negative results for employees. Attempts have been made to understand what workers mostly do, finding that they usually address physiological needs (e.g., eating, going to the bathroom, drinking coffee), disengage from work (e.g., psychological detachment, engaging in relaxing activities), and mentally engage in work-related tasks (e.g., thinking about how to perform a task in the future) (e.g., Berman & West, 2007; Fritz et al., 2011; Strongman & Burt, 2000; Zacher et al., 2014).

I refer to the first set of behaviours as ‘physiological break behaviours’ since they address the essential functions needed for the correct behaviour of the physiological system. I refer to the second set of behaviours as ‘disengagement break behaviours’ since they imply stopping all work-related effort. I refer to the last set of behaviours as ‘task engagement break behaviours’ since they require some degree of effortful cognitive engagement with work-related tasks. In the following sections, I describe each one of these behaviours. Crucially, these break behaviours may be determined by the performance episodes that were completed

immediately before the break, or by what workers anticipate doing immediately after the break. I give examples of how this is the case.

3.2.2.1 Physiological break behaviours

In the Episodic Model of Work Breaks, physiological break behaviours are defined as behaviours that seek to address physiological needs such as drinking water or coffee, going to the bathroom, and snacking. According to previous studies, workers report engaging in breaks mostly for physiological reasons (Fritz et al., 2011; Strongman & Burt, 2000; Zacher et al., 2014). For example, in an early study Strongman and Burt (2000) discovered that the most frequent reason for students to take breaks from their studies was hunger and thirst. Studies in a working context have replicated this result, such that among the top five reasons for taking short breaks are drinking water, having a snack, going to the bathroom, and drinking caffeinated beverages (Fritz et al., 2011; Zacher et al., 2014).

Past studies have highlighted that when employees perform work-related tasks, physical energy is expended (Quinn et al., 2012). A good indicator of physical energy is glucose levels in the blood, and when glucose is low, employees may experience sluggishness and mental fatigue (Quinn et al., 2012). According to Trougakos and Hideg (2009), eating during breaks helps restore glucose which is essential to generate physical energy. Moreover, being able to address other physiological needs, such as going to the bathroom, is likely to prevent negative experiences. Thus, workers may be reactively motivated to take physiological breaks via the disliked path suggested by the Episodic Model of Work Breaks to reduce experiences of negative emotions, such as needing to go to the bathroom and fighting experiences of sluggishness at work. Alternatively, if workers expect high levels of demands in the future that will prevent them from satisfying their physiological needs, they may decide to fulfil those needs pre-emptively. For example, to have an early lunch or snack before a long meeting.

3.2.2.2 Disengagement break behaviours

In the Episodic Model of Work Breaks, disengagement break behaviours are defined as behaviours that aim to mentally and physically distance employees from their work. Most notably, research on breaks as recovery opportunities fall within this category, such that workers would engage in disengagement break behaviours to reduce negative activation that emerges from job demands (e.g., stress) and experience positive affect to improve one's mood. Examples of these types of behaviours are talking about hobbies with colleagues during lunch breaks (von Dreden & Binnewies, 2017), engaging in meditation or mind wandering during breaks (Blasche et al., 2018), or taking park walks during breaks (Sianoja et al., 2017).

There seems to be two functions of disengagement break behaviours. On one hand, they serve an unwinding purpose akin to recovery processes, process that is commonly studied in breaks research (Sonnentag et al., 2017; Trougakos & Hideg, 2009). On the other hand, disengagement break behaviours seem to be similar to emotion regulation strategies, in which workers engage in different behaviours to change or prolong the affective state that they are experiencing (Gross & Thompson, 2007). For example, workers may chat with colleagues about hobbies (von Dreden & Binnewies, 2017) after a difficult work event because this will make them feel better (Quinn et al., 2012).

Although recovery research has seldom considered recovery experiences as emotion regulation strategies, past empirical research suggests that they could certainly be considered as such (Koole, 2009; Nyklíček, 2011; Roemer et al., 2015). Specifically, engaging in meditation and mindfulness (i.e., mental relaxation) and progressive relaxation exercises (i.e., physical relaxation) are associated with reduced negative emotions (Koole, 2009).

Based on the reactive pathway proposed above, and combining self-reinforcement (Bandura, 1976) and recovery theories (Sonnentag et al., 2017), I suggest that disengagement break behaviours are mostly reactive. Specifically, workers would be motivated to engage in

disengagement break behaviours after they just finished a performance episode that was disliked (e.g., a monotonous, repetitive task within a performance episode). Recall that performance episodes have clear performance goals that determine whether the performance episode has been completed (Beal et al., 2005). Self-reinforcement theories suggest that individuals will engage in gratifying behaviours after accomplishing a sufficient level of performance on a given task (Bandura, 1976). The purpose of this self-reward is to keep oneself motivated and increase the chances that particular behaviours would be repeated in the future (Bandura, 1976; Bosch & Sonnentag, 2019). One such self-rewarding behaviour is engaging in disengagement break behaviours that foster positive affect, such as reading a book for fun (Kim et al., 2018), going out for a walk at a local park (Sianoja et al., 2017), or grabbing a coffee and cake at your favourite cafe. Further, as explained by the recovery perspective, workers may engage in disengagement break behaviours to unwind from work and restore previously spent resources (Bosch et al., 2017; Trougakos & Hideg, 2009). Indeed, past research has shown that when workers engage in relaxation during the break, they report being more recovered after the break (Bosch et al., 2017).

Nevertheless, it is important to note that disengagement break behaviours could also be triggered by the proactive pathway. Specifically, I propose that workers would be motivated to engage in disengagement break behaviours to attain a desired mental state before engaging in the next performance episode (Zijlstra et al., 2014). For example, someone may decide to relax right before engaging in a taxing performance episode, such as giving a lecture, because this will allow them more recover or obtain energy and promote positive affect that might be needed to perform a lecture properly. Episodic performance theories (Beal et al., 2005) and coping research serve as theoretical backgrounds to understand why this may be the case. According to Beal and colleagues (2005), different performance episodes elicit and require different affective states. For example, a monotonous task is likely to elicit boredom which is

experienced as a negative affect with low levels of arousal (Fisher, 1993). From a coping perspective, workers may appraise that a future task that is considered boring and monotonous cannot be changed, thus will engage in anticipatory emotion-focused coping behaviours, such as disengagement behaviours, to pre-emptively improve their moods before performing the boring task.

3.2.2.3 Task engagement break behaviours

Within the Episodic Model of Work Breaks, task engagement break behaviours are those break behaviours that imply an effortful cognitive engagement with work-related tasks during breaks. Importantly, task engagement break behaviours are not the same as working during breaks (e.g., meeting with a client during lunch to discuss a project), in which case, the break could scarcely be considered a break. An example of what a task engagement break behaviour can look like is presented in Berman and West's study (2007), where managers use their breaks to distance themselves from work and ponder about how to perform their next tasks.

The work-rumination framework proposed by Cropley and Zijlstra (2011) is particularly helpful to understand task engagement behaviours in the context of the Episodic Model of Work Breaks (Cropley & Zijlstra, 2011). Work-rumination is defined as thinking about work while not working and it is the direct opposite to disengagement behaviours (Cropley & Zijlstra, 2011), thus, there should be little conceptual overlap. 'Work-rumination' can be divided into problem-solving pondering, defined as "a form of thinking that may be characterised by prolonged mental scrutiny of a particular problem or an evaluation of previous work in order to see how it can be improved" (Cropley & Zijlstra, 2011, p. 11) and affective rumination, defined as "the appearance of intrusive, pervasive, recurrent thoughts, which are negative in affective terms" (Cropley & Zijlstra, 2011, p. 10).

Drawing on the dual pathway presented above, I argue that problem-solving pondering is predominantly proactive. This means that workers mostly engage in problem-solving pondering during breaks because of the performance episodes they expect to complete after the break. From an anticipatory coping perspective, this is because workers try to find solutions to complex work problems before they have to engage in them, and this should lead to more effective problem-solving and lower levels of stress. Empirical evidence does support the idea that people, in general, think often about the future intending to find solutions to problems (Kvavilashvili & Rummel, 2020). For example, research on spontaneous future cognition shows that individuals engage several times within an hour in future planning, mental rehearsal, and task-related problem-pondering (Kvavilashvili & Rummel, 2020). This 'mental rehearsal' of the tasks that need to be completed in the future helps fulfil these tasks (Kvavilashvili & Rummel, 2020). This is particularly the case when not much time has passed between the future-oriented thought and the task (Kvavilashvili & Rummel, 2020).

In general, most research studying prospective thinking is descriptive, correlational, or use a diary study approach (Kvavilashvili & Rummel, 2020). For example, in some studies, participants have been asked to describe episodes of mind wandering during long drives or while performing boring tasks during experiments. Findings suggest that around 50% of these mind wandering episodes are future-oriented (as opposed to present or past-oriented) with a focus on problem-solving pondering (Baird et al., 2011; Berthié et al., 2015). Findings from diary studies examining spontaneous cognition are consistent with cross-sectional evidence, showing that people often plan future actions (D'Argembeau et al., 2011). Experimental evidence also converges with correlational evidence (Mazzoni, 2019). Therefore, there is empirical evidence to suggest that during the break employees may proactively think about solutions to work problems that they expect to face after the break.

In contrast to problem-solving pondering, drawing on the dual pathway proposed above, together with coping research, I argue that affective rumination can either be a reactive or proactive emotion-focused coping strategy. When workers engage in emotion-focused coping strategies, they tend to focus on the emotions that specific stressful events make them feel (Lazarus & Folkman, 1984). In general, this type of coping strategy emerges when individuals appraise that there is nothing they can do to solve the coping situation (Lazarus & Folkman, 1984). As a reactive behaviour, workers may engage in affective rumination when they just finished a performance episode that made them experience negative emotions, such as stress, sadness, or annoyance. Since the performance episode already occurred, workers cannot do anything to change the outcome, but they can think about how they felt, as an attempt to control or improve their negative mood (Lazarus & Folkman, 1984). As a proactive behaviour, workers may engage in affective rumination when they expect that their next performance episode will inherently make them feel negative experiences. Importantly, future-oriented rumination has been subclassified as a form of worry (Nolen-Hoeksema et al., 2008). An example of this type of behaviours is when a supervisor anticipates a difficult conversation with a co-worker and worry how the conversation could damage the relationship or team dynamic. A supervisor may think about how the conversation will make them feel as a way to pre-emptively experience that emotion to address it before the negative performance episode.

3.2.2.4 Summary of break behaviours

Past research on work breaks has suggested that employees engage in a range of different behaviours during breaks. In this section, I define three distinct forms of break behaviours that employees engage in during the break. First, according to past research, physiological break behaviours seem to be the most common type of behaviours, in which employees engage in breaks mostly to address their physiological needs. Second, I described

disengagement break behaviours, which is the second most common break behaviour. Employees who engage in disengagement break behaviours seek to improve their mood after finishing or before engaging in a disliked performance episode. Finally, I described task engagement break behaviours which entail a degree of cognitive engagement with work-related tasks while on breaks. Here I argued that problem-solving pondering represents a proactive break behaviour to address future difficult performance episodes. Alternatively, task engagement break behaviours can be reactive, in which case, they will be more related to affective rumination.

Throughout this section, I argued that all break behaviours can be either reactive or proactive, depending on the specific behaviour workers engage in during the break. For example, problem-solving pondering is conceptualised as a future-oriented task engagement break behaviour (Cropley & Zijlstra, 2011), while affective rumination is conceptualised as a past-oriented task engagement break behaviour (Cropley & Zijlstra, 2011). Consistent with the episodic perspective adopted by the Episodic Model of Work Breaks, I argue that whether workers engage in specific reactive or proactive break behaviour is likely to depend on the specific performance episodes and task characteristics that are experienced before and after the break. There is, however, a dearth of research about why workers would engage in different physiological, disengagement, or task engagement break behaviours. Thus, the second research question that will be explored in this thesis is:

Research Question 2: Why do workers engage in different break behaviours? Is it because of what they have done before the break or because of what they expect to do after the break?

3.2.3 Breaks and post-break outcomes

In this section, I focus on how break behaviours can explain post-break outcomes such as well-being (e.g., fatigue levels, experienced affect, etc.) and performance (e.g., task performance, work creativity, etc.). I first focus on break behaviours and well-being, to then discuss the relationship between break behaviours and performance. Nevertheless, it is important to begin with a disclaimer concerning physiological break behaviours.

Above I argued that workers engage in physiological break behaviours to address physiological needs before they experience negative events as a result of not fulfilling basic needs. For example, according to Trougakos and Hideg (2009), eating during breaks can produce glucose which is essential to generate physical energy. Physical energy is a core energetic resource that allows workers to achieve their goals, such as performing a task at work (Quinn et al., 2012). Thus, eating during breaks should be positively related to increased energy after the break. In support of this, Zacher et al. (2014) found that drinking water and having a snack during breaks is positively correlated with vitality after the break. In contrast, Kim et al. (2018) found that nutrition intake was unrelated to well-being and performance. Others have found similar results concerning nutrition intake (Fritz et al., 2011; Kim et al., 2017).

Appropriate nourishment habits and confounding effects can explain the lack of significant results concerning physiological break behaviours. When workers have appropriate nourishment habits, the effects of nutrients intake may not be perceptible and a sense of sluggishness might be due to a lack of mental energy (e.g., motivation) or time of the day (e.g., circadian rhythm) rather than lack of actual physical energy (Quinn et al., 2012). Further, past research has concluded that physiological break behaviours do not usually occur in isolation but together with other break behaviours (Kim et al., 2018). Therefore, the influence of physiological mechanisms on well-being and performance could be due to confounding effects, rather than unique effects. In fact, when physiological break behaviours are considered together

with other break behaviours, the effects of physiological break behaviours on well-being and performance disappear (Kim et al., 2018). The only exclusion to this seems to be caffeinated beverages, as caffeine provides a noticeable quick boost of energy (Kim et al., 2018). In light of this, even though physiological break behaviours occupy a central role in breaks, they seem to be a weak mechanism to explain break effectiveness in promoting well-being and performance. Because of this and the time constraints that characterise a doctoral thesis, physiological break behaviours are not a central focus in this thesis.

3.2.3.1 Break behaviours and well-being

Disengagement break behaviours and well-being

Above I argued that workers engage in disengagement break behaviours to unwind from work, boost energy, and improve their mood after or before a disliked or negative performance episode. Based on this, disengagement break behaviours should have positive effects on well-being and performance for two reasons. First, well-being can be understood as the cumulative experiences of positive affect (Warr, 1990). Considering that disengagement break behaviour's primary concern is experiences of enjoyment (i.e., a positive affective experience), then just engaging in these types of behaviours should lead to increased well-being. Moreover, experiencing positive affect has the potential to improve negative moods (Fredrickson, 2001; Tice et al., 2007). This means that when workers experience negative affect and then experience positive affect, negative affect is either reduced or disappears (Tice et al., 2007). In support of this, past studies have shown that when employees engage in activities that foster positive affect, they report lower levels of negative affect and higher levels of positive affect after the activity (Dalebroux et al., 2008).

Further, the unwinding process that characterises the disengagement behaviours has important benefits for workers from an allostatic perspective (Bosch et al., 2017). The allostatic model of stress argues that when individuals are confronted with demands or stressors, their bodies generate a physiological arousal reaction to cope with the stressor (McEwen, 2007). This physiological reaction is produced by the release of different hormones, such as catecholamines (e.g., adrenaline and noradrenaline) and cortisol (Dienstbier, 1989), which increases the heart rate to accelerate blood circulation and induces a state of alertness and vigil (McEwen, 2007). It is important to mention that the body can stay in such aroused state for short periods of time otherwise permanent harm can occur, such as burnout syndromes and heart disorders (Meijman & Mulder, 1998; Sonnentag et al., 2017). In support of the unwinding process of disengagement from work, past research shows that when employees engage in low-effort behaviours, such as meditation, they also report a reduction in their arousal levels (e.g., lower heart rate and oxygen consumption) (Hoffman et al., 1982; Vempati & Telles, 2002).

Disengagement break behaviours have been studied extensively in breaks research with different research designs. Importantly, several experimental and intervention studies (e.g., Blasche et al., 2018; Scholz et al., 2017; Steidle et al., 2017), together with correlational designs (e.g., Bosch et al., 2017; Kim et al., 2017, 2018), largely support disengagement break behaviours benefits. For example, several diary studies have concluded that engaging in relaxation during breaks is associated with higher levels of positive affect and energy and lower levels of mental fatigue after the break (Bosch et al., 2017; Hunter & Wu, 2016; Kim et al., 2017; Zhu et al., 2018). Moreover, intervention studies show that engaging in relaxation during breaks foster higher levels of well-being and positive affect after the break compared to those who did not engage in relaxation (Blasche et al., 2018; Steidle et al., 2017).

Task engagement break behaviours and well-being

Above I argued that workers engage in task engagement break behaviours to cope with task-related demands reactively and proactively. When workers engage in reactive task engagement break behaviours, they are likely to ruminate about previous performance episodes. In contrast, when workers engage in proactive task engagement break behaviours, they are likely to either worry or ponder about solutions to future work problems. Depending on what they do, their well-being is likely to either diminish or improve.

Past research on affective rumination suggests that this type of work-related thought is mostly harmful, with employees who ruminate about work after work reporting higher levels of fatigue, lower levels of sleep quality, and lower levels of well-being overall (Firoozabadi et al., 2018a; Kinnunen et al., 2019; Querstret & Cropley, 2012). This is because affective rumination is characterised by an inability to switch-off negative work-related thoughts and this increases negative affect and prevents unwinding from work. Thus, it would be expected that when workers engage in affective rumination during breaks, they would also report lower levels of well-being after the break.

Compared to affective rumination, problem-solving pondering should be beneficial for well-being after the break. This is because problem-solving pondering as an anticipatory coping strategy can help employees to pre-emptively deal with job stressors, thus, reducing the job stressors' negative potential impact. Moreover, being able to find solutions to complex work-problems can trigger experiences of mastery, competency, and self-efficacy (Bandura, 1982; Cropley & Zijlstra, 2011), all of which experienced as pleasant and positive (Bandura, 1982; Deci et al., 2017). In support of this, past research has found that problem-solving pondering after work is associated with increased positive experiences, such as work engagement (Bennett et al., 2016) and increased vigour (Kinnunen et al., 2019).

Additionally, problem-solving pondering has the potential to stop another form of future-oriented thought which is negative in essence: worry (Nolen-Hoeksema et al., 2008). Worry has the potential to prevent disengagement processes, but it can also trigger problem-solving strategies (Nolen-Hoeksema et al., 2008; Sonnentag & Fritz, 2015). Thus, being able to effectively find potential solutions to a worrying problem will allow individuals to eliminate the source of worry and improve their well-being (Firoozabadi et al., 2018b). In support of this, past research has shown that problem-solving pondering and finding solutions to work problems is related to being able to disengage from work and relax (Firoozabadi et al., 2018a; Vahle-Hinz et al., 2017).

3.2.3.2 Break behaviours and performance

Compared to the previous section, here I do not distinguish between disengagement and task engagement break behaviours to describe their relationship with performance after the break. This is because past research has highlighted the need to understand the effects of breaks on post-break performance considering the specific performance episode that workers engage in after the break (Bosch et al., 2017; Kim et al., 2018). This is in line with the propositions of the Episodic Model of Work Breaks. Recall that performance episode theories suggest that performance in a given performance episode is a function of affective states, skills, and resources that are congruent with the performance goal (Beal et al., 2005). This means that workers will have an optimal performance if their affective state, skills, and available resources match the required ones for the task (Beal et al., 2005; Kristof-Brown et al., 2005; Warr et al., 2014; Zijlstra et al., 2014). As an example, complex forms of performance, such as proactivity and innovation, require high levels of energy paired with experiences of positive affect to be performed properly (Warr et al., 2014).

For the Episodic Model of Work Breaks, this means that what workers do during the break will only promote high levels of performance after the break if the break behaviour is congruent with the task after the break. Some have drawn from fit perspectives to illustrate this point (e.g., Venz et al., 2019). Fit is broadly defined as an interaction between the environment and an object, most commonly a person, that occurs when characteristics are well-matched (Kristof-Brown et al., 2005). There are two broad categories of fit: complementary and supplementary (Cable & Edwards, 2004). Complementary fit occurs when a person meets the requirements of an environment, or when the environment meets the requirements of the person (Cable & Edwards, 2004). Supplementary fit happens when the person and the environment are similar or share common aspects (Cable & Edwards, 2004).

When there are high levels of complementary and supplementary break-task fit, break effectiveness on performance should be maximised. For example, if workers expect to perform a task that is cognitively demanding, they may engage in either disengagement break behaviours to recover or preserve work-relevant cognitive resources (i.e., complementary fit). Alternatively, workers may decide to engage in a task engagement break behaviour, such as problem-solving pondering, to prepare for that task so that it becomes easier (i.e., supplementary fit). In contrast, if there are low levels of complementary and supplementary break-task fit, break influence on performance is likely to be weaker or even negative. An example is when a worker has to perform an extremely boring task after the break (e.g., schedule 50 emails for a data collection protocol) but engages in a very exciting activity during the break. As per the episodic model of performance, the attentional focus of the worker will likely shift from the current task (i.e., boring task) to the memories of the activity they engaged in during the break (i.e., off-task attentional demands). In this scenario, performance in the performance episode after the break will be impaired because the worker will have to expend

extra regulatory resources to keep the attention focus on the task at hand. This might be translated into more mistakes and longer times to perform this task.

Thus, contrary to past research on breaks as recovery opportunities, which states that disengagement behaviours during the breaks should be universally helpful (Sonnentag et al., 2017), I argue that the relationship between breaks and performance is more complex and both disengagement and task engagement in break behaviours have the potential to be beneficial or harmful for performance after the break.

3.2.3.3 Summary

In this section, I argued that physiological break behaviours are likely to be unrelated to post-break outcomes, so they will not be considered throughout the thesis. I also argued that both disengagement and positive task engagement break behaviours (e.g., problem-solving pondering) should be mostly positively related to post-break affective well-being. This, however, is contrary to what is proposed by the recovery perspective on breaks, such that all forms of task engagement behaviours should be detrimental because they interfere with the recovery processes (Sonnentag et al., 2017). Additionally, I also argued that break influences on post-break performance should be examined in light of the fit between the break behaviour and task to be performed after the break. Thus, contrary to what the recovery perspective suggests, no break behaviours are universally beneficial or harmful (Vahle-Hinz et al., 2017). Based on this, I propose the third research question that emerges from the Episodic Model of Work breaks:

Research Question 3: How do break behaviours in the model relate to well-being and performance after the break?

3.3 Summary of the Episodic Model of Work Breaks

This chapter aimed to present the Episodic Model of Work Breaks that will guide the empirical examination of work breaks in this thesis. I first argued that there is a dual pathway that explains why workers take breaks: either the workers take breaks because of what they have done prior to the break, and the main motivation is a desire for self-reward, or workers take breaks because of what they expect to do after the break, and the main motivation is to anticipatively cope with difficult performance episodes.

Then, I outlined three different break behaviours in which employees engage during the break: physiological, disengagement, and task engagement break behaviours. There is little empirical evidence to understand why employees may decide to engage in these behaviours, so it is not possible to establish whether they are reactive or proactive.

Finally, I discussed how break behaviours may be related to well-being and performance after the break. I first started by discussing that physiological break behaviours are weak explanatory mechanisms. Then, I showed that both disengagement and task engagement break behaviours may be related to well-being after the break. This is contrary to the current recovery perspective on breaks which argues that task engagement break behaviours should be negatively associated with well-being after the break.

I finished this chapter by discussing how the fit between the break behaviour and performance episode immediately after the break is crucial to understand breaks' influence on task performance. Specifically, I discussed that breaks can complement or supplement workers requirements to perform a given task, regardless of whether they engage in disengagement or task engagement break behaviours. Moreover, a lack of fit may end up distracting workers, thus impairing task performance.

The following chapter will discuss the research methodologies that will be implemented to investigate the research questions that emerge from the Episodic Model of Work Breaks, that are also summarised in Table 3.1.

Table 3.1. Summary of research questions.

Research Question 1	Why do workers take breaks? Is it because of what they have done, or is it because of what they expect to be doing after a break?
Research Question 2	Why do workers engage in different break behaviours? Is it because of what they have done before the break or because of what they expect to do after the break?
Research Question 3	How do break behaviours in the model relate to well-being and performance after the break?

Chapter 4
Methodology

This chapter aims to provide a general overview of the research methodology that I adopted to test the model and answer the research questions outlined in the previous chapter. Specifically, I first explain my research approach, to then discuss two important methodological issues that have gained importance over the past decades in quantitative organisational psychology research: causality and endogeneity (Antonakis et al., 2010). I then present the four designs that were implemented in this thesis. Here, I first describe the research designs, outline their benefits and limitations, and then discuss why this specific research method is appropriate to answer the questions posited in this thesis. Importantly, I do not describe specific protocols or measures here as I will do so in each subsequent empirical chapter. I finish this chapter by outlining the specific statistical procedures that are implemented to test the hypotheses proposed in each empirical chapter.

4.1 Research approach

Research within social science has usually adopted either a quantitative or qualitative research (Bryman, 1984). Both approaches entail specific underlying philosophical assumptions regarding reality (ontology), generation of knowledge (epistemology), and how investigation is to be conducted (research methodology) under these philosophical assumptions (Bryman, 1984). In this thesis, I follow a quantitative methodology that usually ascribes to a positivist paradigm (Bryman, 1984), which means that the methods used in this thesis were designed with a focus on hypothesis testing, correct measurement (e.g., phenomenon correctly capture, measurement quality, etc.), and causal estimations (Bryman, 1984).

The issue of causal estimation has gained relevance over the past years. Specifically, some argue that social scientists often discuss causal processes, but then engage in sub-optimal research designs for causal estimation (e.g., cross-sectional) and argue that more robust research is required to address causality issues (cf. Antonakis et al., 2010). As a result, empirical evidence and theory development are plagued with theoretically-driven causal claims that are not empirically tested (Antonakis et al., 2010).

Causality is a contested word and many philosophers have devoted their life work to understand what causality is. For the purpose of this thesis, I will adopt a pragmatic approach in which I will try to understand whether a dependent variable *Y* is a consequence of an independent variable *X* (Hernán & Robins, 2010). This causal dependency implies that, within a statistical model, the dependent variable *Y* occurred for no other reason than *X*, and there are no other reasons. In statistical terms, this means that the coefficient of *X* is exogenous and the unique effect of *X* on *Y* is due to *X* and no other reasons (Antonakis et al., 2010; Hernán & Robins, 2010). Importantly, this does not mean that *X* is the sole predictor of *Y* in the 'real world', but that *X* has a unique effect on *Y* that cannot be explained in any other way.

There are several threats to causal estimation, but one of the most common ones is endogeneity (Antonakis et al., 2010; Hernán & Robins, 2010). Endogeneity occurs when a predictor variable *X* is correlated with the error term of a regression model (Antonakis et al., 2010). In other words, *X* is endogenous when *X* is correlated with unmeasured causes of *Y*. When *X* is endogenous, it is not possible to know if a statistical effect is because of the unique effect of *X* on *Y*, or because of the relationship between an endogenous predictor *X* with other unmeasured causes of the outcome. Critically, it can also occur that there is an unmeasured variable that predicts both *X* and *Y*, and this shared cause is what explains the relationship between *X* and *Y*. Therefore, endogeneity has the potential to bias the estimation. Bias in this context means that the estimated coefficient of a given path in a statistical model systematically

differs from the value that the same path would adopt in the population and it is impossible to know a priori how this bias will affect the estimation in the sample (Antonakis et al., 2010). For a more detailed discussion see Wooldridge (2002).

Research designs that suffer from endogeneity are all of those that do not include an exogenous predictor, such as cross-sectional designs (e.g., Fritz et al., 2011), experience sample methodologies (e.g., Bosch et al., 2017; Kim et al., 2017), and even longitudinal designs without using proper estimation methods (e.g., the cross-lagged model also suffers from endogeneity when a Granger's model for pseudo-causality is not estimated; Little, 2013; Newsom, 2015). Importantly, experience sample methodologies may also be cross-sectional in nature. This is because cross-sectional designs are those studies that capture all variables at the same point in time (Spector, 2019). Cross-sectional studies are by far the most common type of research design used in quantitative organisational research (Spector, 2019; To et al., 2012), however they are extremely flawed to explore anything but correlational hypotheses because they are subject to two important problems: common method bias and the inability to estimate causal paths (Spector, 2019).

Common method bias is when the relationship between two variables is boosted because they come from the same source, therefore, the relationship can be explained by this same variance (Podsakoff et al., 2003). Some have suggested ways in which this problem can be ameliorated, such as separating the source of the predictor and outcome variable, in which case, researchers usually add a prefix to the study, for example, a multisource cross-sectional or a multisource experience sample methodology (cf. Podsakoff et al., 2003). Separating sources of information can be done by either collecting the predictor from one source (e.g., motivation levels provided by an employee) and the outcome from another source (e.g., job performance provided by the company). A different way is to temporally separate predictors and outcomes, is asking participants to first provide information about predictors and at a

different point in time (e.g., 1 hour after) to provide information about the outcome variables. Implementing a multisource study, however, does not solve the second problem of cross-sectional designs: their inability to estimate causal relationships (Spector, 2019). This is mostly due to the endogeneity issues described above.

Table 4.1 illustrates the problem of endogeneity in breaks research from a recovery perspective. Specifically, Table 4.1 provides a summary of breaks studies from a recovery perspective with their designs and whether these designs address issues of endogeneity. To create this list, I searched Scopus for all studies published from 2008 to 2020 using keywords such as breaks, work breaks, recovery at work, within-work recovery, rest breaks, micro-breaks, and a combination of these terms. These dates were chosen because 2008 is when the first study about breaks from a recovery perspective was published according to Bosch et al. (2017), namely the study by Trougakos, Beal, Green, and Weiss (2008), while 2020 was chosen as the ending date because it is when this table was created. To be included in this list, studies had to be about work breaks and adopt a recovery perspective as explained by Trougakos and Hideg (2009) and Sonnentag and Fritz (2007), namely, use Ego Depletion, Conservation of Resources, or Effort-Recovery models as the main theoretical frameworks, and/or use the recovery experiences questionnaire.

Table 4.1. Studies on break from a recovery perspective, their design, and endogeneity issues.

Paper	Design	Addresses endogeneity
• Trougakos, J. P., Beal, D. J., Green, S. G., & Weiss, H. M. (2008). Making the break count: An episodic examination of recovery activities, emotional experiences, and positive affective displays.	Multisource ESM	No
• Fritz, C., Lam, C. F., & Spreitzer, G. M. (2011). It's the Little Things That Matter: An Examination of Knowledge Workers' Energy Management.	Cross-sectional	No

• Zacher, H., Brailsford, H. A., & Parker, S. L. (2014). Micro-breaks matter: A diary study on the effects of energy management strategies on occupational well-being.	ESM	No
• Trougakos, J. P., Hideg, I., Cheng, B. H., & Beal, D. J. (2014). Lunch Breaks Unpacked: the role of Autonomy as a Moderator of Recovery during Lunch.	Multisource ESM	No
• De Bloom, J., Kinnunen, U., & Korpela, K. (2015). Recovery Processes during and after Work: Associations with Health, Work Engagement, and Job Performance	Cross-sectional	No
• Hunter, E. M., & Wu, C. (2016). Give me a Better Break: Choosing Workday Break Activities to Maximize Resource Recovery.	ESM	No
• Sianoja, M., Syrek, C. J., de Bloom, J., Korpela, K., & Kinnunen, U. (2017). Enhancing Daily Well-Being at Work Through Lunchtime Park Walks and Relaxation Exercises: Recovery Experiences as Mediators.	Experiment	Yes
• von Dreden, C., & Binnewies, C. (2017). Choose your lunch companion wisely: the relationships between lunch break companionship, psychological detachment, and daily vigour.	Multisource ESM	No
• Bosch, C., Sonnentag, S., & Pinck, A. S. (2017). What makes for a good break? A diary study on recovery experiences during lunch break	Multisource ESM	No
• Kim, S., Park, Y. A., & Niu, Q. (2017). Micro-break activities at work to recover from daily work demands.	Multisource ESM	No
• Kühnel, J., Zacher, H., de Bloom, J., & Bledow, R. (2017). Take a break! Benefits of sleep and short breaks for daily work engagement.	ESM	No
• Scholz, A., Ghadiri, A., Singh, U., Wendsche, J., Peters, T., & Schneider, S. (2017). Functional work breaks in a high-demanding work environment: an experimental field study.	Field experiment	Yes
• Schulz, A. S., De Bloom, J., & Kinnunen, U. (2017). Workaholism and daily energy management at work: associations with self-reported health and emotional exhaustion.	Cross-sectional	No
• Steidle, A., Gonzalez-Morales, M. G., Hoppe, A., Michel, A., & O'shea, D. (2017). Energizing respites from work: a randomized controlled study on respite interventions.	Experiment	Yes
• Bosch, C., & Sonnentag, S. (2018). Should I take a break? A daily reconstruction study on predicting micro-breaks at work.	Daily reconstruction method	No
• Kim, S., Park, Y. A., & Headrick, L. (2018). Daily Micro-Breaks and Job Performance: General Work Engagement as a Cross-Level Moderator.	Multisource ESM	No
• Zhu, Z., Kuykendall, L., & Zhang, X. (2018). The impact of within-day work breaks on daily recovery	Multisource ESM	No

processes: An event-based pre-/post-experience sampling study.		
• Bennett, A. A., Gabriel, A. S., & Calderwood, C. (2019). Examining the Interplay of Micro-Break Durations and Activities for Employee Recovery: A Mixed-Methods Investigation.	Experiment	Yes
• Venz, L., Bosch, C., Pinck, A. S., & Sonnentag, S. (2019). Make it your Break! Benefits of Person-Break Fit for Post-Break Affect.	Multisource Cross-sectional	No
• de Jonge, J. (2019). What makes a good work break? Off-job and on-job recovery as predictors of employee health.	Cross-sectional	No
• Díaz-Silveira, C., Alcover, C. M., Burgos, F., Marcos, A., & Santed, M. A. (2020). Mindfulness versus physical exercise: Effects of two recovery strategies on mental health, stress and immunoglobulin a during lunch breaks. A randomized controlled trial.	Experiment	Yes

As can be seen, only five studies out of 25 directly address endogeneity. This means that there could be confounding variables that could explain the observed results and no true causal paths can be estimated. Therefore, it is not possible not know if the observed effects are because of the 'true' relationship between variables, or because of confounding variables. As an example, when people engage in relaxation during breaks, they feel better. This might be due to a 'true effect' of relaxation on well-being or because there is a third variable that predicts both engaging in relaxation and feeling good (e.g., low levels of workload after a high-workload period).

Considering that understanding the causal relationship between two variables is key to describe a process and influence policy (Antonakis et al., 2010), the empirical studies presented in this study were designed to reduce estimation bias such as endogeneity and common method bias. Specifically, I implemented three research designs that directly address endogeneity: a laboratory experiment, an online vignette experimental design, and a field experiment. I also implemented a multisource experience sample methodology design that addresses common method bias.

4.2 Randomised laboratory experiments

Randomised laboratory experiments, or experiments for short, are considered by many the optimal research design to test causal models (Antonakis et al., 2010; Hernán & Robins, 2010). An experiment is a research design in which there are at least two groups that are externally manipulated to make them different (i.e., an exogenous variable is externally introduced). Randomised experiment means that the participants were randomly assigned to each of the experimental groups. Randomisation effectively controls for individual differences, as there is no reason to believe that individuals with certain characteristics would be more prevalent in a specific group (Antonakis et al., 2010; Goodwin, 2010). To understand why this is important, is fundamental to introduce the concept of counterfactuals, which are easier to understand through an example. Imagine that there are two participants: Albert and Bernard. Albert and Bernard have been randomly assigned to groups A and B respectively. Counterfactuals are concerned with the question: what would have happened had Albert been assigned to group B instead of A? If the randomisation was done properly, Bernard would act as the counterfactual of Albert, as there is no reason to believe that, with sufficient sample size, participants are different and would have behaved differently unless the experimental manipulation made them act differently. This is because individual differences (e.g., personality traits, gender and age, pre-existent conditions) should be normally distributed across the population (and participants) as per the central limit theorem (Hernán & Robins, 2010). Therefore, in randomised experiments, one will have subjects that are similar across groups, and if there is a statistical effect of the manipulation on the dependent variable, nothing else but the manipulation could have caused this effect (Antonakis et al., 2010). Moreover, since the assignment to the experimental groups is random, experimental group membership should be unrelated to the error term of the equation, thus controlling endogeneity issues.

Experiments are often criticised for lacking ecological validity: namely, experiments are usually conducted in fictional settings that do not necessarily depict real-life scenarios, generally with a student sample, which has very specific characteristics which do not necessarily translate to other contexts (Mook, 1983). Therefore, even if the causal model was true, its generalisability to other contexts and populations may be problematic (Mook, 1983). It is important to mention, however, that the goal of experiments is not generalisability, but model testing (Mook, 1983). Experiments tell us what could happen, even if rarely or under special circumstances (Mook, 1983). Therefore, an experiment is the starting point to investigate causal claims that are generalisable.

The experiment conducted in this thesis targets Research Question 1 (i.e., why do workers take breaks? Is it because of what they have done, or is it because of what they expect to be doing after a break?) and Research Question 2 (i.e., why do workers engage in different break behaviours?). Since the questions of why workers take breaks and why they engage in different break behaviours are inherently causal and the theoretical model presented in this thesis is novel, I deemed it necessary to implement a research design that generates data to estimate causal paths, such as a randomised experiment described above. As mentioned before, the specific protocol will be described in the chapter pertaining the experiment. Unfortunately, due to the pandemic situation that erupted around the globe while I was conducting my studies, the laboratory experiment had to be postponed indefinitely. This means that I could not finish my data collection and lack statistical power for the results to be reliable and valid. The online vignette experimental design, presented next, emerged as a response to the pandemic consequences of the and address the same research questions as the laboratory experiment.

4.3 Online vignette experiment

The online vignette experiment combines techniques from laboratory experiments with experimental vignette methods (EVMs). EVMs consist of presenting participants with a fictional but realistic scenario to assess dependent variables such as attitudes and behavioural intentions (Aguinis & Bradley, 2014). EVMs are ideal when exploring the causal relationship between predictors and outcomes is important, but conducting laboratory randomised experiments is not possible (Aguinis & Bradley, 2014). EVMs combine the best practices to ensure the internal validity in the prediction coming from randomised experiments with the external validity coming from field observational studies, thus, making an ideal middle-step between laboratory experiments and field studies (Aguinis & Bradley, 2014).

In EVMs, researchers first need to construct a fictional scenario that will be presented to participants where they need to respond to what they think and how they would behave in these fictional scenarios. Then, a randomised manipulation is introduced that varies certain aspects of the vignette and participants are randomly assigned to one of the fabricated groups (Aguinis & Bradley, 2014). With this type of design then, and in the same way as laboratory experiments, differences in hypothetical attitudes and behaviours are 'caused' by the specific group and condition participants were assigned to.

EVMs have some important critiques, but the most salient one is that hypothetical scenarios are by no means real scenarios, and behavioural intentions are not the same as actual behaviours (Aguinis & Bradley, 2014). Because of this, there are several issues that researchers have to consider before designing and conducting an EVM. First, it is important to consider if the hypothetical scenario posited to participants will be similar to a real scenario. If the answer is affirmative, the researcher needs to decide how important is the level of immersion (Aguinis & Bradley, 2014).

The level of immersion is how realistic the vignette is constructed. The higher the immersion and realism, the more external validity the EVM will have and the likelier that true behaviours will be expressed. Ways in which immersion and realism can be improved are including audios, videos, and pictures in the presentation of the vignette, as these presentation methods will engage participants further and increase external validity (Aguinis & Bradley, 2014). Nevertheless, 'noise' is also introduced in the vignette when using such presentation techniques. Noise can compromise the internal validity of the study (Aguinis & Bradley, 2014).

As mentioned before, an online vignette experiment was used to address Research Questions 1 and 2. The specific protocol and measures are explained in Chapter 5.

4.4 Field experiment

Field experiments are broadly defined as an experiment that happens in a natural environment as opposed to a controlled laboratory (Harrison & List, 2004). Therefore, field experiments also use random assignment to a treatment that is relevant to a population engaging in genuine tasks with genuine outcomes in natural settings (King et al., 2012). Field experiments are valuable in that they allow the observation of phenomena as they naturally occur without much intervention of the experimenter (Harrison & List, 2004), and according to Mook (1983), field experiments address what can and does happen, as opposed to laboratory experiments which address what could happen. Consequently, field experiments have gained importance over the last decades in different fields, but the organisational psychology field has yet to catch up (Eden, 2017)

Field experiments differ from laboratory experiments across four elements (Harrison & List, 2004; King et al., 2012). Laboratory experiments normally use a standardised sample pool, usually students, thus limiting their generalizability to other populations, while field

experiments use the real target population, thus increasing the generalizability to that population. Second, laboratory experiments use artificial information and usually participant's background is deemed irrelevant for the task at hand, while in field experiments the information of the task that participants bring to the study is extremely important and the reason to conduct a field experiment. Third, in laboratory experiments, the task and rewards are usually artificial, whereas in field experiments tasks and rewards are usually real. Finally, in laboratory experiments, the environment in which the subjects operate is artificial, whereas, in field experiments the environment is real. All of this means that field experiments are usually noisier, less reliable, and less internally valid than laboratory experiments (Harrison & List, 2004). Moreover, because it is sometimes not possible to randomly assign participants to groups, groups may not vary randomly, thus, the counterfactual assumption may be at risk. For example, when researchers are studying work teams and need to create an exogenous treatment. In organisations, it is frequently not possible to assign members of the same team to different conditions (Harrison & List, 2004). If hypotheses are at the individual level, there may be a confounding variable that threatens the internal validity of the study, namely, team membership.

To implement a 'clean' field experiment, namely an experiment that can address the question of causality, the researcher needs to consider two key elements. First, it is important to find a population where the phenomenon of interest naturally occurs in a context and can be easily identified (Harrison & List, 2004). After the phenomenon of interest has been identified, the researcher needs to add the necessary control or treatment (Harrison & List, 2004). Second, one needs to choose the appropriate stimulus regarding construct validity and external validity (King et al., 2012).

In this thesis, a field experiment was implemented to address Research Question 2, namely, why do workers engage in different break behaviours? This research design was

selected to overcome some limitations of the vignette experiment. First, field experiments focus on actual behaviours emerging in real-work environments, thus providing a higher degree of external validity. Second, they maintain an appropriate design to answer questions of causality for the new theoretical framework presented in this thesis.

4.5 Experience sample methodology

Experience sample methodology (ESM) is an umbrella term that encompasses different research methods in which participants provide information on a given phenomenon several times within a timeframe that ranges from within an hour to every week for a set period of time (Fisher & To, 2012; Nezlek, 2012). Therefore, ESMs are ideal when the phenomenon of interest is highly dynamic because the researcher will have multiple observations of the same person concerning the same phenomenon (Ohly et al., 2010). Additionally, ESMs reduce memory errors and biases. Human memory is fragile and when participants are requested to rate an event that has happened even a week before, their perception is likely to be biased for multiple reasons, such as affective experiences (Nezlek, 2012). In asking participants to fill in a questionnaire on something that just occurred, ESMs allow researchers to obtain more accurate and reliable information about that particular phenomenon.

A key disadvantage of diary studies, however, is that they are very intensive for participants, having to fill in a survey several times (Nezlek, 2012). Many problems stem out from this issue. First, participant attrition is usually high; hence, full observations are rare (i.e., people who completed all the surveys over a period). Second, and consistent with the previous point, participants who have a high workload at the moment of the survey may decide not to participate in that specific observation. This may bias the results, as it will affect the type of information obtained. Third, depending on the phenomena at hand, results may be biased

because of self-selection (i.e., you will usually have more observations of the people who are motivated for the study). Finally, since participant attrition is a major concern, it is important to limit the number of constructs and items that you can explore in a diary study. This not only makes diary studies very narrow in scope but also posits threats to the reliability of the scales (i.e., fewer items per scale may engender greater unreliability).

ESMs typically adopt one of three different forms: event contingent, signal contingent, or time contingent (Fisher & To, 2012; Nezlek, 2012). In an event contingent design, participants have to submit a survey every time a relevant event has occurred (e.g., a work break). In signal contingent designs, participants must submit a survey every time they receive a probe (e.g., an alarm or email). In time contingent designs, participants must submit a survey every time a certain amount of time has passed (e.g., every hour during a working day). Signal and interval contingent designs have much in common. Both require participants to provide information at a fixed point in time (Nezlek, 2012). A key point in both designs is to define the temporal nature of the phenomenon under scrutiny, such that the signal and interval occur at a relevant point (Nezlek, 2012). For example, if the relevant phenomenon occurs once a day, there is no point in asking participants to fill in a survey multiple times a day. Similarly, if the phenomenon occurs more than once a day, asking participants to fill in the survey at the end of the workday will lead to biases. With signal contingent designs, some have proposed that the signals should be at random within a timeframe to reduce a participant's anticipation effect (Nezlek, 2012).

The advantages of event contingent designs are that they allow focusing on a specific event of interest and it could provide a large sample of those events (assuming participant compliance). Also, the data of the event of interest is collected shortly after the event has occurred, therefore, diminishing memory errors. The disadvantage of this type of design, however, is that researchers do not know about non-compliance and unregistered events may

go unnoticed. This might be due to the event being ambiguously specified or failure to register the event. This type of design is ideal when the discrete event has a clear beginning and end (so it reduces ambiguity), and it is not too rare nor too frequent. Participants should be trained to recognise the event to maximise compliance (Fisher & To, 2012).

The advantages of the signal contingent designs are that it can capture immediate experiences without minimal memory error and usually can have a large number of signals (sample size) a day. Some disadvantages, however, are that signal contingent designs are more burdensome for participants, requires signalling technology (e.g., phone app, beeper), and may not be as reliable because participants could miss a signal. Signal contingent designs should be used when accurate reports of highly variable current states (e.g., mood, motivation) are required and a random sample of experiences is required (Fisher & To, 2012).

Finally, the advantages of interval contingent designs are that they can be used without any need of special equipment, are less intrusive because of the predictable timing, and are very useful for a cyclical phenomenon (e.g., daily energy cycles and moods). Nevertheless, interval contingent designs may miss-capture some phenomena, such as daily moods. Moods can change from hour to hour and even task to task, therefore asking participants to fill in a survey every 6 hours or at the end of the workday may bias the results. Further, if many reports a day are required, compliance is likely to suffer. Compliance with the protocol is better when signals are sent to remind participants when it is time to fill in a report (Fisher & To, 2012).

This thesis adopts an event contingent design to examine the last segment of the theoretical model and Research Question 3, namely the relationship between break behaviours and employee-related outcomes. This research design was selected to explore how daily variations in break behaviours during lunch breaks are associated with dynamic outcomes, such as well-being and performance. Importantly, this research design does not address issues of

endogeneity but provides important ecological evidence about the relationship between different break behaviours and post-break employee outcomes.

4.6 Statistical techniques

This section broadly describes the general statistical techniques that will be implemented to analyse the empirical data collected via the research designs outlined above. Specifically, I will utilise a combination of multiple regression analysis, multi-level modelling, and structural equation modelling (SEM).

4.6.1 Multiple regression

Multiple regression, based on Ordinal Least Square (OLS), is by far the most common way of analysing data (Kennedy, 1998). Not only this, but multiple regression is the theoretical basis that underlies many other statistical techniques that will be used in this thesis, such as structural equation modelling and multilevel analysis (Byrne, 2012; Kline, 2015; Little, 2013; Snijders & Bosker, 2011). Thus, a correct understanding thereof is key to appreciate other more sophisticated techniques. OLS Multiple regression is a statistical technique that aims to predict the values of a dependent variable Y as a function of a series of independent variables X_i (Kennedy, 1998). OLS, as an estimator, seeks to reduce the difference between the observed values of Y and the predicted values of Y (usually known as $\hat{Y}$) that results from the statistical model. The differences between Y and $\hat{Y}$ are known as the residuals of the model, and when the residuals are small, it is said that the model explains a great deal of variance, or R^2 (Kennedy, 1998).

OLS Multiple regression has five assumptions. If these assumptions are not met, the analysis can lead to biased estimations, false results, and wrong conclusions (Kennedy, 1998).

The *first assumption* is that the dependent variable Y is a linear function of the independent variables in the model plus an error term (Kennedy, 1998). One should not confuse the error term with the residuals, as the error term represents all of the unmeasured variance that is not explained by the model, while the residuals are the difference between the Y and $\hat{Y}$. The first assumption is depicted in formula 4.1:

$$(4.1)\ Y = X\beta + U$$

Where *Y* represents the dependent variable, *X* represents a set of independent variables, β represents the parameters of *X*, and *U* represents the error term. Not meeting the first assumption will lead to model specification errors. The *second assumption* is that the residuals are normally distributed. If this assumption is violated, it will lead to biased intercepts and standard errors. Standard errors are essential for hypothesis testing. The *third assumption* is that the residuals are not correlated with one another. Violation of this assumption can lead to heteroskedasticity (i.e., not all residuals have the same value at the same X level), or autocorrelated errors (i.e., when residuals are correlated to one another). Violation of these assumptions will lead to biased estimates and standard errors. The *fourth assumption* is that the observations on the independent variables are fixed in repeated samples. This assumption is violated when there are large amounts of measurement error in the variables (e.g., low reliability), autoregressions (e.g., cross-lagged models), and simultaneous equation estimators (e.g., SEM). However, with sufficient sample size, and using Maximum Likelihood, the OLS estimator remains largely unbiased even if assumption four is violated (Kennedy, 1998). Finally, *assumption five* is that there is low correlation among the independent variables (i.e., low multicollinearity). Assumptions one to four can be checked visually via graphs and scatterplots, while assumption five can be checked by regressing each predictor by the rest predictors in the model and comparing the R^2 to the R^2 of the full model. If the R^2 of the

predictor is larger than the R^2 of the model, then there might be collinearity issues (Mason & Perreault, 1991).

4.6.2 Multilevel modelling

Multilevel modelling is a statistical technique that is utilised when the data has a nested structure, meaning that one has observations at two different levels (Snijders & Bosker, 2011). An example of this is when researchers observe students (level 1), nested in classrooms (level 2), nested in schools (level 3). Alternatively, the interest may be in occasions (level 1) nested in individuals (level 2). Since it is reasonable to believe that, for example, student data that comes from the same classroom or school shares a degree of commonality (e.g., same teacher, same neighbourhood, etc.), one can expect that the residuals are not independent of one another. This would violate assumption three described above. However, the other four assumptions still need to be observed.

To ameliorate this issue, one can partition the variance of variable *Y* into its lower- and higher-level components, and directly estimate how independent variables at level 1 relate to dependent variables at level 1, and independent variables at level 2 (or the aggregated values of level 1 variables) relate to dependent variables at level 2. This transforms equation 4.1 into equation 4.2, accounting for the nested structure of the data and correlated residuals:

$$(4.2)\ Y_{ij} = \gamma_{00} + X_{ij}\gamma_{10} + \overline{X}_j\gamma_{01} + U_j + R_{ij}$$

Where Y_{ij} represents the predicted value of an individual i in a group j, γ_{00} represents the intercept, X_{ij} represents the X value for an individual i in a group j and γ_{10} its estimate, $\overline{X}_j$ represents the mean value of X for group j and γ_{01} represents its estimate, and U_j and R_{ij} are the error terms of levels 2 and 1 respectively. As can be seen, a key difference between equations

4.1 and 4.2 is that the error term *U* is now separated into U_j and R_{ij}. In this thesis, multilevel modelling will serve to analyse data from the ESM design presented above.

To conduct multilevel modelling, some have argued that there must be sufficient variance at level 1 (Bliese et al., 2018). Variance at level 1 can be estimated via the Variance Partition Component (VPC), also known as intraclass correlation (ICC) using formula 4.3 below:

$$(4.3)\ VPC = \frac{\sigma_j^2}{\sigma_j^2 + \sigma_i^2}$$

Where σ_j^2 represents the variance of *Y* at level 2, and σ_i^2 represents the variance of *Y* at level 1. VPC should be interpreted as the proportion of variance that is attributed to between cluster variation (e.g., differences between schools or between people). Some argue that when the VPC value is lower than .10, complex estimation procedures, such as multilevel modelling, are not needed. However, as Bliese and colleagues (2018) show, any degree of nested data and VPC value can bias the standard errors and lead to wrong hypothesis testing. Thus, Bliese and colleagues (2018) suggest that multilevel modelling estimation should be used whenever there is a degree of nested structure.

Finally, there is a caveat concerning the estimation of measurement reliability in multilevel modelling in general, and experience sampling methodologies in particular (Nezlek, 2017). According to Nezlek (2012, 2017), one should not assume that techniques to estimate reliability in single-level models is informative to the reliabilities in multilevel models. This is especially the case when using ESM designs as most reliability indicators (e.g., Cronbach alpha) were developed for scales with many items. As explained above, ESM designs usually use a small number of items to prevent participant attrition, which threatens the integrity of the scales (Nezlek, 2017). A more robust way of estimating reliability in multilevel models is with equation 4.4:

$$(4.4)\ \alpha = \frac{\sigma_j^2}{\sigma_j^2 + \frac{\sigma_i^2}{p}}$$

Were α represents the reliability score for a given scale, σ_j^2 represents the variance of that scale at the item level, σ_i^2 represents the variance of that scale at the occasion level, and p represents the number of items. According to Nezlek (2017), reliability scores obtained with equation 4.4 should be interpreted similarly to other reliability measures (i.e., $\alpha > .60$ indicates good reliability). Nevertheless, researchers should also be more flexible with these scores as most benchmarks have been proposed and constructed by personality researchers who usually use measures with several items per scale (Nezlek, 2017). With this equation, low levels of reliability imply that there is systematic variation in how the same person responded to the same items throughout the duration of this study (Nezlek, 2017). Qualitatively, lower scores may indicate that the same person did not understand the question 'in the same way' across occasions (Nezlek, 2017).

4.6.3 Structural equation modelling

Structural equation modelling (SEM for short) is an umbrella term that encompasses a series of different statistical techniques and it aims to examine the causal relationships that exist between different variables in a covariance matrix (Byrne, 2012; Kline, 2015). A popular way to estimate SEM models is to use latent variable estimation (Kline, 2015). Latent variables are unmeasured variables that are thought to 'cause' the observed variables in the model, such as the item responses to the questionnaires provided by participants (Byrne, 2012; Kline, 2015; Little, 2013).

Latent variables are estimated by identifying the shared variance in a set of items and regresses each item by this shared variance, called factor (Little, 2013). This also allows having

an indicator of the error that exists in each observed variable. As such, an SEM model using latent variables can effectively manage error in the estimation processes (Little, 2013).

Nevertheless, before conducting an SEM model with latent variables, it is important to establish the factor structure, namely, if the different items in the model are caused by the same unmeasured latent variables or not. The factor structure is called the measurement model. To test the feasibility of the measurement model one needs to estimate how a constraint covariance matrix (i.e., when a factor structure is imposed on the data) fits the unconstraint covariance matrix (i.e., when a factor structure is not imposed on the data) (Byrne, 2012).

The most common way to test the fit of the measurement model is through a χ^2 test (Byrne, 2012; Kline, 2015). The χ^2 test compares the implied covariance matrix of the measurement model to the observed covariance matrix (i.e., unconstrained one), and then conducts a χ^2 test to detect differences. If the differences are significantly large (i.e., the null hypothesis is rejected), then it is concluded that the suggested model is misspecified. Importantly, misspecification of a model applies false constraints to a covariance matrix. Some have argued, however, that since χ^2 test is sensitive to large sample sizes because it is a test of hypothesis (Byrne, 2012), thus, other forms of fit indices should also be used to examine the degree of misspecification (Byrne, 2012). Moreover, a significant χ^2 test shows that there is a degree of misspecification, but does not give any information regarding its size (Byrne, 2012). The most common fit indices are the Standardised Root Mean Square (SRMR), the Root Mean Square Error of Approximation (RMSEA), the Comparative Fit Index (CFI), and the Tucker-Lewis Index (TLI) (Byrne, 2012). Importantly, all of these fit indices have advantages and disadvantages, which are described below.

Similar to the χ^2 test, the SRMR compares the implied covariance matrix to the unconstrained matrix, but it looks into the absolute differences and the residuals as opposed to

conducting a hypothesis test (Byrne, 2012). For this reason, the SRMR is impassive to sample size. However, since the SRMR focuses on the average residuals of the two covariance matrices, it does not provide information about the source of the misfit (Byrne, 2012). For the SMRM, values lower than .06 are considered an indication of a good fit (Byrne, 2012).

The RMSEA compares the implied covariance matrix to the hypothetical population covariance matrix (Byrne, 2012). For this reason, the RMSEA can show whether fit issues are because of misspecification (e.g., omitted variables) or due to sampling variability. Because of its relationship with the population, RMSEA has to be interpreted with its confidence interval (Byrne, 2012). For the RMSEA, values of the higher interval that are lower than .08 are considered good (Byrne, 2012). One issue with the RMSEA, however, is that it is poorly understood and techniques to estimate it in a multilevel context have not been developed yet (Byrne, 2012; Kenny et al., 2015).

The CFI and TLI are similar to one another. Both compare the constrained covariance matrix to a matrix where it is assumed that there is no correlation between all the variables included in the model (Byrne, 2012). Values over .95 are considered excellent, and values over .90 are considered acceptable (Byrne, 2012). The key difference between the CFI and TLI is that the TLI takes model complexity into account (i.e., degrees of freedom), thus it favours simpler, more parsimonious models (Byrne, 2012). A critique of the CFI and TLI is that it is impossible to have a zero-correlation covariance matrix, so it compares the constrained matrix to an impossible one (Byrne, 2012).

Once the measurement model has been established and the fit indices are acceptable, one needs to estimate the structural model. The structural model shows the causal relationship between the variables of the models (Byrne, 2012). This can be estimated either using observed variables (e.g., arithmetic means of the factors), in which case the model is termed a path model or with latent variables, in which case the model is called SEM (Byrne, 2012; Kline, 2015). In

case an SEM model is estimated, one needs to examine the fit indices of the structural model to determine whether the underlying causal structure and constraints properly represent the observed data.

It is important to mention, however, that having a good fitting model does not ensure causality (Antonakis et al., 2010; Kline, 2015). This is because no statistical technique can provide a causal examination if there are no exogenous variables in the model (Antonakis et al., 2010). For this reason, it is commonly said that causality is not estimated, but introduced in the model via an exogenous variable or treatment (Antonakis et al., 2010).

4.7 Methods summary

This chapter outlined the four research designs and three statistical techniques that I will use to explore the research questions posited in Chapter 3. Studies 1 and 2 constitute experimental studies to address, causally, the question of why workers take a break and engage in different break behaviours. Study 2 is a direct consequence of the Covid-19 pandemic, where Study 1 was cut short following government restrictions to collect data in person. Study 3 is a field experiment concerned with the question of why workers engage in different work behaviours during the workday. Finally, Study 4 is a multisource ESM that is concerned with how break behaviours relate to employee outcomes after the break. Table 4.2 provides a summary of the studies, the research questions they address, and the statistical techniques that are used.

Table 4.2. Summary of studies, research questions, and designs.

Study	Research Question	Design	Statistical technique
Study 1	- **RQ1** Why do workers take breaks? Is it because of what they have done, or is it because of what they expect to be doing after a break? - **RQ2** Why do workers engage in different break behaviours? Is it because of what they have done before the break or because of what they expect to do after the break?	Laboratory experiment	Regression analysis, SEM
Study 2	- **RQ1** Why do workers take breaks? Is it because of what they have done, or is it because of what they expect to be doing after a break? - **RQ2** Why do workers engage in different break behaviours? Is it because of what they have done before the break or because of what they expect to do after the break?	Experimental vignette design	Regression analysis, SEM
Study 3	- **RQ2** Why do workers engage in different break behaviours? Is it because of what they have done before the break or because of what they expect to do after the break?	Field experiment	Regression analysis, SEM
Study 4	- **RQ3** Are the break behaviours described in this model related to well-being and performance after the break?	ESM	Multilevel modelling, SEM

Chapter 5
A causal test of the Episodic Model of Work Breaks

In this chapter, I empirically examine the first two research questions that I outlined in Chapter 3. The first research question is 'why do workers take breaks? Is it because of what they have done, or is it because of what they expect to be doing after a break?'. The second research question is 'why do workers engage in different break behaviours? Is it because of what they have done before the break or because of what they expect to do after the break?'. To this end, I designed and implemented a randomised laboratory experiment to provide causal evidence on the processes that underlie the Episodic Model of Work Breaks. Nevertheless, due to the Covid-19 pandemic and government restrictions to collect data in person, this laboratory experiment had to be interrupted indefinitely. To resolve this issue, I implemented an online vignette experiment that addresses the same research questions and hypotheses. Both studies are presented in this chapter.

This chapter makes three contributions to work breaks research and this thesis. First, this chapter extends our knowledge on why workers take breaks. Until now, it was assumed that workers take breaks because they need to rest and recover lost resources because of the work they have done (Bosch & Sonnentag, 2019; Zhu et al., 2018). The recovery perspective on breaks provides useful insights to understand break processes. However, this chapter goes beyond this assumption by considering also what workers anticipate doing after the break as relevant motivators for wanting to take breaks.

Second, this study provides a more nuanced understanding of why workers engage in different break behaviours during breaks. Specifically, past research has attempted to understand how general levels of fatigue and vitality may lead to engaging in general micro-break activities (e.g., going to the bathroom, chatting with colleagues). In contrast, here I argue

that previous and anticipated performance episode characteristics can also have an impact on engaging in different break behaviours.

Third, as explained in Chapter 3, although past research provides important insights to understand why workers may take breaks, the research designs that are often utilised are not appropriate to establish causality (e.g., Bosch & Sonnentag, 2019; Zacher et al., 2014). Therefore, by engaging in research designs in which an exogenous variable is externally introduced, this study contributes to our knowledge about what causes workers to take breaks and engage in different break behaviours.

This chapter is organised as follows. I first describe the section of the Episodic Model of Work Breaks that will be tested in this chapter. I then discuss how two specific performance episode characteristics can shape whether workers take breaks or not and what they do during breaks. I then present Study 1, its results, and its limitations. I then follow with Study 2. I finish this chapter with an overall discussion of the results.

5.1 Theoretical background

Figure 5.1 depict the model that will be tested in this chapter. This model suggests that pre-break performance episode and the anticipation of post-break performance episodes jointly influence whether workers take breaks, and whether workers engage in disengagement or task engagement break behaviours.

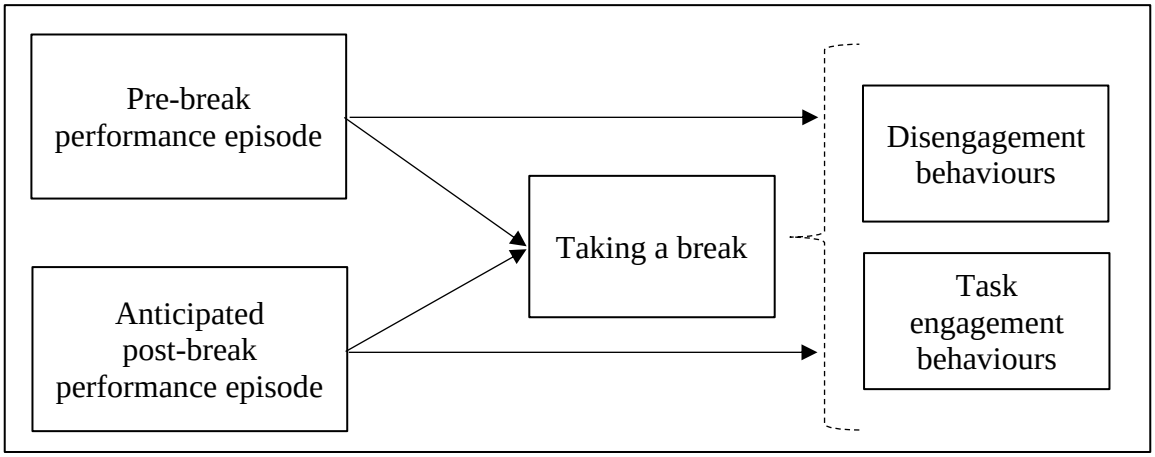

Figure 5.1. Theoretical model to be tested in Chapter 5.

5.1.1 Why do workers take breaks? The Episodic Model of Work Breaks

In Chapter 3 I proposed the Episodic Model of Work Breaks to explain why workers take breaks. The model's main proposition is that performance episodes before and after the break influence whether workers take breaks or not, what workers do during breaks, and break effectiveness. To support this proposition, I suggested a dual pathway, where the reactive pathway represents the influences of performance episodes before the break, while the proactive pathway represents the influences of performance episodes after the break. Moreover, a second proposition is that there are carry-over effects of past and current performance episodes on future performance episodes, such that past affective experiences influence future performance events. Therefore, it is important to consider the joint influences of performance episodes before and after the break to better explain breaks.

According to the Episodic Model of Work Breaks, workers take reactive breaks to reward themselves to improve their mood after completing a performance episode that generated negative affect. Evidence supporting the reactive pathway of breaks as means to improve one's mood comes from Bosch and Sonnentag's study (2019) where they showed that workers take breaks because of a desire for self-reward after a disliked task. For example, in a

scenario were having to mark hundreds of student papers is required, one may divide them into batches of papers (i.e., each batch is a performance episode) and decide to take a break and eat a cookie every time a batch finished. In this example, marking papers is a disliked task, while taking a break and eating cookies can be a form of reward.

According to the Episodic Model of Work Breaks, workers also take proactive breaks to prepare for future complex or difficult performance episodes. As such, proactive breaks are conceptualised as anticipatory coping strategies whereby workers engage in different behaviours to reduce the potential stress of future job demands. For example, imagine someone expecting a meeting with a supervisee where bad news needs to be delivered. Someone may want to take a break immediately before the break as a way to prepare for that meeting, and either think about how to best deliver the news (i.e., problem-focused coping) or regulate their own affective state before the meeting (i.e., emotion-focused coping).

An assumption within the reactive and proactive breaks discussion is that certain performance episode characteristics make workers want to take breaks (e.g., reactive breaks are motivated by disliked performance episodes, while proactive breaks are motivated by performance episodes that can potentially be stressful). One way to describe these performance episode characteristics is from a job design perspective. Job design research at its core aims to describe the different tasks that workers perform in their jobs and how these characteristics influence employee motivation and work behaviours (Oldham & Fried, 2016). In their initial conceptualisation, Hackman and Oldham (1976) defined five job characteristics: skill variety (i.e., number of different skills and talents to perform a task), task identity (i.e., the degree to which the job requires completion of a "whole" and identifiable piece of work), task significance (i.e., the impact of a job on the lives or work of other people), task autonomy (i.e., degree of freedom, independence, and discretion of an individual at their job), and task

feedback (i.e., the degree to which carrying out the work gives clear information about the effectiveness of his or her performance).

These five characteristics can be aggregated to create macro task characteristics, such as task monotony and complexity. From this job design conceptualisation, monotonous tasks have been defined as tasks that require few skills, have little variety, and there is little autonomy (Johansson, 1989). In turn, complex tasks have been often defined as tasks that require a high number of different skills and provide a large degree of autonomy, but there is little task feedback (Fried & Ferris, 1986; Liu & Li, 2012). Therefore, performance episodes can be described as either monotonous or complex, depending on the extent to which different task characteristics are present. Importantly, task monotony and task complexity elicit specific psychological experiences, such as boredom and stress, that should activate the dual pathway described above. Therefore, in the studies presented in this chapter, I will specifically focus on how task monotony and task complexity before and after the break can explain whether workers take breaks or not. In the following sections, I discuss how monotony and complexity are related to taking breaks.

5.1.2 Task monotony and taking breaks

Monotony at work has been defined as engaging in tasks that require performing repetitive movements (e.g., data entry in excel sheets) or performing in environments where hardy anything changes (e.g., vigilance tasks) (Johansson, 1989; Thackray, 1981). Monotony is usually experienced negatively and gives rise to several negative consequences. For example, workers who constantly perform monotonous work report higher levels of strain, stress-related symptoms, and emotional distress (Dunn & Williamson, 2012; Fisher, 1993; Johansson, 1989; Melamed et al., 1995; Reijseger et al., 2013). This is because monotony is closely related to boredom, which is a negative affective state (Fisher, 1993), and when experienced constantly

at work can lead to low levels of well-being and satisfaction (Warr, 1990; Weiss & Cropanzano, 1996).

Task monotony can potentially influence taking breaks via both paths present in the Episodic Model of Work Breaks. From a reactive perspective, and drawing on the episodic performance model (Beal et al., 2005) that underlies the Episodic Model of Work Breaks, I argue that affective states that were experienced in previous performance episodes are carried over to future performance episodes. This means that if a worker finishes a monotonous performance episode and continues straight to the next performance episode, they will still be experiencing the negative affective states that emerged from boredom (Beal et al., 2005). I propose that workers would look to avoid such negative states by engaging in a break to improve their mood. Specifically, drawing on the Episodic Model of Work Breaks, I argue that workers would take a break after completing a monotonous task to reward themselves. From a behavioural perspective, rewards are positive experiences that keep people motivated and facilitate the replication of specific behaviours in the future (Bandura, 1976). This would be especially the case if obtaining a reward is a direct consequence of having completed a task that is disliked (Bosch & Sonnentag, 2019). From an affective perspective, breaks as rewards function as an emotion regulation strategy to improve employee moods after having completed a monotonous task. In this way, workers will be able to improve their mood before commencing a different performance episode.

Despite the above arguments, one could argue that workers who expect to perform a monotonous task may anticipate experiences of negative affect as a result thereof and trigger the proactive pathway for taking breaks. Specifically, workers may engage in breaks to proactively cope with the monotony that they expect to experience in the future. It is important to mention, however, that workers often procrastinate when they have to engage in tasks that they dislike (Steel, 2007), and breaks and procrastination differ. Breaks are usually experienced

as positive and have the goal to make the worker feel better (Trougakos & Hideg, 2009). In contrast, procrastination is often experienced as negative, it prolongs the negative experience that can result from expecting disliked tasks, and results in higher levels of negative affect after procrastinating (Steel, 2007). Procrastination usually emerges when workers feel that they have exhausted their regulatory resources and cannot focus on their current task (Beal et al., 2005; Steel, 2007). Thus, I argue that it is unlikely that the proactive pathway is triggered by anticipated monotony because taking a break can be confounded with procrastination and this may promote negative experiences. Therefore, workers will probably decide to take a break after they complete a monotonous task.

Based on the above, I argue that monotony mostly triggers the reactive pathway for taking breaks. Namely, workers should be motivated to take breaks when they just finished a monotonous task because this will help them feel better. Thus, I propose the following hypothesis:

Hypothesis 1: Employees who have performed a monotonous task are *more* likely to take a break than those who have not.

5.1.3 Task complexity and taking breaks

Campbell's model of complexity (1988) is one of the most widely used conceptualisations for task complexity (Liu & Li, 2012). From this perspective, tasks are objectively complex when they can be completed in multiple ways and there is no 'best way' to do something (i.e., problem complexity), have multiple possible solutions and the best one is not immediately apparent (i.e., decision complexity), have conflicting paths to achieve the desired outcome (i.e., judgement complexity), and there is an uncertain link between an act and an outcome (i.e., fuzzy complexity) (Campbell, 1988). In other words, tasks are complex when

they have high levels of autonomy, high levels of skill variety, and low levels of feedback (Hackman & Oldham, 1976; Liu & Li, 2012).

Past research has highlighted that performing complex tasks can potentially be stressful, because complex tasks can exceed the worker's ability to successfully complete the task and lead to poor performance (Liu & Li, 2012). Performing poorly is stressful because it lowers our self-efficacy (i.e., judgements that we make about ourselves, Bandura, 1982), can lower levels of esteem from peers and supervisors, can lead to loss of financial rewards (e.g., when there is a financial reward associated with performing a task), and ultimately, lead to a loss of job (e.g., when the complex task is also crucial for the job) (Lepine et al., 2005). All of this is experience as stressful because it threatens key resources, such as self-image, and financial and social stability (Hobfoll, 1998).

Drawing on coping research, I argue that when workers anticipate performance episodes, they will engage in appraisal processes to understand whether the tasks posit a threat to them. Appraisal refers to a two-stage process whereby individuals first judge if an event is threatening (i.e., primary appraisal). If the event is appraised as threatening, then people judge their available resources to cope with the event (i.e., secondary appraisal) (Lazarus & Folkman, 1984). If resources are deemed insufficient, then coping strategies are deployed. I propose that tasks that are objectively complex as per Campbell's (1988) model are more likely to be appraised as potentially threatening because it is not clear whether resources are sufficient to perform them properly. Considering this, workers may be motivated to take a break before the task to anticipatedly prepare for that task (G. Feldman & Hayes, 2005).

Alternatively, one could argue that expecting complex tasks in the future is not going to lead to workers taking breaks. This is because when tasks are appraised as having challenging characteristics, as opposed to hindrance characteristics, workers will be more motivated to engage in them (Lepine et al., 2005). Challenge demands are those task

characteristics that are seen as obstacles to be overcome, and if met, challenge demands can lead to positive outcomes, such as higher levels of esteem, pay raise, and the like (Lepine et al., 2005). Thus, workers may be excited to engage in complex tasks because of their potential positive outcomes. This would mean that workers will be less likely to take a break if they expect a complex task in the following performance episode.

I argue, however, that the former path is more likely, namely, that workers who expect a complex task in the future will be more likely to take breaks than not take breaks. This is because even though a task may be appraised as challenging and engaging, challenging demands are still stressful for their potential negative impact (Lepine et al., 2005). Performing poorly on a challenging task will not only fail to deliver the anticipated rewards of performing that task, such as higher esteem from their managers but could threaten important resources, as explained above (Lepine et al., 2005). Thus, I propose the following hypothesis:

Hypothesis 2: Employees who anticipate complex tasks are *more* likely to take a break than those who do not.

5.1.4 The joint influence of task monotony and complexity on taking breaks

An important tenant of the Episodic Model of Work Breaks is that current performance episodes and subsequent or future performance episodes will jointly influence whether workers take breaks. Looking exclusively at monotony and complexity, there are four possible combinations of performance episodes: (1) current monotonous, future complex; (2) current complex, future monotonous; (3) current monotonous future monotonous; and (4) current complex, future complex.

Following the dual process of the Episodic Model of Work Breaks, which states that workers will be reactively motivated to take breaks because they are currently performing a

disliked task and that workers will be proactively motivated to take breaks because they anticipate performing a stressful task in the future, I argue that those in the monotonous-complex scenario will be the likeliest group to take breaks compared to workers in the other three scenarios described above. This is because workers who are currently performing a monotonous task should experience boredom, which is also experienced as a negative affective state (Fisher, 1993), and this should trigger the reactive pathway for taking breaks. Moreover, workers who anticipate a complex task in the future are more likely to engage in a break as an anticipatory coping strategy to prepare for the complex task, triggering the proactive pathway for taking breaks. Therefore, I propose the following hypothesis:

Hypothesis 3a: Workers in the monotonous-complex scenario are *more* likely to take breaks compared to those in the other scenarios.

In contrast, those workers in the complex-monotonous scenario are the least likely group to take breaks. This is because completing a complex task can lead to satisfaction with one's performance, experiences of positive affect and feeling competent (Deci et al., 2017). Past empirical research shows that these experiences are not related to taking breaks (Bosch & Sonnentag, 2019). This is probably due to workers already feeling good thus it is not necessary to upregulate positive emotions and downregulate negative ones, failing to trigger the reactive pathway described in the Episodic Model of Work Breaks.

Moreover, as explained above, anticipating a monotonous task should fail to trigger the proactive pathway for taking breaks. On one hand, workers may want to avoid doing monotonous tasks and procrastinate. However, procrastination is a negative experience in itself and only emerges when there is a failure of self-regulation (Steel, 2007). Based on this, procrastinating before a monotonous task should lead to further experiences of negative affect,

a state that workers would want to avoid. Therefore, I argue that workers in the complex-monotonous scenario are the least likely group across all four scenarios to take breaks because their job characteristics do not trigger either the reactive or proactive pathways for taking breaks. Thus, I propose the following hypothesis:

Hypothesis 3b: Workers in the complex-monotonous scenario are *less* likely to take breaks compared to those in the other scenarios.

Workers in the monotonous-monotonous and complex-complex scenario should be somewhere in the middle compared to the other two groups and present little difference among themselves in terms of taking breaks. This is because these two groups will only trigger one of the pathways each. The monotonous-monotonous group should only experience the reactive pathway for taking breaks. Namely, they should be motivated to take breaks because they are performing a task that fosters negative work experiences (i.e., boredom). In contrast, those in the complex-complex scenario should only experience the proactive pathway for taking breaks. Namely, they should be motivated to take breaks to anticipatedly cope with potential stress. Therefore, I propose the following hypotheses:

Hypothesis 3c: Workers in the monotonous-monotonous scenario are *less* likely to take breaks compared to those in the monotonous-complex group, but *more* likely to take breaks compared to those in the complex-monotonous group.

Hypothesis 3d: Workers in the complex-complex scenario are *less* likely to take breaks compared to those in the monotonous-complex group, but *more* likely to take breaks compared to those in the complex-monotonous group.

5.1.5 Monotony, complexity, break behaviours

Two break behaviours might be influenced by the dual pathway described in the Episodic Model of Work Breaks: disengagement break behaviours and task engagement break behaviours. Disengagement break behaviours are behaviours that aim to mentally and physically distance employees from their work. An example of disengagement behaviour is walking in a park during lunch (Sianoja et al., 2017). Task engagement break behaviours are those break behaviours that imply an effortful cognitive engagement with work-related tasks during breaks. An example of such behaviours is to think about how to improve one's performance during the break (Berman & West, 2007).

As explained in Chapter 3, workers seem to participate in disengagement break behaviours to improve their mood and unwind from job demands. This is because disengagement break behaviours seem to be associated with experiences of positive affect and restoration processes. For example, past research has shown that relaxation during breaks, defined as engaging in leisurely low effort positive activities, is associated with increased positive affect after the break (Steidle et al., 2017). Engaging in activities that foster positive experiences are particularly helpful when experiencing negative emotions, such as boredom because this helps improve one's mood (Gross & Thompson, 2007). Moreover, relaxation is also associated with lower levels of fatigue and promotes a state of feeling recovered (Bosch et al., 2017; Zhu et al., 2018). This is particularly important when employees engage in tasks that elicit negative affective experiences, such as boring task. From an episodic performance model, this is because workers will exert more to keep themselves engaged with such a task, which will lead to higher levels of exhaustion (Beal et al., 2005). Thus, I propose that workers who have taken a break after finishing a monotonous task (i.e., monotonous-complex and monotonous-monotonous groups) will be more likely to engage in disengagement break behaviours during the break.

Although psychological detachment is the best example of work-related disengagement behaviours (Sonnentag & Fritz, 2015), this study will focus only on relaxation for several reasons. First, past research suggests that relaxation is the most typically reason that employees cite for taking breaks (Fritz et al., 2011; Strongman & Burt, 2000; Zacher et al., 2014). Second, relaxation is associated to both unwinding processes and experiences of positive affect, thus relaxation during breaks should have the strongest effects on post-break outcomes (Sonnentag & Fritz, 2007). Therefore, understanding the antecedents of relaxation during breaks is particularly important. Moreover, engaging in activities that facilitate psychological detachment, such as reading a book, is only related to positive outcomes after the break if the activity that was performed was enjoyed (Kim et al., 2018). Some have proposed that psychological detachment is not entirely possible, nor desirable, during work breaks (von Dreden & Binnewies, 2017). This is because breaks are normally taken with co-workers and work-related talks usually emerge (von Dreden & Binnewies, 2017). Additionally, fully detaching from work may disrupt work because workers may take longer to re-engage with the work after the break (Zijlstra et al., 2014). Therefore, based on the above discussion, I propose the following hypothesis:

Hypothesis 4: Employees who have performed a monotonous task and decide to take a break are *more* likely to engage in relaxation during the break than those who have not performed a monotonous task before the break.

To understand task engagement break behaviours, I proposed in Chapter 3 to draw from Cropley and Zijlstra (2011) conceptualisation of work rumination. They define rumination as generally thinking about work during non-working time and differentiate between problem-solving pondering and affective rumination. Problem-solving pondering is defined as thinking about solutions to work problems while not working, while affective rumination is defined as

intrusive, pervasive, and recurrent thoughts about work that are negative and emerge while not working (Cropley & Zijlstra, 2011). Considering that problem-solving pondering usually emerges in the face of complex tasks that need to be completed in the near future (Kvavilashvili & Rummel, 2020), in this chapter I will focus on this type of task engagement break behaviour.

I also argued in Chapter 3 that problem-solving pondering could be considering an anticipatory coping strategy because it can potentially ameliorate the stress of performing a seemingly complex task. For example, workers may have to write an important report right after a break, which can be considered a complex task within Campbell's (1988) framework, where making a mental plan on how to go about it can help reduce stress. This is because thinking about how to perform a task often leads to the successful resolution of that task. In support of this idea, past research has shown that workers who mentally plan how to perform tasks in the future, think about the best ways of performing a task, and mentally rehearse different potential scenarios before engaging in a task also perform better in the future (Kvavilashvili & Rummel, 2020). Thus, I suggest that workers who take breaks because they anticipate complex tasks will be more likely to engage in problem-solving pondering during the break to reduce potential stress. Therefore, I propose the following hypothesis:

Hypothesis 5: Employees who anticipate performing a complex task and decide to take a break are *more* likely to engage in problem-solving pondering during the break than those who do not anticipate a complex task after the break.

5.1.6 Summary

This section explained that monotony and complexity have unique influences on why workers take breaks and what workers decide to do during breaks. The decision to focus on these two task characteristics was due to their presumed direct link with the dual pathway

proposed by the Episodic Model of Work Breaks. Moreover, monotony and complexity are also defined as macro-task characteristics that combine other tasks characteristics, such as skill variety and autonomy. Table 5.1 presents a summary of the hypotheses.

Table 5.1. Summary of hypotheses in Chapter 5.

Why do workers take breaks?	
Hypothesis 1	Employees who have performed a monotonous task are *more* likely to take a break than those who have not.
Hypothesis 2	Employees who anticipate complex tasks are *more* likely to take a break than those who do not.
Hypothesis 3a	Workers in the monotonous-complex scenario are *less* likely to take breaks compared to those in the other scenarios.
Hypothesis 3b	Workers in the complex-monotonous scenario are *less* likely to take breaks compared to those in the other scenarios.
Hypothesis 3c	Workers in the monotonous-monotonous scenario are *less* likely to take breaks compared to those in the monotonous-complex group, but *more* likely to take breaks compared to those in the complex-monotonous group.
Hypothesis 3d	Workers in the complex-complex scenario are *less* likely to take breaks compared to those in the monotonous-complex group, but *more* likely to take breaks compared to those in the complex-monotonous group.
Why do workers engage in different break behaviours?	
Hypothesis 4	Employees who have performed a monotonous task and decide to take a break are *more* likely to engage in relaxation during the break than those who have not.
Hypothesis 5	Employees who anticipate performing a complex task and decide to take a break are *more* likely to engage in problem-solving pondering during the break than those who have not.

5.2 Study 1

This section presents the first study that examines the hypotheses described above, which is a laboratory experiment. Laboratory experiments are ideal when causality is central to the research question. Nevertheless, as mentioned before, Covid-19 heavily thwarted this study. Specifically, I had to stop data collection due to the national lockdown declared in March

2020. For this reason, the results presented here are underpowered and unreliable. Since the experimental tasks were designed to be performed in a laboratory environment, where the participants had access to physical resources, it was not possible to replicate the exact experiment in a virtual setting.

5.2.1 Study 1 – Methods

5.2.1.1 Sample and procedure

This section describes the laboratory experiment that was implemented to test the hypotheses described in Table 5.1. All material, instructions, measurements, and protocols can be found in Appendix A. This experiment was composed of two tasks that each lasted 30 minutes and varied in terms of monotony and complexity. After completing the first task, participants could decide whether to take a 10-minute break before continuing with the second task or continuing straight to the second task. In case participants decided to take the break, they were asked to what extent they engaged in relaxation and problem-solving pondering during the break.

For this study, I recruited a convenience sample of university students (undergraduate, master, and PhD levels) which I accessed through personal contacts (e.g., lecturers and seminar leaders advertising the study), posters around the university campus, and messages in student-relevant Facebook groups (e.g., fresher groups). In all of the recruitment strategies, participants had to access a pre-registration survey either through a QR code or a link that redirected them to an initial survey where they had to provide their contact details and availability to be invited to the experimental session.

This study was advertised as a mock assessment centre where the interest was in understanding how participants managed their time to maximise performance in a personnel

selection process. I decided to not make my interest in work breaks explicit as this could potentially bias the results (e.g., some participants could take more breaks because they would want to 'help' in a study about work breaks). Since this could be considered mild deception, the decision was subject to and accepted by the ethics committee. The assessment centre façade was chosen on the assumption that university students may be interested in participating if they obtained feedback on a personnel selection process. Therefore, at the end of the data collection, participants who registered for feedback received a summary of their performance and personality variables that were collected for the sole purpose of giving feedback. In addition to this feedback, participants were offered a baseline reward of £5 for their participation with the possibility to earn extra payment based on their performance.

Once participants registered for the study, they were scheduled for the experimental session. I scheduled 12 participants per session to ensure that there were fewer distractions (e.g., participants flipping through pages, shifting in their chairs, etc.). Before the experimental session, each participant was assigned to one of the four experimental groups. These experimental group varied the order in which the tasks were presented and are as follow:

1) Monotonous Task – Complex Task
2) Complex Task – Monotonous Task
3) Monotonous Task – Monotonous Task
4) Complex Task – Complex Task

The monotonous task for this study was developed using Johansson's framework (1989) of 'repetitive monotony'. In this framework, repetitive monotony is when a task requires frequent short cycles. For this study, the monotonous task was the revision of two seemingly equal lists of fake names and addresses where participants were asked to visually inspect both lists to ensure that the entries matched perfectly. If the entries did not match, they had to note the mistake. The lists had 700 entries and 210 were randomly altered with typos (20% of the list). Participants were instructed to work as fast as they could. This task was considered

monotonous because they had to perform 700 short cycles of a frequent small task. An example of the task can be seen in Appendix A.3.1.

The complex task for this study was developed using Campbell's (1988) framework described above. Participants had to write a short report about a contested topic, such as whether developing countries should fully migrate to renewable sources of energy or not, or whether marijuana should be fully legalised in the same way as alcohol and tobacco. The second essay topic was only used in the complex-complex condition, as they had to write two short reports. Participants had to write a 500-word essay using the material provided. This material was an assortment of journal articles, blog entries, news articles, and infographics, which can be found in Appendix A.4.2. This task was considered complex because it contained the four sources of complexity described in Campbell's (1988) model: it had multiple paths that could lead to an appropriate answer, it had no obvious answer, there were conflicting paths to reach to the desired solution, and there was no clear link between their effort and a good outcome.

Before the beginning of the study, I piloted the protocol with four doctoral students (one for each experimental group) to examine whether the tasks could be considered either monotonous or complex. The pilot participants did not have prior knowledge of the monotony and complexity frameworks described above. I conducted interviews with each pilot participant to ask them about their experience performing the tasks. The monotonous task was described as "deadening" and "boring". Therefore, it was decided that the monotonous task fitted the criteria for a repetitive monotonous task (Johansson, 1989). In turn, participants described the complex task as "interesting and fun", "difficult because of the time pressure and the variety of material", and that it was not readily obvious how to compose the essay, as the material "covered both sides of the argument". Thus, the complex task was also deemed appropriate for this study because it fitted the criteria for complex tasks according to Campbell (1988).

Participants were told that the top 20% of performers in each group would be entered into a raffle for one of four £50 vouchers (one voucher per experimental group). This was done to add pressure to maximise their performance and increase ecological validity (i.e., obtaining the voucher was akin to getting the job). Importantly, it was highlighted in the instructions that taking the break would not affect in any way their chance of getting the voucher and that if they felt that they needed the break, they should take it. In contrast, if they felt that the break would disrupt their workflow, they should not take it.

Considering the four scenarios described above, I conducted a power analysis using G*Power (Faul et al., 2009) to identify the appropriate sample size to reduce Type-2 error (i.e., possibility of finding a false-positive result). Results indicate that I needed 200 participants to identify a medium effect size (F = .25) using probit multiple regression with a statistical power of 80% at a significant level of .05, and assuming four groups and a binary dependent variable (take a break or not). The inclusion criteria for this study were to be proficient in English and a university student at the moment of the study. Of the 200 required participants, I managed to collect only 60 due to Covid-19 restrictions. Of this sample, 55% were undergraduate students, 8.3% were master's students, and 36.7% were doctoral students. The average age was 23.4 (SD = 4.8), and 55% were females.

5.2.1.2 Measures

This section describes the measures that were used in this study. The specific items included in each scale with their factor loadings can be seen in Appendix A.6.

Taking a break. The dependent variable in this study was whether participants took a break or not after the first task, thus, it was coded as 0 (not taking a break) or 1 (taking a break).

Relaxation. Relaxation was measured through four items from the Recovery Experience questionnaire (Sonnentag & Fritz, 2007). An example item is "During the break, to what extent did you use your time to relax?" (α = .76).

Problem-solving pondering. Problem-solving pondering was adapted from the measure developed by Querstret and Cropley (2012) and consisted of four items. An example item is "During the break, to what extent did you use your time to think about how to perform the next task?" (α = .94).

5.2.1.3 Planned data analysis strategy

This section briefly describes how I planned to analyse the data, had I been able to finish data collection. To test hypotheses 1 and 2 concerned with performing a monotonous task first and a complex task second respectively, I first created two binary groups. Group 1, labelled pre-break monotony, distinguished between the participants who performed a monotonous task first (monotonous-complex and monotonous-monotonous groups) from those who did not. Group 2, labelled post-break complexity, distinguished between the participants who performed a complex task second (monotonous-complex and complex-complex) from those who did not. I then expected to run a probit regression using the break decision as the dependent variable, and the binary groups as the independent variable. Probit regression is an alternative to multiple regression analysis used when the dependent variable is binary. Results must be interpreted as how likely is that subjects would endorse 1 (i.e., take the break) as a function of the independent variables (i.e., group assignment).

To test hypotheses 3a-d concerned with the interaction between performing monotonous and complex tasks I expected to run four probit models. Since the independent variables were four orthogonal binary variables indicating the experimental group membership,

each model omitted one of these variables. As such, model 1 regressed the break decision on the monotonous-complex, complex-monotonous, and monotonous-monotonous groups. In this case, results must be interpreted as the degree to which individuals in each group would engage in breaks compared to the reference group, which in this example is the complex-complex group. Model 2 used the monotonous-monotonous group as the reference group, model 3 used the complex-monotonous group as the reference, and model 4 used the monotonous-complex group as the reference. Importantly, model 4 does not provide any information above the other three models, but it does make it easier to interpret some of the results.

To test hypotheses 4 and 5 concerned with how task characteristics influence relaxation and problem-solving pondering during breaks, I followed a similar approach as the one used to test hypotheses 1 and 2 (namely, the creation of two binary groups), but instead of using probit regression, I used two T-tests (one for each hypothesis) as the variable is continuous. Moreover, I also used the subsample of participants that took the break.

Unfortunately, as was already mentioned, I could not collect the full sample, and many of the analyses described above could not be conducted. Thus, the next section describes what I actually did, based on the data that I had.

5.2.1.4 Actual data analysis strategy

To test hypotheses 1 and 2, I first grouped participants into the two binary groups described above (i.e., monotonous tasks first, and complex task second) and conducted two χ^2 tests in R to understand whether there is an association between the experimental groups and taking breaks. The first χ^2 tests examined whether there was an association between performing a monotonous task first (vs a complex one) and taking a break. The second χ^2 test examined whether there was an association between anticipating a complex task after the first

one (vs a monotonous task) and taking a break. To test hypotheses 3a-d concerning whether there is an interaction between performing monotonous and complex tasks, I conducted a Fisher's exact test, as the sample size was too small to use a χ^2 test. Unfortunately, this means that hypotheses 3a to 3d are not directly testable as Fisher's exact test shows whether there is an association between the experimental groups and taking a break, but it does not statistically test whether the differences between groups are significant.

Finally, I do not have a sufficient sample size to test hypotheses 4 and 5 concerning the relationship between performing a monotonous task first and anticipating a complex task later with relaxation and problem-solving pondering. Specifically, power analysis in G*Power shows that to identify medium effect sized with a T-test I need 64 participants per group, which is not the case. This means that the results are not reliable. Nevertheless, I decided to conduct the analyses as an intellectual exercise.

5.2.2 Study 1 – Results

Descriptive data for this study can be found in Table 5.2. This table shows how many people were assigned to each group, how many within each group took the break after the first task, and out of them, the degree of relaxation and problem-solving pondering that people engaged in during that break. Table 5.3 shows the row-proportion of people who took the break, in case their first task was monotonous vs complex, and in case their second task was monotonous vs complex. Finally, Table 5.4 shows the row-proportion of people who took the break in each of the experimental groups. I decided to focus on the row-proportions as the groups were unbalanced and this gives a sense of the absolute amount of people who took the break in each condition; therefore, it shows whether there is an association between the experimental condition and taking breaks. If there would be no association, one should observe the same proportions of participants who took the break compared to those who did not.

Table 5.2 Descriptive results for the laboratory experiment.

Group	N	N took break	Relaxation (SD)	PSP (SD)
Monotonous – Complex	19	7	3.54 (.59)	2.46 (1.20)
Complex – Monotonous	14	2	2.50 (1.41)	1.00 (.00)
Monotonous – Monotonous	12	3	4.25 (.90)	2.58 (1.77)
Complex – Complex	15	4	2.88 (.72)	3.19 (1.99)

Notes. This table contains the descriptive results of the relevant variables of this study. 'N' = Total sample size in each group; 'N took a break' = Total participants that took the break in each experimental group; 'Relaxation' = the degree of relaxation of those who took breaks; 'PSP' = the degree of problem-solving pondering of those who took breaks.

Hypothesis 1 suggested that employees who have performed a monotonous task will be *more* likely to take a break than those who have not. Results in Table 5.3 show that participants who perform a monotonous task first take proportionally more breaks than those who performed a complex task first (.32 vs .21). Nevertheless, the χ^2 test is not significant ($\chi^2 = .52$, $df = 1$, $p > .05$), thus hypotheses 1 is rejected.

Hypothesis 2 suggested that employees who expect to perform a complex task second will be *more* likely to take a break than those who do not. Results in Table 5.3 show that participants who anticipated a complex task second take proportionally more breaks than those who expected a monotonous task (.32 vs .19). Nevertheless, the χ^2 test is not significant ($\chi^2 = .71$, $df = 1$, $p > .05$), thus hypotheses 2 is rejected.

Table 5.3 Row proportions of those who took breaks vs those who did not across binary groups in the laboratory experiment.

Group	No break	Break
Task 1 is monotonous	.68	.32
Task 1 is complex	.79	.21
χ^2 test	$\chi^2 = .52$, $df = 1$	

Group	No break	Break
Task 2 is monotonous	.81	.19
Task 2 is complex	.68	.32
χ^2 test	$\chi^2 = .71$, $df = 1$	

Hypotheses 3a, 3b, 3c, and 3d were concerned with how membership to each experimental group was related to taking breaks. Hypothesis 3a stated that workers in the monotonous-complex scenario will be *more* likely to take breaks compared to those in the other

scenarios. Results in Table 5.4 show that this is indeed the case, with participants in this group taking proportionally more breaks compared to all other groups (.37).

Hypothesis 3b argued that workers in the complex-monotonous scenario will be *less* likely to take breaks compared to those in the other scenarios. Again, this is the case, with participants in the complex-monotonous group taking proportionally the least breaks compared to the other groups (.14).

Hypothesis 3c proposed that workers in the monotonous-monotonous scenario will be *less* likely to take breaks compared to those in the monotonous-complex group, but *more* likely to take breaks compared to those in the complex-monotonous group. In turn, hypothesis 3d suggested that workers in the complex-complex scenario will be *less* likely to take breaks compared to those in the monotonous-complex group, but *more* likely to take breaks compared to those in the complex-monotonous group. Results in Table 5.4 show that this is the case, such that participants in the monotonous-monotonous and complex-complex groups take proportionally fewer breaks than those in the monotonous-complex group, but proportionally more breaks than those in the complex-monotonous group. Moreover, there is a negligible difference between these two groups (proportion of .25 for the monotonous-monotonous group, and .27 for the complex-complex group).

Nevertheless, the Fisher's exact test was not significant. Thus, hypotheses 3a, 3b, 3c, and 3d are not statistically supported ($p > .05$).

Table 5.4 Row-proportion of those who took breaks vs those who did not, across experimental groups in the laboratory experiment.

Group	No Break	Break
Monotonous – Complex	.63	.37
Complex – Monotonous	.86	.14
Monotonous – Monotonous	.75	.25
Complex – Complex	.73	.27
Exact Fisher's test	$p > .05$	

Hypothesis 4 stated that employees who have performed the monotonous task first and decided to take a break will be *more* likely to engage in relaxation during the break than those who have not. A T-test showed that this is indeed the case ($t = 2.37$, $df = 9.2$, $p < .05$). Further, Levene test of variance equality shows that the variance is equivalent between the two groups ($F = .25$, $df = 14$, $p > .05$). Therefore, hypothesis 4 is supported. Looking at Table 5.2, one can see that the groups that engaged more in relaxation during breaks are the monotonous – monotonous group, followed by the monotonous – complex group. Thus, I performed a post-hoc ANOVA test to see whether there is a difference across the different experimental groups, but it was not significant ($F = 2.77$, $df = 3$, $p > .05$).

Hypothesis 5 proposed that employees who anticipated performing a complex task second and decide to take a break will be *more* likely to engage in problem-solving pondering during the break than those who did not anticipate a complex task. A T-test does not support this assertion ($t = .96$, $df = 7.5$, $p > .05$). A Levene test also shows that the variances between the two groups are equivalent ($F = .25$, $df = 14$, $p > .05$), therefore, hypothesis 5 is rejected. I also performed an ANOVA test to see whether there is a difference across the four experimental groups, but it was also not significant ($F = .97$, $df = 3$, $p > .05$).

5.2.3 Study 1 – Discussion

Although the study is underpowered due to the university restrictions to collect data in person in line with government legislation and therefore cannot support generalizable conclusions, the data within this sample does show promising trends that are in line with the hypotheses.

As hypothesised, participants who performed a monotonous task first did take more breaks compared to those who performed a complex task first. Additionally, participants who

anticipated a complex task second also took more breaks compared to those who anticipated a monotonous task second. These results provide evidence that an employee's decision to take a break is influenced by the characteristics of the tasks they have just performed and the characteristics of the tasks they expect to be doing next. Importantly, results provide preliminary evidence to answer Research Question 1.

When looking at the joint influence of the two types of tasks (i.e., monotonous and complex), participants who performed a monotonous task first and then anticipated a complex task second are the likeliest group to take breaks. In contrast, participants who performed a complex task first and then anticipated a monotonous task second are the least likely group to take breaks. This lends support to the dual pathway proposed in the model, such that there is a reactive pathway and a proactive pathway that explain why workers take breaks. When both pathways are present, workers will be more likely to take breaks compared to other conditions. In contrast, when both pathways are absent, workers will be less likely to take breaks compared to other conditions. These results provide preliminary evidence to one of the core tenants of the Episodic Model of Work Breaks concerning the joint effects of past and anticipated performance episodes.

The results concerning break behaviours are also promising. Consistent with what was hypothesised, participants who performed a monotonous task first and took a break were more likely to engage in relaxation. This supports the idea that workers may engage in disengagement behaviours after they experienced negative work events, and more importantly, this result does begin to answer Research Question 2, namely, that performance episodes immediately before the break seem to influence what workers do during their break. However, results concerning problem-solving pondering were not supported.

5.3 Study 2

This study was developed as an alternative to Study 1 that could be conducted under the current global situation, thus it tests the same hypotheses as Study 1. Specifically, I developed a randomised online vignette experiment that combines features of both experiments and vignette designs to increase the external and internal validity. On one hand, participants were presented with a hypothetical vignette where they had to report whether they would take a break given the scenario they were randomly assigned to (vignette section). On the other hand, participants had to perform fragments of the real tasks that they would be expected to perform in the real scenario to increase the realism of the situation (experimental section).

5.3.1 Study 2 – Methods

5.3.1.1 Sample and procedure

This section describes the randomised online vignette experiment that was implemented to test the hypotheses described in this chapter. All material, instructions, measurements, and protocols can be found in Appendix B. In this study, participants were given a fictional scenario where they were told that they just started a new job as industrial designers in a marketing consultancy and they needed to perform two important tasks. As with the previous study, these tasks were either monotonous or complex and participants were randomly assigned to one of the four experimental groups that varied the order in which the tasks are presented in the following way:

1) Monotonous – Complex
2) Complex – Monotonous
3) Monotonous – Monotonous
4) Complex – Complex

To develop the tasks for this study, I used the same frameworks of task monotony and complexity described earlier this chapter. Further, to increase ecological validity, I reviewed

the job descriptors of an industrial designer in O*Net and discussed the tasks with two independent industrial designers. All sources agreed that the experimental tasks could be part of the daily job of an industrial designer. Similar to Study 1, the monotonous task was to check two equivalent lists of fake names and addresses in which participants had to ensure that they match perfectly. In one of the lists, 20% of the entries were randomly altered with typos.

The complex task was different from the one presented in Study 1. This is because it was not possible to implement that task in a fully virtual environment. The new task was a creative activity in which participants had to come up with a marketing slogan for a specific product in a Haiku format for a Japanese client. A Haiku is a Japanese poem that follows a fixed structure with three lines of 5-7-5 syllables; therefore, participants had to be creative in two ways. First, they needed to come up with a slogan that meets the brief (e.g., a Haiku marketing slogan for a futuristic Japanese lamp). Second, this slogan had to meet the Haiku format.

To ensure that the tasks adhered to the monotony and complexity frameworks, I first piloted the study with four doctoral students (one for each experimental group). These pilot students were different to the ones in Study 1 and did not have any prior knowledge about the monotony and complexity frameworks. I asked participants to describe how they felt doing both tasks, and what they thought of the tasks. Participants typically described the monotonous task as mind-numbing, boring, easy, simple, and tedious. Overall, these participants agreed that the monotonous task could be considered monotonous and boring. Typical words to describe the complex task were engaging, interesting, fun, complex, difficult. Overall, participants agreed that the complex task could be considered complex and engaging. Therefore, the tasks were judged to be appropriate for the purpose of this study.

To increase the immersiveness of the vignette, participants were shown a set of videos and performed work samples of the real tasks that they would have to perform if the situation

was real, lasting for a duration of 10 minutes. Participants were first greeted by the company's fictional CEO in a pre-recorded video. This pre-recorded video was developed to set the scene and expectations for the vignette. Specifically, the CEO mentioned that in their new role, participants will be involved in different tasks, some of them complex and exciting, and others simple and mundane. After this video, participants watched an introductory video of their line manager who gave the instructions for the study. Specifically, this video suggested that high levels of performance were expected and told participants that they will have to perform two tasks in this study. Depending on the experimental group, participants saw different videos of the line manager explaining the different tasks. When explaining the simple task, the manager mentioned that the task was requested by the marketing team to invite potential product testers. Participants had to ensure that the list matched perfectly with the one in the 'central database'. They were also told that this task was simple, repetitive, but important, so they must be careful and thorough. When explaining the complex task, the manager said that this task was complex, difficult, and important and instructed participants to be as creative as they could. Subtitles were added to the videos to ensure that participants could perform the task even if sound was not available. The videos are currently uploaded on the internet, and the links and scripts are in Appendix B.2.2.

Upon completion of the first work sample as per their experimental group, participants read a description of how this task would be had they performed it in a real job situation. This was so that participants had a grasp of the full scope of the task. After this, participants had to practice the task that they were expected to perform next. Only then participants had to report the extent to which they would take a break before continuing with the second task. In practicing the second task before the break decision, participants obtained a 'feel' of the task so that they could use this stimulus to anticipate their fictional future workload. If participants responded that they would likely take a break in this situation, they were asked what they would

do during it in terms of relaxation and problem-solving pondering. Since all the hypotheses could be tested with the information that was already obtained at this point, participants were told that they could decide to either continue with the second task or go to the demographic section and finish the study.

To access the sample, I utilised the Prolific platform for online recruitment. Prolific enables researchers to anonymously recruit and filter participants based on set demographics (e.g., students, workers, country) who get paid for their time. Some have questioned whether samples secured through online platforms, such as Prolific, are valid and have the necessary measurement quality to conduct robust research compared to samples obtained via more conventional routes (Walter et al., 2019). Encouragingly, empirical evidence shows that, with sufficient care, data obtained from online platforms is equivalent to conventional samples (Walter et al., 2019). Given the ease of recruitment, some even recommend these platforms for exploratory research such as the one conducted here (Walter et al., 2019). Prolific has the advantage that it can filter out responses that do not comply with specific instructions as these can be considered dubious. To this end, Prolific suggests that researchers should include attentional checks throughout the study with clear instructions that must be followed. If someone does not follow these instructions (e.g., 'in question 5, write XOY'), the researcher can decide to remove that person from the dataset and withhold the payment. In the case of my study, I recruited participants who were working full time to increase external validity. I rejected seven participants due to the failure to comply with the attentional checks. Participants were paid £2.50, in line with Prolific standards.

Power analysis conducted via G*Power (Faul et al., 2009) suggested that I required at least 128 participants (i.e., 32 per experimental group). This is to have sufficient power to prevent Type-2 error to identify a medium effect size with a continuous dependent variable (F = .25), a statistical power of 80%, and a significance level of .05. Considering that Power

Analysis is a priori and assumes an effect size, for this study I collected a total of 152 participants (group size = 38) to ensure that I can detect slightly smaller effects than medium size. The mean age of the sample was 28.95 years old (SD = 9.86), the mean tenure was 4.13 years (SD = 5.63), and 32% were female. An analysis of variance (ANOVA) showed that there is no difference between groups in age ($F = .43$, $p = .74$), tenure ($F = 1.03$, $p = .38$), and gender ($F = .67$, $p = .56$).

5.3.1.2 Measures

This section describes the measures that were used in this study. The specific items included in each scale with their factor loadings can be seen in Appendix B.5.

***Break decision*.** Break decision was assessed with a single-item measure in a Likert scale from 1 to 4 that asked whether participants would take the break given the hypothetical scenario with which they were presented, with 1 referring to 'I would definitely not take the break' and 4 referring to 'I would definitely take the break'. Some have criticised the use of single-item measures because they are supposedly less reliable (Wanous & Hudy, 2001). However, some have shown that when the construct of interest is narrow in scope, single-item measures are appropriate (Fuchs & Diamantopoulos, 2009). Since the decision to take a break in most cases is yes or no, I deemed it appropriate to use a single-item 4-point Likert for this study. The 4-point Likert scale, as opposed to a binary variable (yes or no), was selected to avoid estimating the model with probit regression which generally requires larger sample sizes to achieve equivalent statistical power to multiple regression analyses. Moreover, due to the research design, the break decision question concerned a hypothetical behaviour as opposed to an actual behaviour. So, likelihood of engaging in a specific behaviour (i.e., the break) was deemed more appropriate than just a binary decision.

Relaxation. Relaxation was measured with four items adapted from the recovery experiences questionnaire developed by Sonnentag and Fritz (2007). The adaptation was to fit the context of the break in this study rather than a general recovery experience. An example item is 'In case you would take the break, would you do the following: relax?' (α = .88).

Problem-solving pondering. Problem-solving pondering was measured with four items adapted from Querstret and Cropley (2012). The adaptation was to fit the context of the break and the goals of this study. Specifically, it targeted the task that was expected to be done *after* the break. An example item is 'In case you would take the break, would you do the following: ponder about how to do your next task?' (α = .94).

Control variables. On top of the measured variables, I asked participants the extent to which they felt immersed in the role of a designer with a Likert scale (1: not immersed at all-5: very immersed), the extent to which they felt immersed in the tasks they were performing, also with a Likert scale (1: not immersed at all-5: very immersed), and whether they completed the study during working hours (0: not working time; 1: during working time). The extent to which they felt immersed in the role of a designer and the tasks could affect the external validity of this study. People who felt more immersed may be more prone to take a break because they want to increase their performance in the fictional tasks. Further, the complex task may be more engaging than the monotonous task, therefore, I need to control for potential confounding effects. Having completed the study during working hours can interfere with the extent to which participants were mindful in their participation. Finally, I also included whether participants skipped the second task or not as a control variable as this reflects motivation for the study. Since some experimental groups were more engaging than others (e.g., complex – complex group vs monotonous – monotonous group), I expected these variables to not be randomly distributed across groups. Therefore, inclusion in the study is important to control possible confounder effects.

5.3.1.3 Data analysis strategy

To analyse the data, I conducted a series of Confirmatory Factor Analyses, regression analyses, and path models using maximum likelihood estimator in Lavaan using R (Rosseel, 2012). I chose a path model over an SEM for three reasons. First, the factor structure and reliabilities provided evidence to support the aggregation of arithmetic means and use this value for estimating the paths. Second, some have suggested that less than 300 observations may not be enough to reliably estimate an SEM model (Wolf et al., 2013). Third, path analysis allows me to test how multiple independent variables relate to multiple outcome variables, which provides an advantage over multiple regression analyses.

To test the hypotheses, I used the data analysis strategy that I planned for Study 1. Specifically, to test hypotheses 1 and 2 concerned with performing a monotonous task first and a complex task second respectively, I first created two binary groups. Group 1, labelled pre-break monotony, distinguished between the participants who performed a monotonous task first (monotonous-complex and monotonous-monotonous groups) from those who did not. Group 2, labelled post-break complexity, distinguished between the participants who performed a monotonous task second (monotonous-complex and complex-complex) from those who did not. I then ran a regression analysis using the continuous break decision variable as the dependent variable, and the binary groups as the independent variables with all the control variables. All independent variables were correlated among themselves.

To test hypotheses 3a-d concerned with the joint effects task monotony and complexity, I ran four regression analyses. Since the independent variables were four orthogonal binary variables indicating the experimental group membership, each model omitted one of these variables. As such, model 1 regressed the break decision on the complex-monotonous, monotonous-monotonous, and complex-complex groups, together with all the control variables. All independent variables were correlated among themselves. Model 1 omitted the

monotonous-complex group, in which case results must be understood as the degree to which workers would engage in the break *compared* to the other groups. Model 2 omitted the complex-monotonous group, model 3 omitted the monotonous-monotonous group, and model 4 omitted the complex-complex group. Importantly, model 4 does not provide any information above the other three models, but it does make it easier to interpret the results.

To test hypotheses 4 and 5 concerned with how task characteristics influence relaxation and problem-solving pondering during breaks, I followed a similar approach as above (i.e., using first the binary groups and then each experimental group) but using relaxation and problem-solving pondering as outcomes simultaneously. Thus, I ran a series of path analysis models. The outcome variables were entered simultaneously into the equation ensuring that they are correlated. I used a sub-sample of the total sample (N_s = 121 compared to N = 152): those who answer 3 or 4 in the 'Break decision' question (i.e., I would take the break/I would definitely take the break). Specifically, I first analysed whether performing a monotonous task vs a complex one first, whether expecting to perform a complex task vs a monotonous one second, and the interaction of both predicted if people engaged more in relaxation and problem-solving pondering in the hypothetical break.

5.3.2 Study 2 – Results

5.3.2.1 Measurement quality

Table 5.5 shows that both relaxation and problem-solving pondering have good reliability (.88 and .94 respectively). To test the factor structure of the break behaviours, I first ran a confirmatory factor analysis loading all items of relaxation and problem-solving pondering into a single factor. This single-factor model provided poor fit (χ^2 = 112.43, df = 20, p < .01; CFI = .76; TLI = .66; RMSEA = .20 [.16, .23]; SRMR = .15). In contrast, the two-factor model differentiating between both break behaviours provided excellent fit (χ^2 = 29.07,

df = 19, p > .05; CFI = .97; TLI = .96; RMSEA = .07 [.00, .11]; SRMR = .05). Moreover, a model comparison also suggests that the two-factor model is a better fit for the data as depicted by the overall lower χ^2, AIC, and BIC ($\Delta\chi^2 = 83.36$, $\Delta df = 1$, $p < .01$; $\Delta AIC = 81.36$; $\Delta BIC = 78.56$). Overall, the CFA results and the high reliabilities of the scales support the decision to use path analysis with the arithmetic means.

5.3.2.2 Preliminary and descriptive analyses

Table 5.5 contains the descriptive data, zero-order correlations, and reliability scores. An ANOVA examining the differences between groups shows that there are no significant differences between groups in terms of gender (F = 1.04, df = 149, p = .31), age (F = .11, df = 150, p = .74), tenure (F = .77, df = 125, p = .38), skipping task 2 (F = 1.40, df = 150, p = .24), task immersion (F = 2.27, df = 150, 0 = .13), and role immersion (F = .20, df = 150, p = .66). There is, however, a significant difference in having completed the study during working hours (F = 7.11, df = 149, p < .01), with participants in the group complex-complex completing the study more frequently while not at work, compared to the other groups. Overall, these results show that groups are fairly similar to one another, and the randomisation was successful. Differences in the df in the ANOVA indicate missing data on those variables.

Looking at task immersion and role immersion, one can see that average values are high (respectively, 3.43 and 3.93 out of 5). This suggests that participants did feel immersed in the vignette. Importantly, there is a small negative correlation between task and role immersion with skipping the second task, indicating that those who felt more immersed, were also more motivated to complete the study.

Descriptive data in Table 5.6 shows that in general, the majority of the participants would likely take a break before continuing with their second task, based on the hypothetical scenario that was proposed.

Table 5.5. Descriptive data and correlation matrix for the online vignette experiment study (1).

	Mean (SD)	1.	2.	3.	4.	5.
1. Break decision	3.03 (.91)	-				
2. Relaxation	3.36 (.79)	-	**.88**			
3. PSP	3.71 (.97)	-	-.21*	**.94**		
4. Monotonous-Complex	.25 (.43)	.15	.04	.12	-	
5. Complex-Monotonous	.25 (.43)	-.06	.12	-.27**	-.33**	-
6. Monotonous-Monotonous	.25 (.43)	.02	-.08	-.04	-.33**	-.33**
7. Complex-Complex	.25 (.43)	-.11	-.08	.18*	-.33**	-.33**
8. During Work	.79 (.41)	.06	.08	-.11	.07	.15
9. Skip task 2	.43 (.50)	.02	.07	-.05	.02	-.14
10. Task immersion	3.43 (1.30)	-.02	.14	.09	.04	.06
11. Role immersion	3.93 (1.13)	.04	.21*	-.06	-.03	.07

Table 5.5. Descriptive data and correlation matrix for the online vignette experiment study (2).

	Mean (SD)	6.	7.	8.	9.	10.	11.
6. Monotonous-Monotonous	.25 (.43)	-					
7. Complex-Complex	.25 (.43)	-.33**	-				
8. During Work	.79 (.41)	.04	-.26**	-			
9. Skip task 2	.43 (.50)	-.02	.14	-.13	-		
10. Task immersion	3.43 (1.30)	.07	-.17*	.13	-.22**	-	
11. Role immersion	3.93 (1.13)	.05	-.09	.04	-.22**	.47**	-

Notes. *p < .05; ** p < .01; Reliability scores are in the diagonals; PSP = Problem Solving Pondering; The descriptive data for the groups is the sample size. Break behaviours do not correlate with break decision, because only those who reported taking a break responded to the break behaviours questions.

Table 5.6. Descriptive results per group in the online vignette experiment study.

Group	N	N took break	Break decision (SD)	Relaxation (SD)	PSP (SD)
Monotonous – Complex	38	34	3.24 (.71)	3.38 (.65)	3.96 (.90)
Complex – Monotonous	38	28	2.95 (.90)	3.68 (.85)	3.30 (1.10)
Monotonous – Monotonous	38	28	3.05 (.96)	3.35 (.73)	3.48 (.86)
Complex – Complex	38	31	2.87 (.56)	3.34 (.93)	4.01 (.84)

Notes. This table contains the descriptive results of the relevant variables of this study. 'N' = Total sample size in each group; 'N took break' = Total participants that marked 3 or 4 in the break question

5.3.2.3 Hypothesis testing

Hypothesis 1 suggested that employees who have performed a monotonous task will be *more* likely to take a break than those who have not. Results in Table 5.7 show that those who perform a monotonous task first are more likely to take a break compared to those who do not (b = .26, p = .049), supporting hypothesis 1.

Hypothesis 2 suggested that employees who expect to perform a complex task second will be *more* likely to take a break than those who do not. Results in Table 5.7 show that there is no difference regarding deciding to take a break between those who expected a complex task second compared to a simple task (b = .09, p = .51). Thus, hypothesis 2 is rejected.

It is important to mention that none of the control variables included in the models presented in Table 5.7 presented significant results.

Table 5.7. Break decision model results according to binary-group membership in the online vignette experiment.

	Took Break		Took Break	
	B (SE)	β	B (SE)	β
Monotonous task first	.26 (.13)*	.16		
Complex task second			.09 (.13)	.05
Work hours	.11 (.16)	.06	.15 (.16)	.08
Skip task 2	.03 (.13)	.02	.03 (.14)	.02
Task Immersion	-.05 (.06)	-.08	-.04 (.06)	-.06
Role immersion	.06 (.07)	.09	.06 (.07)	.08
R^2	.03		.01	

Notes. * p < .05.

Hypothesis 3a-d were concerned with whether the decision to take a break or not was determined by the joint effect of performance episode characteristics before and after the break. When looking at results in Table 5.8, one can see that the only significant difference is between the monotonous-complex group with the complex-complex group, with the former reporting taking more breaks than the latter (b = .40, p = .03). The complex-monotonous group differed

to a similar level as the complex-complex group with the monotonous-complex group (β = .18 vs β = .22), but the difference with the monotonous-complex group was not significant (b = .34, p = .07). Based on these results, hypothesis 3a, which stated that workers in the monotonous-complex scenario are more likely to take breaks compared to those in the other scenarios, is partially supported. In contrast hypotheses 3b, 3c, and 3d are rejected.

None of the control variables included in the models presented in Table 5.8 presented significant results.

Table 5.8. Break decision model results according to experimental group membership in the online vignette experiment.

	Monotonous-Complex as baseline		Complex-Monotonous as baseline		Monotonous-Monotonous as baseline		Complex - Complex as baseline	
	B (SE)	β	B (SE)	β	B (SE)	β	B (SE)	β
During Work	.10 (.16)	.05	.10 (.16)	.05	.10 (.16)	.05	.10 (.16)	.05
Skip task 2	.04 (.14)	.02	.04 (.14)	.02	.04 (.14)	.02	.04 (.14)	.02
Task immersion	-.05 (.06)	-.08	-.05 (.06)	-.08	-.05 (.06)	-.08	-.05 (.06)	-.08
Role immersion	.06 (.07)	.09	.06 (.07)	.09	.06 (.07)	.09	.06 (.07)	.09
Monotonous-Complex	-	-	.34 (.18) †	.18	.22 (.18)	.12	.40 (.19)*	.22
Complex-Monotonous	-.34 (.18) †	-.18	-	-	-.11 (.18)	-.06	.07 (.19)	.04
Monotonous-Monotonous	-.22 (.18)	-.12	.11 (.18)	.06	-	-	.18 (.19)	.10
Complex-Complex	-.40 (.19)*	-.22	-.07 (.19)	-.04	-.18 (.19)	-.10	-	-
Full model R^2	.05							

Notes. †p < .07 *p < .05; β = Standardised values. The R^2 is the same for all models.

Tables 5.9 and 5.10 present the results of the path models that were used to test hypotheses 4 and 5 concerning the relationship between the experimental groups with the break behaviours. Table 5.9 contains the results using the binary groups described above (i.e.,

performing a simple task first and anticipating a complex task second), while Table 5.10 presents the results differentiating between all experimental groups.

Table 5.9. Break behaviour model results according to binary-group membership in the online vignette experiment.

	Monotonous task first				Complex task second			
	Relaxation		PSP		Relaxation		PSP	
	B (SE)	β	B (SE)	β	B (SE)	β	B (SE)	β
Group	-.21 (.14)	-.13	.05 (.18)	.03	-.12 (.14)	-.07	.58 (.17)**	.30
Work hours	.16 (.18)	.08	-.22 (.22)	-.09	.12 (.18)	.06	-.08 (.21)	-.03
Skip task 2	.25 (.15)	.15	-.09 (.18)	-.05	.23 (.15)	.15	-.12 (.17)	-.06
Task Immersion	.10 (.07)	.16	.10 (.08)	.14	.08 (.07)	.14	.11 (.08)	.14
Role immersion	.09 (.08)	.12	-.14 (.10)	-.16	.09 (.08)	.13	-.11 (.09)	-.14
R^2	.08		.03		.07		.11	

Notes. ** p < .01. Group variable represents the estimate for the specific grouping binary variable according to the column.

First of all, it is important to point out that the control variables presented in Table 5.9 do not correlate significantly with engaging in relaxation and problem-solving pondering during the break.

Hypothesis 4 stated that employees who have performed the monotonous task first and decide to take a break will be *more* likely to engage in relaxation during the break than those who have not. As shown in Table 5.9, it is apparent that engaging in relaxation during the break is unrelated to performing a monotonous task before the break (b = -.21, p = .15). When analysing the results contained in Table 5.10, one can see that there is a considerable difference, although non-significant, between the complex-monotonous group and the monotonous-monotonous group to do with the extent to which they engage in relaxation, with the former engaging more in relaxation than the later (b = .39, p = .057). This difference, however, is contrary to the hypothesised effect. Therefore, based on both sets of results, hypothesis 4 is rejected.

Hypothesis 5 proposed that employees who anticipate performing a complex task second and decide to take a break will be *more* likely to engage in problem-solving pondering during the break than those who have not. Results in Table 5.9 support this hypothesis, such that those who anticipate in a complex task second report engaging more in problem-solving pondering during the break ($b = .58$, $p < .01$). When specifically comparing the results of the complex-monotonous group with the complex-complex group in Table 5.10, one can see the strongest difference among all groups, such that the complex-complex group engage in problem-solving pondering significantly more ($b = .73$, $p < .01$). There is also a smaller but significant difference between the monotonous-monotonous and the complex-complex groups, such that the latter engage in more problem-solving pondering during the break ($b = .55$, $p = .023$). Interestingly, there is no difference between the monotonous-complex and the complex-complex group in terms of problem-solving pondering ($b = .10$, $p = .66$). Thus, hypothesis 5 is supported.

Results in Table 5.10 reveal that none of the control variables included in the analyses were significant, although there is a considerable positive difference regarding skipping task 2 and reporting engaging in relaxation during the break ($b = .27$, $p = .06$).

Table 5.10. Break behaviour model results according to experimental group membership in the online vignette experiment.

	Monotonous-Complex as baseline		Complex-Monotonous as baseline		Monotonous-Monotonous as baseline		Complex-Complex as baseline	
	B (SE)	β	B (SE)	β	B (SE)	β	B (SE)	β
Relaxation								
During Work	.10 (.18)	.05	.10 (.18)	.05	.10 (.18)	.05	.10 (.18)	.05
Skip task 2	.27 (.15) †	.17	.27 (.15) †	.17	.27 (.15) †	.17	.27 (.15) †	.17
Task immersion	.10 (.07)	.15	.10 (.07)	.15	.10 (.07)	.15	.10 (.07)	.15
Monotonous-Complex	-	-	-.33 (.20)	-.19	.06 (.19)	.03	-.04 (.19)	-.02
Complex-Monotonous	.33 (.20)	.18	-	-	.39 (.20) †	.21	.30 (.21)	.16
Monotonous-Monotonous	-.06 (.19)	-.03	-.39 (.20) †	-.21	-	-	-.09 (.20)	-.05
Complex-Complex	.04 (.19)	.02	-.30 (.21)	-.17	.09 (.20)	.05	-	-
Role immersion	.09 (.08)	.12	.09 (.08)	.12	.09 (.08)	.12	.09 (.08)	.12
Full model R^2	.10							
PSP								
During Work	-.05 (.22)	-.02	-.05 (.22)	-.02	-.05 (.22)	-.02	-.05 (.22)	-.02
Skip task 2	-.14 (.17)	-.07	-.14 (.17)	-.07	-.14 (.17)	-.07	-.14 (.17)	-.07
Task immersion	.11 (.08)	.15	.11 (.08)	.15	.11 (.08)	.15	.11 (.08)	.15
Monotonous-Complex	-	-	.63 (.23)**	.30	.45 (.23) †	.21	-.10 (.23)	-.05
Complex-Monotonous	-.63 (.23)**	-.28	-	-	-.18 (.24)	-.08	-.73 (.25)**	-.32
Monotonous-Monotonous	-.45 (.23) †	-.20	.18 (.24)	.08	-	-	-.55 (.24)*	-.24
Complex-Complex	.10 (.23)	.05	.73 (.25)**	.33	.55 (.24)*	.25	-	-
Role immersion	-.12 (.09)	-.14	-.12 (.09)	-.14	-.12 (.09)	-.14	-.12 (.09)	-.14
Full model R^2	.12							

Notes. †p < .06 *p < .05, **0 < .01

5.3.3 Study 2 – Discussion

This study aimed to understand if completing a monotonous task and anticipating a complex one would influence whether workers take breaks and break behaviour. To this end, an online vignette experimental design was implemented. In this vignette, participants were told that they just started a new job as industrial designers in a marketing company and that

they had to perform two tasks that varied in terms of monotony and complexity. The study' results contribute to the thesis and the study of breaks at work in two ways.

First, the results presented in this study are in line with the dual pathway proposed in the Episodic Model of Work Breaks which describes that workers would take breaks because of what they have done before the break or because of what they anticipate doing after the break. Specifically, completing a monotonous task (as opposed to a complex one) induces workers to take breaks, lending support to the reactive pathway. Moreover, this is consistent with results reported by Bosch and Sonnentag (2019) in which they found that the strongest predictor for taking a break was completing a task that is disliked. Interestingly, when comparing all four groups, it is evident that the largest difference occurs between the monotonous-complex and the complex-complex group, with the former reporting engaging in more breaks than the latter. This, coupled with the fact that the monotonous-monotonous group presents no significant difference with any of the other groups, suggests that it is not what workers have done before the break, nor what they anticipate being doing later, but a combination of both that influences whether workers take breaks. On one hand, this suggests that the reactive pathway has a stronger influence on taking breaks compared to the proactive pathway. On the other hand, it seems that the proactive pathway is triggered when workers have just finished a disliked task. This result also lends support to one of the main tenants of the Episodic Model of Work Breaks, namely, that breaks are a function of both previous and future performance episodes. Overall, results in this study provide important insights concerning why workers may decide to take a break, a topic that is poorly understood in break research (Bosch & Sonnentag, 2019).

Second, to the best of my knowledge, this is the first study that attempts to understand how performance episodes before and after the break influence what workers do during the break. In fact, past studies have called for a better understanding of why workers engage in

different break behaviours (Kim et al., 2018). Results in this study suggest that workers who expect a complex task after a break are more likely to engage in problem-solving pondering during the break. Importantly, this result emerges across all experimental groups in which workers anticipated a complex task, suggesting that anticipated performance episodes are more conducive to problem-solving pondering during the break than the interaction between different types of performance episodes. This is consistent with what was proposed in Chapter 3, where it was argued that problem-solving pondering is a proactive break behaviour in which workers engage to prepare for future stressful performance episodes. Therefore, this study expands our knowledge concerning why workers may decide to engage in different break behaviours, and especially the ones that are catalogued as harmful from a recovery perspective because they inhibit the recovery processes (Cropley & Zijlstra, 2011).

The lack of significant results concerning relaxation was unexpected. Overall, this means that performing a monotonous task will not necessarily lead to engaging in relaxation during the break. Considering that relaxation seems to be ubiquitous to work breaks (Fritz et al., 2011; Strongman & Burt, 2000), these results might mean that regardless of what is done immediately before the break, or what is expected to be done immediately after the break, workers will engage in relaxation regardless. More research is needed on this to understand if other task characteristics may prompt relaxation during breaks, or relaxation during breaks occurs regardless of the work context.

5.3.3.1 Study 2 – Strengths, limitations, and future research

Study 2 has several important strengths. Due to the randomisation of the independent variables, the models presented here are causally identified. This means that it is possible to draw causal conclusions based on the results presented here. This is especially the case considering that groups were equivalent in all but one demographic variable. Moreover, this

study included a combination of videos and tasks to increase immersiveness so that results are more ecologically valid. Accordingly, participants reported being immersed in both the tasks and their role across all experimental groups, therefore, results could also be considered more externally valid than classic laboratory experiments. Additionally, the power analysis conducted prior to the data collection suggests that the effects regarding whether workers take breaks or not are less likely to be subject to Type-2 error.

Despite the strengths, this study also has five key limitations that can impact the validity of the results presented here. First, participants in the complex-complex group performed this experiment significantly more during non-working time compared to the other groups. This has the potential to introduce unmeasured variables into the system and be a threat to the internal validity of the experiment. Nevertheless, this should not be a major cause for concern considering that this variable was included as a control in the model and its relationship with the outcome variables was non-significant in all cases.

A second limitation is a focus on hypothetical behaviours, as opposed to real behaviours. Specifically, participants in this study reported their intention to take a break considering the scenario that was proposed to them. This scenario, however, was atypical for many, if not for all of the participants. Thus, it is not possible to know if these results would be generalisable or if this study would be replicated in a laboratory experiment or in a field study. Future research should attempt to explore real behaviours to provide more accurate perspective about break taking behaviours.

A third limitation concerns the hypotheses regarding relaxation and problem-solving pondering. The power analysis was conducted to test the primary hypothesis, namely, whether workers take breaks or not as a function of what they currently do or what they anticipate being doing after the break. Since the statistical analyses for relaxation and problem-solving pondering used a sub-sample, these results are underpowered and Type-2 error is a threat. Thus,

future studies should focus specifically on what determines engaging in different break behaviours.

A fourth limitation is that the study only focused on two task characteristics, monotony and complexity. As a result, it is not possible to generalise these results to other forms of task characteristics. Moreover, there could be important confounding effects if other task characteristics share similar underlying mechanisms. Thus, future studies should aim to explore other task characteristics that may also produce similar results.

A final limitation is that this study does not provide a direct test of core mechanisms proposed by the dual pathway in the Episodic Model of Work Breaks. Specifically, the dual pathway proposes that workers will take reactive breaks as a result of performing disliked tasks, while they will take proactive breaks as a result of anticipating stressful tasks. The study does not measure task dislike or anticipated stress directly. However, this is the first study that shows that taking the break and deciding what to do during the break is a function of what workers do during before the break and what they anticipate being doing after the break, and since this has been established as a plausible explanation, future research should focus on directly testing the mechanisms proposed by the Episodic Model of Work Breaks.

5.4 General discussion and summary

This chapter aimed to provide empirical evidence to answer Research Question 1 (i.e., why do workers take breaks? Is it because of what they have done, or is it because of what they expect to be doing after?) and Research Question 2 (i.e., why do workers engage in different break behaviours? Is it because of what they have done before the break or because of what they expect to do after the break?). Although Study 1 was thwarted due to Covid-19 restrictions to collect data in person, results show a promising trend to answer the first research question,

namely that workers do take breaks depending on the current performance and anticipated performance episode. Importantly, Study 2 confirms this trend. Workers who complete a monotonous task first and expect a complex task after, appear more likely to take a break than those who complete a monotonous task first and then anticipate a monotonous task second. Importantly, this means that the decision to take a break is a function of what workers do and what they expect to be doing later. This supports the Episodic Model of Work Breaks which understands breaks as a function of different performance episodes as opposed to just recovery opportunities.

Results concerning relaxation and problem-solving pondering are also promising. On one hand, Study 1 shows that performing a monotonous task immediately before the break will lead to engaging in relaxation during the break. On the other hand, Study 2 shows that anticipating a complex task after the break will lead to more problem-solving pondering during the break. Both studies support the need to focus on performance episodes before and after the break to understand why workers engage in different break behaviours, and hence supports the underlying rationale of the Episodic Model of Work Breaks. Nevertheless, both studies are underpowered to reliably estimate the effects of performance episodes on break behaviours. Thus, the next chapter will focus specifically on determining why workers decide to engage in break behaviours and will address some of the limitations reported above.

Chapter 6
Do break behaviours depend on pre- and post-break performance episodes? A field experiment

In this chapter, I address the second research question generated by the Episodic Model of Work Breaks, namely "why do workers engage in different break behaviours? Is it because of what they have done before the break or because of what they expect to do after the break?" (see Chapter 3). The study addressing this question was originally going to be a laboratory experiment. Nevertheless, due to the Covid-19 pandemic and restrictions to collect data in person, the laboratory experiment could not be initiated and had to be modified. The study presented here emerged as a response to this situation.

Recall that the Episodic Model of Work Breaks defines three types of break behaviours in which employees engage during breaks (i.e., physiological, disengagement, and task engagement break behaviours). But only two are related to post-break outcomes: disengagement and task engagement break behaviours. Disengagement break behaviours represent behaviours aimed at mentally and physically distance employees from their work. For example, when employees look for fun content in the web during a break (Kim et al., 2018). Task engagement break behaviours represent behaviours that require a degree of effortful cognitive engagement with work-related issues during breaks. For example, when employees think about how to best approach a difficult meeting with a supervisor during the break (Berman & West, 2007).

Moreover, the Episodic Model of Work Breaks proposes a dual pathway that explains why workers engage in different break behaviours: a reactive and a proactive pathway. The reactive pathway suggests that workers engage in specific break behaviours because of the performance episode that was completed immediately *before* the break. The proactive pathway

claims that workers engage in break behaviours to prepare for performance episodes that are anticipated *after* the break.

The propositions regarding the influence of performance episodes before and after the break on break behaviours, presented in the preceding chapter, is theoretical. To the best of my knowledge, there are no studies that have empirically examined how the work context influences what workers do during the break (Kim et al., 2018). Therefore, this chapter aims to empirically examine how the task characteristics of performance episodes before and after the break influence what workers do during their breaks.

To meet this aim, I conducted a field experiment in which participants needed to complete two surveys during one working day. The first survey had to be completed immediately before a break that participants took during the workday. Here, participants were randomly assigned to one of the three experimental groups. Participants in the first group had to describe the performance episode that was completed immediately before the break and were labelled the 'reactive group'. Participants in the second group had to describe the performance episode they expected to engage in immediately after the break and were labelled 'proactive group'. Participants in the third group had to describe their job and were the control group. This treatment was to make a specific performance episode more salient before the break. The control group was used as a reference to observe what workers would do in the study setting without any nudge towards a specific performance episode. After the break, participants had to complete a second survey concerning break behaviours.

The study presented in this chapter also addresses three limitations of the study presented in Chapter 5. First, this study focuses on behaviours that employees report based on their actual work environment, as opposed to a fictional setting like the ones used in the experiment or online vignette experiment. Therefore, results here are more externally valid, while also maintaining some degree of internal validity due to the experimental feature in this

study. Second, the studies in Chapter 5 were underpowered to examine hypotheses regarding break behaviours, thus results can suffer from Type-2 error. In focusing here exclusively on break behaviours, the study uses an appropriate sample size to explore the hypotheses, thus minimising Type-2 errors. Third, Chapter 5 only focuses on monotony and complexity, while this chapter focuses on other tasks characteristics and experiences that may influence break behaviours. This will help gain new insights on how the work context influences break behaviours.

This study makes two significant contributions to the study of work breaks. First, this study extends our understanding of why workers decide to engage in different break behaviours during breaks by causally examining how focusing on the performance episode before or after a break influences different break behaviours. Second, this study expands our understanding about how specific task characteristics correlate with different break behaviours.

This chapter is organised as follow. I first present a theoretical review and hypotheses, recapitulating the break behaviours described in the Episodic Model of Work Breaks, and focusing on how these break behaviours are either reactive or proactive. Following this, I discuss how task characteristics before and after a break correlate with break behaviours. I then report my methods, including the protocols, sampling strategy and final sample, measures, and data analysis strategy. I follow with the results and finish this chapter with the discussions, strengths and limitations, and concluding remarks.

6.1 Theoretical framework

This section describes the theoretical framework from which the research question posed above will be explored. The theoretical model, depicted in Figure 6.1, describes how pre-break performance episodes and anticipated post-break performance episodes relate to disengagement and task engagement break behaviours.

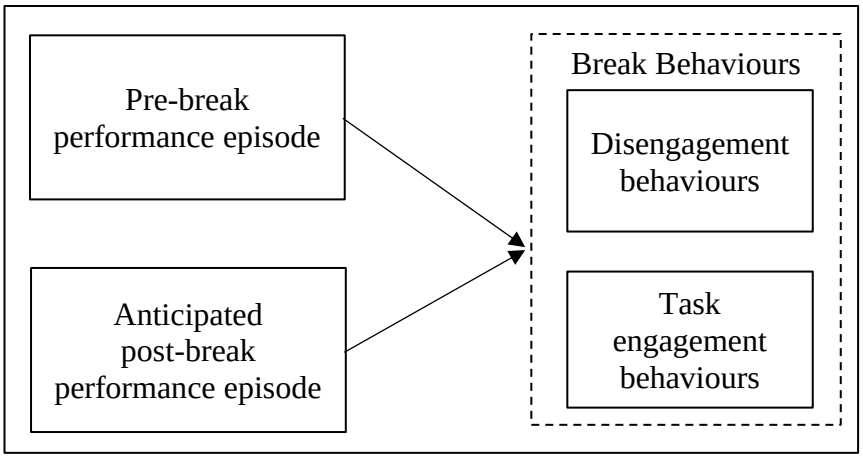

Figure 6.1. Theoretical model to be tested in Chapter 6.

6.1.1 Break behaviours and the dual pathway

Past research has made efforts to understand what workers do during their breaks. Two approaches are usually taken. Studies taking an activity-based approach that focus on the break activity itself (e.g., the act of drinking coffee), and studies taking a process-based approach that focus on the processes underlying the break activity (e.g., why drinking coffee fosters break effectiveness) (Bosch et al., 2017). An example of the former type of research is Fritz and colleagues' study (2011), which mapped the extent to which employees engage in certain activities during their micro-breaks (i.e., breaks lasting less than 5 minutes). They found that workers mostly engage in drinking water, snacking, going to the bathroom, and drinking coffee during micro-breaks (Fritz et al., 2011). An example of the latter approach is Bosch et al.'s study (2017), which sought to understand how recovery experiences during breaks (i.e., the

restoration of resources and unwinding of the psychophysiological system) can explain break effectiveness.

The activity-based approach has been crucial to understanding what workers do during breaks and which activities are potentially good for fostering well-being (Bosch et al., 2017; Sonnentag et al., 2017). However, the activity-based approach has often been critiqued because knowing what workers do during breaks is not informative about the processes that explain why employees engage in such activities or why such activities foster break effectiveness (Bosch et al., 2017; Sonnentag et al., 2017). For example, someone may drink coffee for multiple reasons, such as obtaining caffeine, finding the experience of drinking coffee relaxing, or go to a cafe to physically be disengaged from the workplace. Just knowing that workers drink coffee during their break does not tell us anything about why they did so. Therefore, in this study, I take a process-based approach.

As mentioned above, the Episodic Model of Work Breaks differentiates between two key break behaviours: disengagement and task engagement. ***Disengagement break behaviours*** are behaviours that aim to mentally and physically distance employees from their work, such as engaging in leisurely activities (e.g., reading a book for fun, going out for coffee with colleagues). Importantly, emotion regulation seems to be the underlying process that explains why workers engage in disengagement break behaviours and the positive influence on several post-break employee-related outcomes (see Chapter 3).

There are different types of disengagement strategies, and this chapter will focus specifically on relaxation as a disengagement break behaviour for four reasons. First, relaxation, defined as engaging in low effort activities that foster positive affect (Sonnentag & Fritz, 2007), has shown the most consistent effects in promoting positive break outcomes after the break, such that relaxation during the break is associated with feeling more refreshed, experiencing higher levels of positive affect, and less fatigue after the break (Bosch et al.,

2017; Kim et al., 2017, 2018; Zhu et al., 2018). Second, relaxation is an experience that underly different disengagement activities, such as lunch park walks (Sianoja et al., 2017; Sonnentag & Fritz, 2007). Third, psychological detachment, the key recovery experience *after* work that exemplifies disengagement behaviours, is not related to post-break outcomes (Bosch & Sonnentag, 2019; Kim et al., 2017) unless it is achieved through activities that are enjoyed, namely, that elicit positive affect (Kim et al., 2018). This means that there could be an important confounding effect concerning the relationship between psychological detachment and experiences of positive affect. This seems to be the case when one see that psychological detachment is related only to break outcomes when relaxation is not included in the model (for multiple examples see, Bosch et al., 2017; Kim et al., 2017, 2018; Rhee & Kim, 2016; Zhu et al., 2018). Fourth, although recovery research seldom considers relaxation as an emotion regulation strategy, past research suggests that it could certainly be considered as such, with people who engage in meditation and mindfulness (i.e., mental relaxation) and progressive relaxation exercises (i.e., physical relaxation) reporting lower levels of negative emotions (Koole, 2009; Nyklíček, 2011; Roemer et al., 2015).

The role of relaxation as an emotion regulation strategy that down-regulates negative emotions and up-regulates positive ones can be explained from two perspectives, the allostatic model of stress (McEwen, 2007) and the broaden and build theory of positive emotions (Fredrickson, 2004). The allostatic model of stress suggests that the physiological system (i.e., sympathetic neural system) gets aroused when workers face demands (e.g., job demands), and this causes the physiological reaction to stress, such as increased heart rate and sweaty palms (McEwen, 2007). From an allostatic perspective, engaging in low-effort leisurely activities has the potential to reduce the arousal in the system that characterises stress reaction, thus allowing individuals to effectively unwind from work demands and reduce negative emotions (Bosch et al., 2017; Sonnentag & Fritz, 2007). In addition, the broaden and build theory suggests that

experiences of positive emotions can lead to more experiences of positive emotions (i.e., upward spiral of positive emotions) and can repair negative moods and fatigue (Fredrickson, 2001). This is because workers who are experiencing positive emotions will perceive events in a more optimistic perspective, but will also have more energy to seek positive experiences, promoting an upward spiral of positive emotions (Gable & Harmon-Jones, 2010; Hobfoll et al., 2018; Schwarz & Clore, 2003). Past research does support the proposition that engaging in relaxation during breaks promotes experiences of positive affect (Bosch et al., 2017; Kim et al., 2018). Moreover, an intervention-based study supports the role of relaxation in fostering an upward spiral of positive emotions by showing that participants who were instructed to engage in relaxation during breaks over two weeks report an overall increase in their baseline level of positive affect compared to participants in the control group (Steidle et al., 2017). Considering the consistent positive effects of relaxation during breaks on different employee-related outcomes, it is important to understand what prompts workers to relax during breaks.

Drawing on recovery and self-reinforcement theories, I propose that relaxation during breaks is mostly reactive (i.e., undertaken in reaction to the nature of the previous performance episode). Self-reinforcement theories argue that humans engage in gratifying behaviours after attaining a sufficient level of performance on a given task (Bandura, 1976). The purpose of this self-reward is to keep oneself motivated and increase the chances that particular behaviours (e.g., completing a performance episode) would be repeated in the future (Bandura, 1976; Bosch & Sonnentag, 2019). Additionally, recovery research proposes that workers are motivated to engage in recovery experiences and activities to replenish resources (e.g., energy, self-regulation) that were exhausted to cope with job demands and to reduce psychophysiological levels of arousal that resulted from stress reactions (Meijman & Mulder, 1998; Sonnentag et al., 2017). This is because the emerging fatigue and unpleasant activation (e.g., stress) are usually experienced as a negative affective experience in the form of low or

high energy unpleasant affect (Warr, 1990). Engaging in recovery experiences such as relaxation help reduce the negative activation and foster experiences of positive affect (Sonnentag & Fritz, 2007). Therefore, workers may want to engage in relaxation after completing a task to get a reward and recover.

It is important to mention, however, that relaxation could also be proactive. Zijlstra et al (2014) proposed a new conceptualisation of recovery, where recovery is perceived as harmonising the actual state (e.g., activation, affective states, etc) with the desired state. This desired state could be whatever workers want it to be and is functional to their own goals, such as feeling good or performing well (Zijlstra et al., 2014). In the context of work, recall that the performance episode theory suggests that different performance episodes require and elicit different affective experiences (Beal et al., 2005; Warr et al., 2014; Weiss & Cropanzano, 1996), thus workers are likely to engage in relaxation to harmonise their actual state with the required state that is functional to meet the performance episode's goals. As an example, consider an employee who takes a break right before they expect to perform a three-hour lecture. Some workers may decide to engage in relaxation to lower their activation levels and put them in a positive mood so that they feel refreshed for the lecture.

Task engagement break behaviours are those behaviours that involve cognitive engagement with work-related issues. As an example, imagine a researcher who keeps thinking about how to write a paragraph in a journal article over the lunch break. Past research has shown that thinking about work-related problems while not working is prevalent (Bennett et al., 2016; Firoozabadi et al., 2018a; Querstret & Cropley, 2012). Within the Episodic Model of Work Breaks, task engagement break behaviours are considered problem- and emotion-focused strategies to cope with task-related demands. Problem-focused coping strategies emerge when workers attempt to find solutions to problems that cause stress, while emotion-focused strategies emerge when workers focus on the negative affective experience elicited by

the event that caused the coping reaction (Lazarus & Folkman, 1984). Workers usually use a problem-focused coping strategy when they believe that the situation can be managed, while emotion-focused coping usually emerges when there is a belief that the situation cannot be managed (Lazarus & Folkman, 1984). Cropley and Zijlstra's (2011) conceptualisation of work-rumination is particularly helpful for characterising task engagement break behaviours. Specifically, they differentiate between problem-solving pondering (i.e., prolonged mental scrutiny of work problems) and affective rumination (i.e., thinking about work problems with a focus on negative emotions). Both forms of rumination can be classified as problem-focused coping and emotion-focused coping respectively.

Task engagement break behaviours can be either reactive or proactive, depending on the content of the work-related thought. According to rumination research, problem-solving pondering is catalogued as future-oriented ruminative thinking (Cropley & Zijlstra, 2011; Nolen-Hoeksema et al., 2008), consequently, I propose that problem-solving pondering is mostly proactive. Supporting this proposition, past research on prospective memory and future thinking has shown that people usually think about how to address events and problems that they anticipate in the future (Kvavilashvili & Rummel, 2020). Nevertheless, thinking about future problems can also trigger worry, especially when one believes that nothing can be done to solve the problem (Casper et al., 2017). From a coping perspective, worry can be defined as a maladaptive emotion-focused anticipatory coping strategy where workers think about problems in the future, but focus on the negative emotions that the specific problem makes them feel (Lazarus & Folkman, 1984; Nolen-Hoeksema et al., 2008). Thus, proactive task engagement break behaviours can take two forms, either problem-solving pondering or worry.

A type of reactive task engagement break behaviour is affective rumination. This is because affective rumination typically focuses on negative events that already occurred, thus workers cannot do much to solve them (Cropley & Zijlstra, 2011; Hamesch et al., 2014; Nolen-

Hoeksema et al., 2008). In this case, affective rumination would be a form of emotion-focused coping strategy where workers attempt to deal with the negative feelings they are experiencing because, since the situation already happened, they cannot deal with it (Lazarus & Folkman, 1984).

To summarise, the Episodic Model of Work Breaks considers two key break behaviours. Disengagement break behaviours represent strategies to unwind form work and improve one's mood. In this study, I will focus specifically on relaxation, which can be either reactive or proactive. Task engagement break behaviours represent forms of coping strategies concerning past and future stressful events. An adaptive proactive strategy is problem-solving pondering, a maladaptive proactive strategy is worry, and a maladaptive reactive strategy is affective rumination. The next section will discuss how focusing one's attention on the performance episode before or after the break can trigger reactive or proactive break behaviours.

6.1.2 Self-regulation and the importance of attentional focus for break behaviours

What motivates engaging in different break behaviours? According to Carver and Scheier's (1998) model of self-regulation, there is a negative feedback loop that determines why people engage in different behaviours intending to reduce any discrepancy that may occur between an input and a reference goal. This feedback loop proposes that there will be an input and a goal or standard that are compared and then lead to an output (i.e., behaviour or lack of thereof). Then, and depending on other variables (i.e., disturbance), the output will create an effect on the environment, which in turn will re-influence the input (Carver & Scheier, 1998). According to this negative feedback loop, humans are constantly comparing their goals with their current situation and making adjustments to reduce the discrepancy between their actual state and their desired goal (Carver & Scheier, 1998). In terms of break behaviours, when

workers decide to take the break, I argue that they will examine the performance episode before and after the break and engage in behaviours accordingly. Carver and Scheier (1998) also describe a positive feedback loop, which aims is to enlarge the discrepancy between the input and the goal. This loop, however, is outside the scope of the Episodic Model of Work Breaks, therefore, will not be discussed.

Based on the negative feedback loop described above, I propose that focusing one's attention on the performance episode that was completed immediately before the break will trigger either reactive disengagement break behaviours (i.e., relaxation) or reactive task engagement break behaviours (i.e., affective rumination). Regarding relaxation, workers who focus their attention on the previous performance episode have a chance to review their performance and see how this compares with the specific performance goals they had. If there is no discrepancy between the actual performance and goal in the previous performance episode, workers are likely to engage in relaxation during the break as a form of a rewarding behaviour. An alternative proposition is that workers will focus on what they did not achieve, triggering negative thoughts, which can result in reactive affective rumination. Considering that work-rumination and relaxation can coexist (Bennett et al., 2016; Kinnunen et al., 2017), these are not alternative propositions, but parallel. Thus, I propose the following parallel hypotheses:

Hypothesis 1a: There is a positive relationship between focusing on the performance episode immediately before the break and relaxation during the break.

Hypothesis 1b: There is a positive relationship between focusing on the performance episode immediately before the break and affective rumination during the break.

Focusing one's attention on a performance episode that is anticipated immediately after the break should lead to a similar feedback loop. On one hand, workers may appraise that no adjustment has to be made to accomplish the goal, in which case, workers will likely engage in relaxation during the break to refresh and reduce levels of exhaustion before engaging in the next performance episode (Bosch et al., 2017; Zhu et al., 2018). However, if workers appraise that there could be a discrepancy, there are several actions that can be taken during the break to reduce this discrepancy. Discrepancies between the requirements of the task (i.e., what has to be done) and the resources workers have (i.e., what can be done) can trigger problem-focused coping strategies (i.e., problem-solving pondering) or emotion-focused coping strategies (i.e., worry), depending on beliefs about the discrepancy that workers may have (Casper et al., 2017; Lazarus & Folkman, 1984). Specifically, when workers believe that the task requirement discrepancies can be reduced, they may engage in problem-solving pondering to think about how they can best address the problem. Alternatively, when workers believe that it is not possible to reduce the discrepancy, then they may engage in worry as a way to cope with the emerging negative emotions (Lazarus & Folkman, 1984). Again, relaxation, problem-solving pondering, and worry can coexist, and these propositions are not contradictory. Therefore, I propose the following parallel hypotheses:

Hypothesis 2a: There is a positive relationship between focusing on the performance episode immediately after the break and relaxation during the break.

Hypothesis 2b: There is a positive relationship between focusing on the performance episode immediately after the break and problem-solving pondering during the break.

Hypothesis 2c: There is a positive relationship between focusing on the performance episode immediately after the break and worry during the break.

Overall, this section proposed that focusing one's attention on the performance episode before or after the break will influence what workers do during the break. This argument, however, does not consider how specific aspects of the performance episode and work experiences can shape specific work behaviours, such as break behaviours. Therefore, the next section will specifically consider two task demands that might be related to break behaviours: cognitive and emotional demands.

6.1.3 Task characteristics and break behaviours

An important proposition of the Episodic Model of Work Breaks is that past and future performance episode characteristics should influence what workers do during their break. For example, workers may want to engage in a relaxing break after turning in a complex report. In contrast, someone else may want to think about how to perform a difficult task after the break.

Past research has highlighted the importance to match job demands with recovery experiences to understand different behavioural outcomes (Daniels & de Jonge, 2010; de Jonge et al., 2012), such that emotional demands should be closely related to emotional recovery experiences, and cognitive demands are closely related to cognitive recovery experiences (de Jonge et al., 2012). Similarly, this chapter focuses on emotional and cognitive demands because both types of demands have unique characteristics that should promote the expression of specific break behaviours.

Emotional demands are defined as experiences of unpleasant emotions while performing a task (Van Veldhoven & Meijman, 1994). Past research on job demands has shown that workers who perform emotionally demanding tasks, such as dealing with unpleasant clients, also report higher levels of negative affect (Dormann & Zapf, 2004; Van Veldhoven & Meijman, 1994; Weiss & Cropanzano, 1996). Considering that workers can anticipate future

job demands (DiStaso & Shoss, 2020; G. Feldman & Hayes, 2005), one could argue that anticipated high levels of emotional demands will also lead to higher levels of negative affect. In support of this proposition, research on evocative memory suggests that people are able to anticipate how emotionally upsetting events will make them feel, and that this anticipation has a stronger negative emotional reaction than experiencing the actual event (Van Boven & Ashworth, 2007).

As previously mentioned above, relaxation can be classified as a form of emotion regulation strategy whereby workers attempt to downregulate negative emotions and upregulate positive ones. As such, drawing from past research on the congruency between job demands and recovery (de Jonge et al., 2012), I propose that workers who just completed emotionally demanding tasks before the break or anticipate emotionally demanding tasks after the break will engage in more relaxation during the break. From a reactive perspective, this would be because workers attempt to modify the way they are feeling to improve their mood. From a proactive perspective, this would be because workers seek to pre-emptively modify their own moods before experiencing negative emotions. Therefore, I propose the following hypotheses:

Hypothesis 3a: Emotional demands immediately before the break are positively related to relaxation during the break.

Hypothesis 3b: Emotional demands immediately after the break are positively related to relaxation during the break.

Affective rumination and worry are conceptualised as emotion-focused coping strategies. Affective rumination is past-oriented, while worry is future-oriented. Past research concerning the antecedents of coping strategies suggests that experiencing or anticipating

negative affect triggers emotion-focused coping strategies (Rovira et al., 2005). This is because negative affect usually narrows the attentional focus and limits the information processing capacity, all of which inhibits effective problem-solving pondering (Elliot et al., 2013; Gable & Harmon-Jones, 2010; George & Zhou, 2007; Hamesch et al., 2014). Considering that emotional demands, either experienced or anticipated, should trigger negative affect, I propose that emotional demands before the break should be associated with affective rumination during the break, while emotional demands after the break should be associated with worry during the break. Therefore, I propose the following hypotheses:

Hypothesis 4a: Emotional demands immediately before the break are positively related to affective rumination during the break.

Hypothesis 4b: Emotional demands immediately after the break are positively related to worry during the break.

Cognitive demands are defined as requiring high levels of concentration and constant attentional focus to prevent mistakes (Van Veldhoven & Meijman, 1994). Based on the matching principle (Daniels & de Jonge, 2010; de Jonge et al., 2012), I suggest that problem-solving pondering during break, which is mostly defined as a neutral cognitive process (G. Feldman & Hayes, 2005), should help employees alleviate some of the anticipated stress that may come from tasks that are cognitively demanding. For example, workers can mentally engage pre-emptively with the task to plan how to best approach a task that requires high levels of concentration and attention to detail so that they do not need to expend cognitive resources to think about how to perform the task while performing the task (Hockey, 2013). Moreover, thinking about how to perform a task can lead to better use of the resources available (M. S. Feldman & Worline, 2011). For example, consider needing to perform a task that requires a lot

of concentration and attention to detail, such as ensuring that a list of names is correct (e.g., see the previous chapter). Workers during the break can think of ways to optimise the task to make it less demanding (M. S. Feldman & Worline, 2011). Thus, I propose the following hypothesis:

Hypothesis 5: Cognitive demands immediately after the break are positively related to problem-solving pondering during the break.

6.1.4 Summary

This chapter aimed to provide a theoretical framework on break behaviours as defined in the Episodic Model of Work Breaks and the motivational sources that determine what workers do during breaks. In line with this, I draw from the dual pathway described in Chapter 3 and self-regulation theories to hypothesise under which condition disengagement and task engagement break behaviours are reactive or proactive. I also argued that task characteristics are key to explain why workers engage in specific break behaviours. Specifically, I draw from match theories to argue that emotional and cognitive demands will have a degree of congruency with break behaviours, such that emotional demands will be related to affect-related break behaviours (i.e., relaxation, affective rumination, and worry) and cognitive demands will be related to cognitive-related break behaviours (i.e., problem-solving pondering). Table 6.1 summarises all the hypotheses that will be tested with the method described in the next section.

Table 6.1. Summary of hypotheses in Chapter 6.

Treatment effect hypotheses	
Hypothesis 1a	There is a positive relationship between focusing on the performance episode immediately before the break and relaxation during the beak.
Hypothesis 1b	There is a positive relationship between focusing on the performance episode immediately before the break and affective rumination during the break.
Hypothesis 2a	There is a positive relationship between focusing on the performance episode immediately after the break and relaxation during the break.
Hypothesis 2b	There is a positive relationship between focusing on the performance episode immediately after the break and problem-solving pondering during the break.
Hypothesis 2c	There is a positive relationship between focusing on the performance episode immediately after the break and worry during the break.
Task characteristics effects hypotheses	
Hypothesis 3a	Emotional demands immediately before the break are positively related to relaxation during the break.
Hypothesis 3b	Emotional demands immediately after the break are positively related to relaxation during the break.
Hypothesis 4a	Emotional demands immediately before the break are positively related to affective rumination during the break.
Hypothesis 4b	Emotional demands immediately after the break are positively related to worry during the break.
Hypothesis 5	Cognitive demands immediately after the break are positively related to problem-solving pondering during the break.

6.2 Methods

6.2.1 Sample and procedure

This section describes the field experiment that was implemented to test the hypotheses described in Table 6.1. All the material and the instructions can be found in Appendix C. The study was composed of three questionnaires: a pre-screening survey, a survey that needed to be completed immediately *before* taking any break during the workday, and a survey that had to be completed immediately *after* they came back from that break.

In the first survey (i.e., pre-screening), participants were presented with the goals of the study, then registered their interest to participate and signed the informed consent, and then read the full protocol of the study. Participants were asked four questions about this protocol,

and if they responded to two of these questions incorrectly, they were excluded from this study. Additionally, they had to report their usual working schedule. Participants who completed surveys 2 and 3 outside their usual working schedule were excluded from the data analysis, unless they provided an explanation for this behaviour (e.g., shift change).

The second survey included an experimental treatment. This treatment nudged participants towards focusing on either the performance episode they completed immediately before taking the break, the performance episode they expected to complete immediately after the break, or their general job. Participants were randomly assigned to one of the three experimental groups. Participants in group 1, labelled reactive, had to describe the episodic performance in which they were engaged immediately *before* the break, in terms of the tasks and steps they performed, and also report the degree of cognitive demands and emotional demands they experienced during that performance episode. Participants in group 2, named proactive, had to respond to the same questions as group 1 but concerning the performance episode they expected to engage in immediately *after* the break. Those in group 3 were the control group and had to respond to the same questions as the other two groups but about their general job.

In the third survey, participants had to report what they did during the break in terms of relaxation, problem-solving pondering, affective rumination, and worry. Moreover, participants had to report whether the task they expected to perform immediately after the break was a continuation of the task they were performing immediately before the break. Considering that the treatment was to focus on the task before or after the break, the treatment effect should be smaller when the tasks were the same.

I accessed the sample via Prolific and participants completed the study in Qualtrics. The inclusion criteria for this study were to have a full-time job and being able to understand English (as the instructions were in this language). The sampling in Prolific was restricted to

the UK because this made it easier to control for participants responding to the surveys within working hours. Participants were paid for each of the sections of the study that they completed. There was an extra financial bonus for completing the three surveys to incentivise full submissions. Including all three surveys, the study had a total duration of 12 minutes, and participants who completed all three sections were paid £2.54, which is above the Prolific standard.

For this study, I required two different sample sizes: one to test the hypotheses regarding the treatment effect and one to test the hypotheses concerning the influences of the task characteristics (i.e., cognitive demands and emotional demands) on break behaviours. This was because each experimental group had their own task characteristics questionnaire with a different focus (i.e., the previous performance episode, the future performance episode, or the job), so the analyses had to be run separately. Power analysis using G*Power 3.1 (Faul et al., 2009) indicated that for the treatment effect hypotheses I required a minimum of 53 participants per experimental group to identify medium effect sizes (F = .25) with an α of .05 power of .80, and three experimental groups. For the task characteristics hypotheses I needed to recruit at least 92 participants per experimental group to be able to identify a medium effect size (F = .15) with an α of .05, and a power of .80, and five independent variables (i.e., two task characteristics plus three control variables). To make sure that I could properly identify effects smaller than medium size effects, I aimed to recruit at least 100 participants per group. The final sample size was 306 people. The reactive group had 104 participants, while the proactive group and the control group had 101 participants each. The group sample size difference was due to some participants not completing the study and exclusions for not complying with the protocol. Mean age was 34.6 (SD = 8.94) and 60% were female.

6.2.2 Measures

This section describes all the measures that were included in this study. The actual list of items with their corresponding factor loadings can be found in Appendix C.

Relaxation. Relaxation was measured with four items from the recovery experience questionnaire (Sonnentag & Fritz, 2007). The items were adapted to target the break and were answered with a 5-point Likert scale (1-Not at all, 5-A great deal). An example item was "During your break, did you use your time to relax?" (α = .84).

Problem-solving pondering. Problem-solving pondering was measured with four items developed by Cropley et al. (2012). All items were answered with a 5-point Likert scale (1-Not at all, 5-A great deal). This scale was adapted to the break context and the future orientation needed for this study. An example item was "During the break, did you think about solutions to problems about the task you expect to do after the break?" (α = .91).

Worry. Worry was measured with the four items of the affective rumination scale developed by Cropley et al. (2012) but adapted to the future to capture the future orientation of worry. Moreover, the scale was adapted to the break context. All items were answered with a 5-point Likert scale (1-Not at all, 5-A great deal). An example item of the proactive version was "During the break, were you annoyed by issues related with the task you will do after the break?" (α = .93).

Affective rumination. Affective rumination was measured with the four items developed by Cropley et al. (2012) but adapted to capture the past orientation of affective rumination. Moreover, the scale was adapted to the break context. All items were answered with a 5-point Likert scale (1-Not at all, 5-A great deal). An example item of the proactive version was "During the break, were you annoyed by issues related with your task before the break?" (α = .92).

Cognitive demands. Cognitive demands were measured with three items extracted from the VBBA questionnaire (Van Veldhoven & Meijman, 1994). The three items were selected based on the factor loading and criterion validity. The items were responded with a 5-point Likert scale (1-Strongly Disagree, 5-Strongly Agree), and all items were adapted to reflect the participant's experimental group membership (i.e., reactive, proactive, or control group). An example item for the reactive group was "This task demanded a lot of concentration". An example item for the proactive group was "This task will demand a lot of concentration". An example item for the control group was "My job demands a lot of concentration". The reliability for the reactive group was $\alpha = .80$, for the proactive group was $\alpha = .76$, and for the control group was $\alpha = .61$.

Emotional demands. Emotional demands were also measured with three items extracted from the VBBA questionnaire (Van Veldhoven & Meijman, 1994). The three items were selected based on the factor loading and criterion validity. The items were responded with a 5-point Likert scale (1-Strongly Disagree, 5-Strongly Agree), and all items were adapted to reflect the participant's experimental group membership (i.e., reactive, proactive, or control group). An example item for the reactive group was "This task put me in emotionally upsetting situations". An example item for the proactive group was "This task will put me in emotionally upsetting situations". An example item for the control group was "My job puts me in emotionally upsetting situations". The reliability for the reactive group was $\alpha = .77$, for the proactive group was $\alpha = .83$, and for the control group was $\alpha = .93$.

Control variables. In the analyses concerning the treatment hypotheses, I included two control variables: break length in minutes and whether participants engaged in the same task before and after the break. Break length is generally considered key for break effectiveness (Bennett et al., 2019; Hunter & Wu, 2016). Moreover, it may be that relaxation is likelier in longer breaks. Thus, break length could carry an important confounding effect that needs to be

accounted for. The 'same task' variable included in the analyses was binary, where 1 represents performing the same task before and after the break. Considering that the treatment in this study was to focus on either the pre- or post-break task, performing the same task could affect the results. When testing the hypotheses concerning task characteristics, I also included task enjoyment as a control variable. This is because past evidence has shown that enjoying or disliking the tasks that were done immediately before the break could influence breaks (Bosch & Sonnentag, 2019). Moreover, finishing or anticipating an enjoyable task can spark positive emotion which can influence affective rumination, problem-solving pondering, and worry during the break. Therefore, it can carry an important confounding effect that has to be accounted for. In the same way that each group had their own task characteristics questions, each group had their own task enjoyment question. Task enjoyment was measured with a single item responded in a 7-point Likert scale. For the reactive group, tasks enjoyment was "to what extent did you enjoy the task you just performed?"; for the proactive group was "to what extent do you expect to enjoy the task you will perform after the break?"; for the control group was "to what extent do you enjoy your work?"

6.2.3 Data analysis strategy

To test the study hypotheses presented in Table 6.1, I conducted a series of structural equation models (SEM) in R using the Lavaan package (Rosseel, 2012). Additionally, I estimated a series of confirmatory factor analyses to establish the factor structure of the different break behaviours and job demands, also using the Lavaan package (Rosseel, 2012) in R. All estimations were with Maximum Likelihood.

To test hypotheses 1a, 1b, 2a, 2b, and 2c concerning the treatment effect on relaxation, problem-solving pondering, worry, and affective rumination, three SEM models were estimated including all the break behaviours as outcomes, and the experimental groups, break

length, and the ‘same task’ variable as independent variables. Outcomes and independent variables were correlated among themselves. The first SEM model included only the proactive and control groups, using the reactive group as the reference group. This means that the estimates must be understood as the degree to which those in the proactive and control groups engaged in, for example, relaxation during the break *compared* to the reactive group. The second model used the proactive group as the reference group. The third model used the control group as the reference group. Estimating this third model does not add more information over the other two models, it makes it easier to interpret the results.

To test hypotheses 3a, 3b, 4a, 4b, and 5 concerning the relationship between cognitive demands and emotional demands with relaxation, problem-solving pondering, worry, and affective rumination, three separate SEM models were estimated using three different subsamples, including all the break behaviours as outcomes and all the independent variables. Outcomes and independent variables were correlated among themselves. The first subsample included those in the reactive group, the second subsample included those in the proactive group, and the third subsample included those in the control group. This was done because each experimental group had their specific task characteristics questions that were modified to capture the focus of the group.

6.3 Results

6.3.1 Scale reliability and factor structure

Results in Table 6.2 show that all scales have good reliabilities (.61 – .93). Confirmatory factor analysis (CFA) of the break behaviours showed that a four-factor model differentiating the four factors does not have good fit by conventional standards (χ^2 = 441.90, df = 71, p < .01; CFI = .91; TLI = .89; RMSEA = .11 [.10, .12]; SRMR = .05). Examination of

the modification indices indicates that some of the items in the affective rumination and worry factors (see Appendix C) have important levels of correlation with other items in the same factor. Upon inspection, one can see, that for example, items 1 and 2 are very similar. Based on this, two additional CFAs were conducted, one keeping item 1 and one keeping item 2 in the affective rumination and worry factors. Both CFAs provide excellent fit, but the one keeping item 1 fits slightly better (keeping item 1: $\chi^2 = 167.88$, df = 71, $p < .01$; CFI = .97; TLI = .96; RMSEA = .07 [.05, .08]; SRMR = .04 | keeping item 2: $\chi^2 = 203.92$, df = 71, $p < .01$; CFI = .96; TLI = .95; RMSEA = .08 [.07, .09]; SRMR = .04). Thus, the model keeping item 1 was preferred. The job demands' CFA for the reactive group showed acceptable fit ($\chi^2 = 20.38$, df = 8, p = .01; CFI = .94; TLI = .89; RMSEA = .12 [.06, .19; SRMR = .08). For the proactive group it also showed acceptable fit ($\chi^2 = 20.01$, df = 8, p = .01; CFI = .95; TLI = .90; RMSEA = .12 [.06, .19]; SRMR = .08). The CFA for the control group had excellent fit ($\chi^2 = 13.93$, df = 8, p = .08; CFI = .98; TLI = .96; RMSEA = .09 [.00, .16]; SRMR = .06). Although the CFAs generally show a good fit for the factor structures, the RMSEA are higher than the usual standards (Byrne, 2012). The specific fit indices for the complete structural models are presented with the respective results.

Table 6.2. Descriptive and bivariate correlations in the field experiment.

Variables	Mean (SD)	N	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. Relaxation	2.50 (.98)	306	**.84**											
2. Affective rumination	1.53 (.77)	306	-.17**	**.90**										
3. Problem-solving pondering	2.11 (.97)	306	-.24**	.29**	**.91**									
4. Worry	1.46 (.75)	306	-.09	.59**	.44**	**.91**								
5. Reactive group	-	104	.07	-.12*	-.13*	-.09	-							
6. Proactive group	-	101	-.09	.03	.06	.12*	-.50**	-						
7. Control group	-	101	.02	.10	.08	-.02	-.50**	-.49**	-					
8. Break length (minutes)	36.62 (4.85)	306	.13*	.00	.02	.03	-.03	.06	-.03	-				
9. Same task	64%	306	.05	.08	-.03	.07	-.18**	.06	.12*	.05	-			
Pre-break task characteristics														
10. Pre-task enjoyment	3.89 (1.39)	104	.07	-.19	-.06	-.11	-	-	-	.19	.08	-		
11. Pre-break cognitive demands	3.71 (1.01)	104	.13	.16	.16	.18	-	-	-	.10	.12	.30**	**.80**	
12. Pre-break emotional demands	1.64 (.76)	104	-.10	.36**	.19	-.02	-	-	-	-.10	-.06	-.02	.21*	**.77**
Post-break task characteristics														
10. Post-task enjoyment	3.91 (1.41)	101	-.22	-.18	.13	-.22				.04	-.06	-		
11. Post-break cognitive demands	3.92 (.91)	101	-.09	.14	.32**	.23*	-	-	-	-.02	-.06	.27**	**.76**	
12. Post-break emotional demands	1.83 (.87)	101	.00	.26**	.13	.44**	-	-	-	.00	-.04	.02	.27**	**.83**
Job characteristics														
10. Control-task enjoyment	5.23 (1.28)	101	.03	-.04	.09	-.01	-	-	-	.06	.06	-	-	
11. Control-break cognitive demands	4.50 (.47)	101	-.12	.15	.12	.02	-	-	-	.01	.06	.29**	**.61**	
12. Control-break emotional demands	2.92 (1.24)	101	-.19	.26**	.03	.12	-	-	-	.13	-.12	.21*	.33**	**.93**

Notes. **p < .01, *p < .05. Reliabilities (Cronbach alpha) are in the diagonal. Correlations are with observed means. Affective rumination and worry scales correlations and reliabilities are estimated with the final items.

6.3.2 Test of hypotheses

6.3.2.1 Treatment effects

The structural model to test hypotheses 1a, 1b, 2a, and 2b concerning the treatment effect on break behaviours provided excellent fit (χ^2 = 217.85, df = 111, p < .01; CFI = .97; TLI = .95; RMSEA = .06 [.05, .07]; SRMR = .04). It is important to mention that there is a positive and significant relationship between break length and relaxation (b = .03, p < .05). This indicates that the decision to include break length as a control variable was adequate. Performing the same task before and after the break did not have a significant effect on any of the break behaviours.

Hypothesis 1a stated that there will be a positive relationship between focusing on the performance episode immediately before the break and relaxation during the beak. Table 6.3 shows that those in the reactive group engaged more in relaxation during the break, compared to the proactive group (b = .30, p < .05). There is no significant difference between the control group and the reactive group (b = .11, p = .48) and control group and the proactive group (b = -.19, p = .19). Thus, hypothesis 1 is supported.

Hypothesis 1b stated that there will be a positive relationship between focusing on the performance episode immediately before the break and affective rumination during the break. Table 6.3 shows that those in the reactive group did not engage in more affective rumination during the break compared to the proactive group (b = -.16, p = .13). However, contrary to what was expected the reactive group reported engaging *less* in affective rumination compared to the control group (b = -.21, p < .05). Thus, hypothesis 1b is rejected.

Hypothesis 2a suggested that there will be a positive relationship between focusing on the performance episode immediately after the break and relaxation during the break. Considering that there is a significant effect of focusing on the performance episode before the break on relaxation, one needs to look at the differences between the proactive and the control

groups to test this hypothesis. If there was a significant influence of focusing on the performance episode after the break, there would be a significant difference. Results, however, show that this is not the case, finding no difference between focusing on the performance episode after the break and the control group in terms of relaxation ($b = -.19$, $p = .19$). Thus, hypothesis 2a is rejected.

Hypothesis 2b proposed that there will be a positive relationship between focusing on the performance episode immediately after the break and problem-solving pondering during the break. Table 6.3 reveals that workers in the proactive group did engage in more problem-solving pondering during the break compared to the reactive group ($b = .29$, $p < .05$). There is, however, no significant difference between the proactive and the control group ($b = .01$, $p = .92$). Results also show that those in the control group also engage in more problem-solving pondering compared to those in the reactive group ($b = .31$, $p < .05$). Thus, hypothesis 2a is supported.

Finally, hypothesis 2c argued that there will be a positive relationship between focusing on the performance episode immediately after the break and worry during the break. Table 6.3 shows that workers in the proactive group engaged in more worry during the break compared to the reactive group ($b = .19$, $p < .05$). However, there is no difference between the proactive and the control group ($b = .15$, $p = .11$), thus, hypothesis 2b is supported.

Table 6.3 SEM results for the treatment effects on break behaviours in the field experiment.

	Relaxation		Affective rumination		Problem-solving pondering		Worry	
	b (SD)	β	b (SD)	β	b (SD)	β	b (SD)	β
Break length	.03 (.02)*	.14	.00 (.01)	.00	.00 (.01)	.02	.00 (.01)	.02
Same task	.14 (.13)	.07	.09 (.09)	.06	-.16 (.12)	-.09	.07 (.08)	.06
Reactive group as reference group								
Proactive group	-.30 (.15)*	-.14	.16 (.11)	.10	.29 (.14)*	.15	.19 (.09)*	.14
Control group	-.11 (.15)	-.05	.21 (.11)*	.14	.31 (.14)*	.16	.04 (.09)	.03
Proactive group as reference group								
Reactive group	.30 (.15)*	.14	-.16 (.11)	-.10	-.29 (.14)*	-.15	-.19 (.09)*	-.14
Control group	.19 (.15)	.09	.06 (.11)	.04	.01 (.14)	.00	-.15 (.09)	-.11
Control group as reference group								
Reactive group	.11 (.15)	.05	-.21 (.11)*	-.14	-.31 (.14)*	.16	-.04 (.09)	-.03
Proactive group	-.19 (.15)	-.09	-.06 (.11)	-.04	-.01 (.14)	-.00	.15 (.09)	.11
R^2								

Notes. ** p < .01, *p < .05.

6.3.2.2 Task characteristics effects

Results in Table 6.4 concern hypothesis 3a, 3b, 4a, 4b, and 5 about the relationship between tasks characteristics and break behaviours. To make it easier to read, results concerning the reactive hypotheses will be presented first (i.e., 3a and 4a) and results concerning the proactive hypotheses will be presented second (i.e., 3b, 4b and 5). The structural model concerning the task characteristics of the reactive group predicting break behaviours had good fit (χ^2 = 252.45, df = 197, p < .01; CFI = .95; TLI = .94; RMSEA = .05 [.03, .07]; SRMR = .07). The structural model regarding the task characteristics of the proactive group predicting break behaviours had acceptable fit (χ^2 = 301.94, df = 197, p < .01; CFI = .92; TLI = .90; RMSEA = .07 [.06, .09]; SRMR = .06). Finally, the structural model concerning the *job* characteristics of the control group predicting break behaviours had excellent fit (χ^2 = 254.55, df = 197, p < .01; CFI = .96; TLI = .95; RMSEA = .05 [.03, .07]; SRMR = .06).

Hypothesis 3a suggested that emotional demands immediately before the break will be positively related to relaxation during the break. Results in Table 6.4 concerning the *reactive* group model reveal that this is not the case, and there is no relationship between emotional demands before the break and engaging in relaxation during the break ($b = -.27$, $p = .09$). Therefore, hypothesis 3a is rejected

Hypothesis 4a proposed that emotional demands immediately before the break will be positively related to affective rumination during the break. Results concerning the *reactive* group model show that there is indeed a positive relationship between emotional demands before the break and engaging in affective rumination during the break ($b = .42$, $p < .01$). Therefore, hypothesis 4a is supported.

Hypothesis 3b stated that emotional demands immediately after the break (i.e., proactive group) will be positively related to relaxation during the break. Results concerning the *proactive* group model reveal that there is no relationship between emotional demands after the break and relaxation during the break ($b = .03$, $p = .82$). Therefore, hypothesis 3b is rejected.

Hypothesis 4b posited that the emotional demands immediately after the break will be positively related to worry during the break. Results concerning the *proactive* group model reveal that there is a positive relationship between emotional demands after the break and worry during the break ($b = .31$, $p < .01$). Thus, hypothesis 4b is also supported.

Finally, hypothesis 5 stated that cognitive demands immediately after the break will be positively related to problem-solving pondering during the break. Results concerning the *proactive* group model support this hypothesis, showing that anticipating more cognitive demands after the break is associated with engaging in problem-solving pondering during the break ($b = .52$, $p < .01$).

It is important to point out that when looking at the results regarding the control group model, one generally does not find a significant relationship between job cognitive and emotional demands with relaxation (b = -.33, p = .44; b = -.18, p = .17), problem-solving pondering (b = .26, p = .47; b = .00, p = .99), and worry (b = -.12, p = .65; b = .13, p = .11). There is a significant positive relationship between job emotional demands and affective rumination (b = .22, p < .05), but not between cognitive demands and affective rumination (b = .17, p = .58).

The results regarding the control variables also reveal an interesting pattern. When looking at the *reactive* group model, it is possible to see that there is a negative relationship between task enjoyment before the break with affective rumination (b = -.14, p < .01) and worry (b = -.10, p < .05) during the break. When looking at the *proactive* group model, one can see that there is a significant negative association between performing the same task before and after the break with engaging in problem-solving pondering during the break (b = -. 53, p < .01). Moreover, there is a negative relationship between anticipated task enjoyment after the break with relaxation (b = -.15, p < .05), affective rumination (b = -.09, p < .05), and worry (b = -.13, p < .05) during the break.

Table 6.4 SEM results for the treatment effects on break behaviours in the field experiment per group

	Relaxation		Affective rumination		Problem-solving pondering		Worry	
	b (SD)	β	b (SD)	β	b (SD)	β	b (SD)	β
Reactive group model								
Break length	.07 (.03)*	.23	.02 (.02)	.08	-.01 (.03)	-.05	.01 (.02)	.07
Same task	-.11 (.19)	-.06	.17 (.13)	.12	-.18 (.16)	-.12	.12 (.11)	.11
Task enjoyment	-.03 (.08)	-.05	-.14 (.05)**	-.28	-.07 (.06)	-.13	-.10 (.04)*	-.26
Cognitive demands	.17 (.13)	.17	.15 (.09)	.20	.18 (.11)	.22	.17 (.08)*	.29
Emotional demands	-.27 (.16)	-.20	.42 (.11)**	.41	.11 (.13)	.10	-.11 (.09)	-.14
R^2	.11		.23		.06		.07	
Proactive group model								
Break length	.03 (.02)	.14	.03 (.01)	.19	.03 (.02)	.11	.02 (.01)	.15
Same task	.33 (.19)	.18	.03 (.12)	.02	-.53 (.20)**	-.25	-.13 (.12)	-.10
Task enjoyment	-.15 (.07)*	-.24	-.09 (.04)*	-.23	.00 (.07)	.00	-.13 (.04)**	-.29
Cognitive demands	-.06 (.14)	-.05	.10 (.09)	.13	.52 (.16)**	.40	.16 (.09)	.20
Emotional demands	.03 (.13)	.03	.18 (.09)*	.25	-.06 (.14)	-.05	.31 (.09)**	.40
R^2	.13		.17		.24		.35	
Control group model								
Break length	.02 (.03)	.10	-.03 (.02)	-.16	-.01 (.02)	-.03	-.02 (.02)	-.10
Same task	.14 (.27)	.06	.16 (.19)	.08	.31 (.23)	.14	.33 (.17)*	.21
Task enjoyment	.12 (.10)	.13	-.08 (.07)	-.11	.03 (.09)	.04	-.01 (.06)	-.02
Cognitive demands	-.33 (.43)	-.12	.17 (.31)	.08	.26 (.36)	.11	-.12 (.26)	-.07
Emotional demands	-.18 (.13)	-.17	.22 (.09)*	.28	.00 (.11)	.00	.13 (.08)	.20
R^2	.07		.11		.04		.07	

Notes. ** $p < .01$, *$p < .05$.

6.4 Discussion

The general aim of this study was to explore the second research question that emerged from the Episodic Model of Work Breaks, namely: why do workers engage in different break behaviours? Is it because of what they have done before the break or because of what they expect to do after the break? Specifically, I first attempted to establish whether engaging in relaxation and affective rumination was related to focusing the attention on the pre-break

performance episode, and whether engaging in problem-solving pondering and worry was related to the focusing attention on the post-break performance episode. Second, I aimed to explore if emotional and cognitive demands before and after the break influence break behaviours.

Results presented in this study have two important theoretical implications for the study of work breaks. First, results suggest that focusing on either the performance episode immediately before the break or the one immediately after the break influences what workers do during the break in terms of relaxation, problem-solving pondering, and worry. Specifically, focusing on the performance episode before the break promotes relaxation activities, while focusing on the performance episode after the break promotes engaging in problem-solving pondering and worry during the break. These results lend support to the dual pathway described in the Episodic Model of Work Breaks. Namely, certain break behaviours can be classified as reactive, such as relaxation, and other break behaviours can be classified as proactive, such as problem-solving pondering and worry. More importantly, results of this study suggest that to understand which break behaviours are adopted, it is important to examine the performance episodes before and after the break, as opposed to only considering performance episodes before the break (e.g., Bosch & Sonnentag, 2019; Zhu et al., 2018).

Nevertheless, results regarding the treatment effect on affective rumination were unexpected. Specifically, affective rumination was defined as a reactive break behaviour, however, results show that those in the reactive group engaged in *less* affective rumination during the break compared to the control group. One way to explain this result is that there was an unexpected treatment effect concerning affective rumination. Workers may have ruminated about their task while describing it as per the experimental task, and then go on a break. Future studies may want to explore the possibility of how describing completed performance episodes may influence ruminative thinking.

It is interesting to note that there is no difference between the proactive group and the control group concerning problem-solving pondering, while both are significantly different from the reactive group. This supports the assertion that workers may naturally ponder about their future tasks, as suggested by prospective thinking research (Kvavilashvili & Rummel, 2020).

The second theoretical implication of this study concerns the proposition that there is a congruency between specific task characteristics before and after the break with specific break behaviours. The positive relationships between pre-break emotional demands and affective rumination, post-break anticipated emotional demand and worry, and post-break anticipated cognitive demands and problem-solving pondering reveals two important effects. First, consistent with the episodic framework adopted in this thesis, reactive and proactive break behaviours are triggered by job demands before and after the break respectively. This provides major support for the Episodic Model of Work Breaks, as it shows that to understand the effects of task characteristics on break behaviours, one needs to study work breaks from an episodic perspective, looking into what workers do before and after the break. Second, there is a congruency between job demands and break behaviours, such that emotional demands influence affective-related break behaviours, while cognitive demands influence cognitive-related break behaviours. This is consistent with research on recovery, which suggests that specific job demands will call for specific, congruent recovery experiences (de Jonge et al., 2012).

Surprisingly, neither cognitive demands nor emotional demands were related to relaxation during the break. However, post-break task enjoyment was. Specifically, workers who anticipate a task after the break that is less enjoyed will be more likely to engage in relaxation during the break. This was surprising, considering that relaxation seems to be mostly a reactive behaviour. Considering that 64% of the sample reported engaging in the same task

before and after, one explanation for this result is that workers may decide to engage in relaxation only if the task is the same. Namely, if workers are performing a task that they do not enjoy, they may take a break in the middle and relax before carrying on. A moderation analysis would be underpowered to test this post-hoc hypothesis. Therefore, I conducted a post-hoc analysis using two sub-samples: those who performed the same task before and after the break, and those who performed different tasks. This post-hoc analysis reveals an almost statistically significant result in the right direction ($b = -.15$, $p = .06$). This non-significant result could be explained by the lack of power ($N = 69$, compared to the minimum of 92 required by the power analyses described above). In contrast, estimating the model with the sub-sample that performed a different task shows a clear non-significant result ($b = -.11$, $p = .33$). This provides some support for this post-hoc hypothesis and suggests that to understand why workers engage in relaxation during breaks, it is important to look into the performance episodes before and after the break simultaneously. Nevertheless, this is a post-hoc hypothesis tested with an underpowered sample. Therefore, more research is needed to test and verify this proposition.

To summarise, the Episodic Model of Work Breaks suggested that break behaviours can either be reactive or proactive, and that workers would engage in specific break behaviours to fulfil their specific needs based on the performance episodes before and after the break. The results presented in this chapter provide support to both assertions and to the episodic perspective taken in this thesis to understand why workers engage in different break behaviours. Moreover, results also lend support to the notion that workers engage in specific break behaviours to match their needs. For example, workers engaging in problem-solving pondering during breaks when they anticipate cognitively demanding tasks after the break. Therefore, to fully understand what workers do during the break and why, it is important to

consider whether the break behaviour is reactive or proactive and the fit between the performance episodes before and after the break with the specific break behaviour.

6.4.1 Strengths, limitations, and future research

Field experiments have important strengths over other research designs, such as non-experimental field studies and laboratory experiments (Eden, 2017). Compared to non-experimental field studies, field experiments can establish a causal link between the predictors and the outcomes due to the randomised treatment implemented (Antonakis et al., 2010), while also maintaining stronger external validity and generalisability compared to laboratory experiments (Eden, 2017). Nevertheless, field experiments have less internal validity compared to laboratory experiments, which is the most important limitation of this study for establishing causality. An example of this issue is that it is not possible to establish in this study whether workers in the proactive group engaged *less* in relaxation because they were thinking about the task right after the break and this is what explains the differences concerning relaxation between the proactive and the reactive groups, or whether workers engaged in relaxation because of the mechanisms described in the theoretical section. Thus, future research must aim to disentangle these effects in controlled laboratory experiments to observe the causal link expressed in the model.

Another important limitation is that because of how this study was designed, there is no information about what the reactive group expected to do after the break, or what the proactive group did before the break. Thus, no counterfactuals can be established to estimate the causal paths, and the relationship between specific task characteristics and break behaviours was analysed cross-sectionally. Therefore, it is not possible to establish a causal relationship. That being said, the independent variables were separated from outcomes which should reduce common method error which typically biases cross-sectional estimates (Podsakoff et al., 2003).

Moreover, there were distinct relationships between the reactive task demands with the reactive break behaviours, and between the proactive tasks demands with the proactive break behaviours. Interestingly, there were almost no significant relationships between the general job demands with break behaviours. These results do suggest a causal link, but future research should aim to experimentally manipulate task characteristics to establish how they can influence break behaviours.

A third limitation of this study is the treatment itself. The treatment is closely related to priming, which has been criticised in previous research because it has low replicability (Cesario, 2014). This is mostly because priming is very sensitive to the experimental environment (Cesario, 2014). Nevertheless, considering the sampling strategy, it was not possible to actually manipulate the tasks that workers performed or expected to perform after the break. Future studies should aim to replicate these results with different research designs, such as laboratory experiments that manipulate the tasks before and after the break, or experience sample methodologies that consider tasks characteristics before and after the break and their relationship with break behaviours.

Finally, fit indices presented alongside the results suggest that there may be some issues with the measurement models in the SEM analyses. Specifically, the RMSEAs of the job demands measurement models across the different groups tend to be higher than accepted norms and with larger confidence intervals (Byrne, 2012). The RMSEA contrasts the covariance matrix implied by the model with a population covariance matrix. Poor-fitting models indicate that the constraints imposed on the data by the structural model are not *true in* the population, thus results may not be generalisable. One explanation for poor fitting RMSEA values is the low number of degrees of freedom (Kenny et al., 2015). This explanation seems to be likely looking at the appropriate fit indices of structural models including originally poor-fitting measurement models but having higher degrees of freedom (see section 6.3.2.2).

Therefore, a high RMSEA may not be problematic or indicative of poor fit in this particular case.

6.5 Conclusions

Overall, the study presented in this chapter aimed to answer the second research question that emerged from the Episodic Model of Work Breaks, namely: "why do workers engage in different break behaviours? Is it because of what they have done before the break or because of what they expect to do after the break?". Results of a field experiment show that focusing on the performance episode immediately *before* the break leads to workers engaging in more relaxation during the break, compared to focusing on the performance episode immediately *after* the break. In contrast, focusing on the performance episode immediately *after* the break leads to engaging in more problem-solving pondering and worry during the break, compared to focusing on the performance episode immediately *before* the break. Moreover, task characteristics seem to influence break behaviours. Expecting cognitively demanding tasks after the break may lead to employees engaging in problem-solving pondering during the break, especially if the task is different from the one that they were performing before. Similarly, expecting emotional demands after the break may lead to employees engaging in worry during the break, while emotional demands immediately before the break may lead to employees engaging in more affective rumination during the break. These results support one of the main propositions of the Episodic Model of Work Break, namely, what workers do during the break depends on the performance episodes before and after the break.

Chapter 7
How do break behaviours influence post-break outcomes? An event contingent diary study

This chapter addresses the third research question generated by the Episodic Model of Work Breaks, namely "how do break behaviours in the model relate to well-being and performance after the break?" (See Chapter 3). Recall that the Episodic Model of Work Breaks describes two key break behaviours. 'Disengagement break behaviours' are behaviours that allow employees to mentally and physically distance employees from their work, and the key functions are to promote unwinding from job stressors (i.e., recovery processes) and to reduce negative affective activation by fostering positive emotions (i.e., emotion regulation processes). For example, when workers go for a walk in a park during the lunch break (Sianoja et al, 2017). 'Task engagement break behaviours' are behaviours that imply an effortful cognitive engagement with work-related issues, and a key function is to help employees cope with negative affective states that emerge because of performance episodes before and after the break. Work-related problem-solving pondering is an example of task engagement break behaviours as the primary function is to think about solutions to work problems (Cropley & Zijlstra, 2011).[2] Based on the Episodic Model of Work Breaks on can argue that disengagement and task engagement break behaviours will relate differentially to employee well-being and a key performance outcome, namely creativity. Thus, the specific aim of this chapter is to test the differential effects of disengagement and task engagement break behaviours on employee well-being and creativity.

[2] Finally, 'physiological break behaviours' refer to behaviours that address physiological needs, such as eating, drinking, or going to the bathroom. It is important to say, however, that there is little empirical evidence to suggest that survival behaviours can promote positive employee-related outcomes such as well-being and performance, assuming a healthy individual. Thus, I do not consider these in this study.

Focusing on affective well-being as an outcome has important benefits over other popular well-being variables explored in breaks research. Specifically, most studies about work breaks usually focus on one or a combination of different well-being outcomes, such as general positive affect (Bosch et al., 2017), fatigue (Zhu et al., 2018), and subjective feelings of energy (Hunter & Wu, 2016). All of these variables are integrated into the affective well-being model described by Warr (1990), which defines affective well-being as the cumulative affective experiences that are generally experienced. These affective experiences can be differentiated in terms of activation (high vs low) and valence (pleasant vs unpleasant). Specifically, fatigue and vigour represent low and high levels of activation respectively, while pleasant and unpleasant valence represent positive and negative forms of affect, respectively. Therefore, in studying the effect of break behaviours on the full spectrum of affective well-being, I am incorporating the most commonly studied outcome variables in breaks research in a single construct.

Moreover, it has been highlighted that research on breaks does not pay sufficient attention to breaks' behavioural outcomes such as performance (e.g., Kim et al., 2018). Based on past research, one behavioural outcome that should be influenced by the break behaviours defined in the Episodic Model of Work Breaks is creativity (i.e., the generation of novel ideas). Moreover, creativity is essential for organizational change and survival (Hughes et al., 2018; Madrid & Patterson, 2018). Thus, exploring how work breaks can influence creativity in particular addresses previous calls to better understand the behavioural outcomes of breaks and has important practical value for organisations.

To meet the aims of this chapter, I conducted an event contingent diary study in which participants filled in two daily surveys, six days, across two weeks. The first survey was completed immediately after the lunch break and concerned the degree of engaging in relaxation, problem-solving pondering, and affective rumination during the break. The second

survey was filled in one hour after the lunch break and participants reported their affective well-being and participated in a creativity task.

The study presented in this chapter makes three important contributions to the study of work breaks and this thesis. First, this study provides a more integrated account of break behaviours that considers both disengagement and task engagement break behaviours. Second, it addresses past empirical evidence showing that work-related behaviours during non-working time (e.g., thinking about work at home) is not necessarily problematic. Third, the study presented here shows the simultaneous effects of different break behaviours on affective well-being and creativity.

This chapter is organised as follow. I first present a theoretical review focusing on how the break behaviours described in this model relate to affective well-being and creativity. I then report my methods: protocols, sample and sampling, measures, and data analysis strategy. I follow with the results and finish this chapter with the discussion, strengths and limitations, and finish with concluding remarks about the results in this chapter.

7.1 Theoretical framework

This section describes the theoretical framework from which the research questions posed above will be explored and follows the model depicted in Figure 7.1.

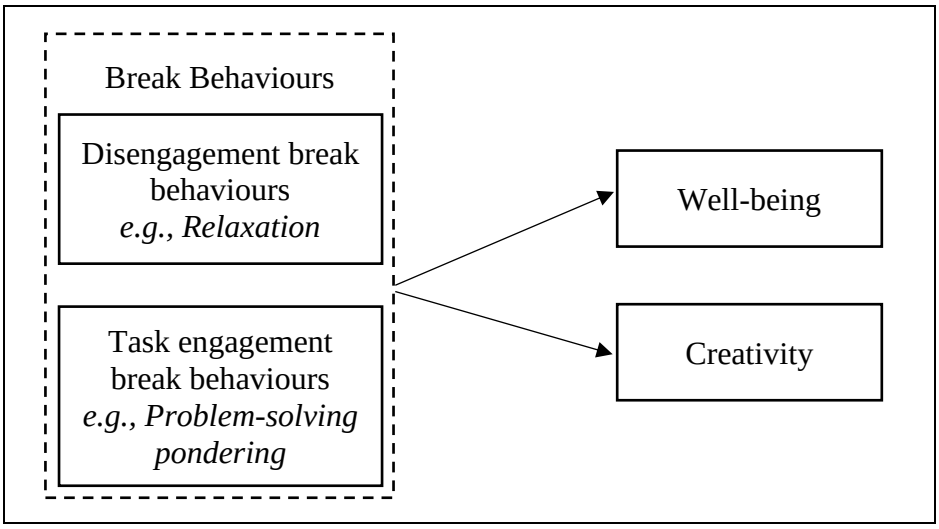

Figure 7.1. Theoretical Model to be tested in Chapter 7

7.1.1 Break behaviours

Past research on breaks has attempted to unpack what workers do during their breaks and why these behaviours are effective in promoting positive employee-related outcomes after the break, such as reduced fatigue, increased vitality, and increased performance (Kim et al., 2018; Zacher et al., 2014; Zhu et al., 2018). Considering that work breaks imply to briefly stop working during the workday, it has been proposed that breaks can serve as momentary recovery opportunities at work (Trougakos & Hideg, 2009). Recovery is a process by which individuals can reduce work-related fatigue and restore previously spent resources by engaging in four core recovery experiences: psychological detachment (i.e., not thinking about work), relaxation (i.e., engaging in low-effort activities that foster positive affect), mastery (i.e., learning new skills unrelated to the work), and control (i.e., degree of autonomy over what to do during the free time). Importantly, all of these recovery experiences require disengaging from work (Sonnentag et al., 2017).

In line with the recovery perspective on breaks, researchers have focused on the role that recovery experiences play during breaks. Psychological detachment represents the main dimension of disengagement from work during breaks (Sonnentag & Fritz, 2015) and it has been found to be the stronger predictor in the positive relationship between recovery after work and increased well-being (Bennett et al., 2017; Sonnentag & Fritz, 2015; Steed et al., 2019). Consequently, some have found that psychological detachment during breaks is also associated with higher levels of well-being (e.g., more positive affect, less fatigue) after the break (Rhee & Kim, 2016; Zhu et al., 2018). Nevertheless, others have found that when psychological detachment during the break is examined together with other recovery experiences, the positive influences of it on post-break positive outcomes disappears (Bosch et al., 2017; de Jonge, 2019; Kim et al., 2017). The only exception is when it is made explicit that the break activity that led to psychological detachment was for fun, namely, the activity produced positive affect (Kim et al., 2018). Therefore, it seems that there exists a confounding effect in psychological detachment to explain its effectivity during breaks: positive affect.

Relaxation during breaks shows the most consistent positive effects in promoting positive break outcomes, such as increased positive affect, increased vitality, reduced fatigue and increased performance (Bosch et al., 2017; Kim et al., 2017, 2018; Sianoja et al., 2017; Steidle et al., 2017). Additionally, there is causal evidence that suggests that relaxation during breaks indeed is related to higher levels of well-being after the break (Blasche et al., 2018; Steidle et al., 2017). Based on the Episodic Model of Work Breaks, these results are in line with the key mechanisms that explain disengagement break behaviours positive results. Specifically, relaxation is facilitates both unwinding processes and experiences of positive affect (Sonnentag & Fritz, 2007). Therefore, in this study, I will focus on relaxation as the disengagement break behaviour.

Nevertheless, workers do not always disengage from work during breaks. Past research has highlighted that, for example, senior managers sometimes think about how their work can be improved during breaks, or what they will be doing next, and this does not impair their well-being (Berman & West, 2007). Further, engaging in work-related tasks during breaks is not harmful if employees have a high degree of control over what to do during the break (Trougakos et al., 2014). Sometimes, workers who take lunch with their supervisor discuss work-related issues during the break and report higher levels of positive affect right after the break, although this positive affect rapidly declines over the day (von Dreden & Binnewies, 2017).

Research on work-related rumination can help understand why engaging in task engagement break behaviours during the break deliver these results which seem contradictory to recovery research. Work-rumination generally refers to thinking about work when one is not required to be working (Cropley & Zijlstra, 2011). Although most research classifies rumination as negative and detrimental for well-being because it prologues experiences of job-related stressors (Hamesch et al., 2014), Cropley and Zijlstra (2011) differentiated affective rumination from problem-solving pondering. Affective rumination is defined as "the appearance of intrusive, pervasive, recurrent thoughts, which are negative in affective terms" (Cropley & Zijlstra, 2011, p. 10). In contrast, problem-solving pondering refers to "a form of thinking that may be characterized by prolonged mental scrutiny of a particular problem or an evaluation of previous work in order to see how it can be improved" (Cropley & Zijlstra, 2011, p. 11).

Affective rumination captures the negative essence of work-related rumination in that it prolongs experiences of negative affect and impairs effective problem solving (Cropley & Zijlstra, 2011; Nolen-Hoeksema et al., 2008). In contrast, problem-solving pondering captures a potentially positive aspect of work-related rumination in that it promotes effective problem-

solving and resolution to work problems (Cropley & Zijlstra, 2011). Moreover, problem-solving behaviours, such as future planning and rehearsing how to perform future tasks, are ubiquitous to human life and usually emerge in undemanding environments (Cole & Kvavilashvili, 2019; Kvavilashvili & Rummel, 2020), such as work breaks. For example, past research on recovery and work-rumination has shown that people often engage in relaxation together with problem-solving pondering during evenings at home, and this leads to positive outcomes, such as higher levels of work engagement and positive affect (Bennett et al., 2016; Kinnunen et al., 2017).

Therefore, claiming that only disengaging from work during breaks is beneficial for well-being and performance may be too simplistic (Vahle-Hinz et al., 2017). Therefore, in the following sections, I discuss how engaging in disengagement break behaviours, in the form of relaxation, and engaging in task engagement break behaviours, in the form of affective rumination and problem-solving pondering can relate to post-break levels of affective well-being and creativity.

7.1.2 Relaxation and affective well-being

Relaxation during the break should be particularly helpful in promoting affective well-being after the break. Affective well-being is defined as the cumulative affect that is generally experienced (Warr, 1990), which can be understood in terms of valence (i.e., pleasant vs unpleasant) and activation (i.e., high or low levels of arousal experience with the valence) (Warr, 1990; Yik et al., 2011). High levels of affective well-being are characterized by experiences of *mostly* pleasant affect, either high (e.g., enthusiasm) or low (e.g., calm) activated. In contrast, low levels of affective well-being are characterized as experiences of *mostly* high (e.g., anxiety) or low (e.g., depression) negative activated affect.

Considering that relaxation is generally defined as low-effort positive experiences that emerge from engaging in different activities, such as meditating and park-walks during lunchtime (Sianoja et al., 2017; Sonnentag & Fritz, 2007), two theoretical reasons explain why relaxation should be associated with higher levels of affective well-being. First, and drawing on the broaden and build theory of positive emotions (Fredrickson, 2001), it can be suggested that behaviours and activities that promote experiences of positive emotions generally lead to higher levels of affective well-being. This is because experiencing positive emotions makes it more likely to experience more positive emotions in the future, creating an upward spiral of positive emotions (Fredrickson, 2001). Considering that activities that foster relaxation also induce positive affective experiences, it follows that workers who engage in relaxation during breaks will experience more positive affect after the break, and this should also generate an upward spiral of positive emotions. Empirical evidence supports this assertion, with workers who engage in relaxation during breaks also reporting higher levels of positive affect after the break (Bosch et al., 2017; Kim et al., 2017, 2018). Moreover, an intervention study shows support for the upward spiral of positive emotions, such that when workers periodically engage in relaxation activities during breaks over two weeks, they report higher baseline levels of positive affect compared to pre-intervention levels and other experimental groups that did not engage in relaxation during the break (Steidle et al., 2017). Another benefit of experiencing positive emotions, according to the broaden and build theory of positive emotions, is that positive emotions have the potential to repair negative moods (Fredrickson, 2001; Tice et al., 2007). Varied empirical evidence using different research designs supports this assertion (see Fredrickson, 2001). For example, an intervention study showed that those who express positive emotions after experiencing negative ones report lower levels of negative emotions, compared to venting (Dalebroux et al., 2008).

A second theoretical reason that explains why relaxation during breaks is associated with higher levels of affective well-being comes from the allostatic model of stress (McEwen, 2007). The allostatic model of stress posits that stress increases the load on the physiological system and triggers reactions such as increased blood pressure, higher heart rate, and higher generalized alertness (McEwen, 2007). From an allostatic perspective being able to engage in low-effort activities during breaks, such as meditation (e.g., Blasche et al., 2018; Steidle et al., 2017), can reduce the prolonged activation resulting from having to face job stressors, thus reducing negative work experiences that can lead to negative emotions (Sonnentag & Fritz, 2007). According to the allostatic model of stress, being able to reduce arousal levels that increased as a result of coping with job demands will lead to better physical health overall and fewer experiences of negative affect (Bosch et al., 2017). In support of this, past research shows that engaging in relaxing activities, such as yoga or meditation, is indeed associated with a reduction in arousal reactions associated with stress (e.g., lower heart rate) and lower oxygen consumption (Hoffman et al., 1982; Vempati & Telles, 2002). Based on relaxation's capacity to induce positive affect and reduce arousal levels, I propose the following hypothesis:

Hypothesis 1a: relaxation during breaks is positively associated with affective well-being after the break.

7.1.3 Relaxation and creativity

Engaging in relaxation during the break should be related to creativity after the break. In this study, I will define creativity as "the cognitive and behavioural processes applied when attempting to generate novel ideas" (Hughes et al., 2018, p. 3). Dual-pathway models of creativity assert that two cognitive pathways are instrumental for achieving high levels of creative performance: cognitive flexibility and cognitive persistence (de Dreu et al., 2012). The cognitive flexibility pathway is an automatic process, characterized by a global model of

cognitive processing (as opposed to a narrow, focused one), low levels of cognitive control, reduced organization of thoughts, mind wandering, and higher distractibility to focus on as many inputs as possible (de Dreu et al., 2012; Nijstad et al., 2010). Thus, creativity via the flexible path flourishes when individuals are in a state of mind that favours cognitive breadth (George & Zhou, 2007; Madrid & Patterson, 2018; Nijstad et al., 2010). In contrast, the cognitive persistence pathway captures a deliberate, narrow, and systematic process by which individuals explore fewer categories and concepts to create novel ideas, and then scrutinize these to either keep or discard them in search of more novel ideas that might be 'better' to address the problem at hand (de Dreu et al., 2012; Nijstad et al., 2010). Thus, creativity via the persistence pathway flourishes when people are in a state of mind that favours cognitive narrowness and problem-focus (Bledow et al., 2013; Madrid & Patterson, 2018; Nijstad et al., 2010).

Considering that cognitive flexibility is essential for creativity, relaxation during breaks should be associated with creativity after the break because, at a neurological level, engaging in relaxation promotes a similar brain state as when individuals are performing divergent thinking tasks (Mölle et al., 1996). Specifically, engaging in relaxation triggers higher levels of dimensional complexity in the frontal cortex, which is also associated with a loosened organization of thought and reduced attentional control which fosters a flexible type of thinking (Mölle et al., 1996). This explains why, for example, random thinking processes, such as daydreaming, emerge when people relax (McMillan et al., 2013; Mölle et al., 1996). Importantly, such random thought processes also seem to be linked to increased creativity (McMillan et al., 2013). Considering this, I argue that when workers engage in relaxation during the break, they will start the next task in a flexible cognitive state that facilitates creativity. Thus, I propose the following hypothesis:

Hypothesis 1b: relaxation during breaks is positively associated with creativity after the break.

7.1.4 Task engagement break behaviours and affective well-being

Based on the mood as information theory (Schwarz & Clore, 2003) and the allostatic model of stress, affective rumination during breaks should be negatively associated with affective well-being for two reasons. Mood as information theory proposes that the affect that people experience can be used as information to judge happiness and satisfaction (Schwarz & Clore, 1983). Specifically, when individuals are experiencing positive emotions, they are more likely to emit favourable judgements about their own life and their current situation, while the opposite happens with experiences of negative emotions (Schwarz & Clore, 1983). Affective rumination prolongs experiences of negative affect because individuals keep thinking about negative events and how they made them feel without being able to switch-off those thoughts (Cropley & Zijlstra, 2011; Hamesch et al., 2014). Constantly thinking about negative events can make them more salient, thus indicating a negative environment and leading to a negative evaluation of a situation (Schwarz & Clore, 2003; Weiss & Cropanzano, 1996). Secondly, affective rumination is characterized by not being able to switch-off from work, thus impairing recovery processes (Cropley & Zijlstra, 2011). As mentioned above, being unable to switch-off from job stressors should keep the physiological system in a constant state of alert, which is experienced as negative and can lead to permanent health impairment (McEwen, 2007; Meijman & Mulder, 1998).

Although there is not much direct empirical evidence on affective rumination during work breaks, research on affective rumination after work is emphatic on its negative influences on well-being. For example, affective rumination is related to increased fatigue and reduced sleep quality (Querstret & Cropley, 2012). Moreover, affective rumination during evenings

impairs recovery processes and this is indirectly associated with increased negative affect on the next day (Firoozabadi et al., 2018b) and increased fatigue even one year after (Kinnunen et al., 2019). I argue that a similar process should occur when workers engage in affective rumination during the break, thus, I propose the following hypothesis:

Hypothesis 2a: affective rumination during breaks is negatively associated with affective well-being after the break.

Compared to affective rumination, problem-solving pondering during breaks should improve affective well-being. Focusing on solutions to problems, as opposed to the problem itself is usually a more effective coping strategy that can lead to a successful resolution of a potentially stressful event (Cropley & Zijlstra, 2011; Lazarus & Folkman, 1984). Furthermore, problem-solving pondering has the potential to stop other negative cognitive processes, such as worry (Cropley & Zijlstra, 2011; Nolen-Hoeksema et al., 2008). Worry is a future-oriented cognitive process that usually emerges when we think about what can go wrong (e.g., how a meeting with the supervisor can go wrong), and is experienced as a negative affective experience (Nolen-Hoeksema et al., 2008; Warr, 1990). Theoretically, the benefits of problem-solving pondering occur because thinking about and mentally rehearsing how to perform a task in the future helps perform that task in the future (Kvavilashvili & Rummel, 2020). Similarly, being able to find solutions to problems can lead to experiences of mastery, feeling competent, and increased self-efficacy, all of which is experienced as *feeling good* (Bandura, 1982; Cropley & Zijlstra, 2011; Deci et al., 2017).

Although there is no research on problem-solving pondering during work breaks, studies show the positive influences of *after-work* problem-solving pondering on affective well-being. For example, engaging in problem-solving pondering during evenings is associated

with the next day's increased positive affect and decreased negative affect (Firoozabadi et al., 2018b). Furthermore, engaging in problem-solving pondering during evenings is positively associated with positive work experiences that foster positive affect, such as work engagement (Bennett et al., 2016; Kinnunen et al., 2017). Drawing on the above theoretical arguments and empirical results, a similar process should occur when employees engage in problem-solving pondering during breaks. Thus, I propose the following hypothesis:

Hypothesis 2b: problem-solving pondering during breaks is positively associated with affective well-being after the break.

7.1.5 Task engagement break behaviours and creativity

Affective rumination should impair creativity because it can disrupt both the flexible and the persistence pathways of creativity (Vahle-Hinz et al., 2017). Affective rumination narrows the attentional focus and directs it towards the problem that caused the ruminative thinking, while also preventing effective problem-solving pondering (Nolen-Hoeksema et al., 2008). As explained above, this attentional narrowness is contrary to the cognitive breadth required for the flexible pathway. Moreover, being unable to engage in effective problem-solving pondering should also impair the perseverance pathway as individuals focus on the problem itself as opposed to solutions to that problem (Cropley & Zijlstra, 2011).

Empirical evidence, however, does not support the negative influence of affective rumination on creativity, with past research showing that affective rumination is unrelated to creativity over the long term (Vahle-Hinz et al., 2017). In their three-waves longitudinal study, Vahle-Hinz et al. (2017) argued that the lack of a significant result between affective rumination and creativity might be due to the time lag (one year difference between each wave), and suggested that the effects of affective rumination on creativity might be short-lived. Thus,

examining the immediate effects of affective rumination during breaks on post-break creativity could yield different results. Therefore, we argue that engaging in affective rumination during breaks will be associated with a lower creative performance after the break due to the narrowing cognitive focus and impaired problem-solving pondering. Accordingly, I hypothesize that:

Hypothesis 3a: affective rumination during breaks is negatively associated with creative performance after the break.

In contrast, problem-solving pondering should lead to higher levels of creativity via the persistence pathway because problem-solving pondering allows prolonged mental scrutiny of work problems, which should lead to more original ideas on how to solve a given problem (de Dreu et al., 2012; Nijstad et al., 2010; Vahle-Hinz et al., 2017). While engaging in problem-solving pondering, individuals have time to deeply scrutinize a problem, mentally rehearse possible solutions to this problem, and imagine a future in which this problem has been solved (Kvavilashvili & Rummel, 2020). This also allows more information to be retained in the working memory, which is a key cognitive process for increased creativity via the persistence pathway (de Dreu et al., 2012). In support of the positive influence of problem-solving pondering on creativity, past longitudinal research has shown that engaging in problem-solving pondering during evenings is associated with work creativity over two years (Vahle-Hinz et al., 2017).

Considering that workers sometimes engage in thinking about how to improve their performance while on work breaks (Berman & West, 2007), I argue that a similar process as the one described above should occur during breaks. Namely, problem-solving pondering during breaks should be related to increased creativity via the perseverance pathway because

it allows individuals to scrutinize a problem while on breaks. Thus, I put forward the following hypothesis:

Hypothesis 3b: problem-solving pondering during breaks is positively associated with creativity after the break.

7.1.6 Summary

This section aimed to provide a theoretical framework on how break behaviours as defined in the Episodic Model of Work Breaks influence affective-wellbeing and creativity after the break. Specifically, relaxation as a form of disengagement break behaviour should be related to affective well-being because it promotes experiences of positive affect and facilitates unwinding from job demands. Relaxation during the break should be also related to higher levels of creativity after the break because it promotes a more flexible mode of thinking, which is essential for creative performance. In turn, affective rumination during the break should be negatively related to affective well-being after the break because it prolongs the negative activation that characterises negative events at work. Further, affective rumination should be also related to reduced creativity after the break because it promotes a narrow attentional focus and diverts people's attention to the problem that generated the affective rumination. Finally, problem-solving pondering during the break should be associated with increased affective well-being after the break because it helps workers cope with stressful events at work, prevent the emergence of worry, and can foster experiences of positive affect due to workers feeling competent. Table 7.1 summarises all the hypotheses that will be tested with the method described in the next section.

Table 7.1. Summary of hypotheses in Chapter 7.

Affective well-being hypotheses	
Hypothesis 1a	Relaxation during breaks is positively associated with affective well-being after the break.
Hypothesis 2a	Affective rumination during breaks is negatively associated with affective well-being after the break
Hypothesis 2b	Problem-solving pondering during breaks is positively associated with affective well-being after the break.
Creativity hypotheses	
Hypothesis 1b	Relaxation during breaks is positively associated with creativity after the break.
Hypothesis 3a	Affective rumination during breaks is negatively associated with creative performance after the break.
Hypothesis 3b	Problem-solving pondering during breaks is positively associated with creativity after the break.

7.2 Methods

7.2.1 Sample and procedure

To access the sample, a snowball strategy was adopted (Goodman, 1961) based on personal and work contacts. Inclusion criteria were working in a full-time job at the moment of the study and having a lunch break at some point during the day. Potential participants were invited through a message providing information about the goals of the study and a brief explanation of the protocol. They had to register through a link that redirected them to an online survey in which they had to sign the informed consent form, provide demographic information (i.e., age, gender, industry, educational level, and tenure), and provide a valid email address to participate in this study. In this survey, they also had to state their usual working schedule and their usual lunchtime. This information was used to exclude observations collected at time points that deviated greatly from their reported schedule, unless participants provided an explanation for this deviation.

A multi-source event contingent design was employed (Fisher & To, 2012). Event contingent designs are a subtype of experience sample methodologies that focus on specific events with clear beginnings and ends. This design was deemed optimal for two reasons. First, individuals can engage in different break behaviours across different breaks, thus, having multiple observations for the same individual about their break provides a more realistic picture of the effects. Second, breaks are events with a clear beginning and end, thus, they are easily identifiable. Nevertheless, to make sure that participants 'knew' when they were on a break, I asked them to fill in the survey about their lunch break, which is considered a structured break (Wendsche et al., 2016).

Participants were asked to fill in six events over two weeks. This was done to obtain sufficient events, but also to prevent participant attrition. Participants were instructed that they would receive an email during their lunch break with a link to an online survey that had to be completed immediately after their break. Importantly, these links were sent at custom hours established by the participants. They could be sent at 12 pm, 1 pm, or 2 pm depending on the participant's specific lunch schedule. One hour after they completed the lunch break survey, they received a second email with the link for the survey containing the outcome variables. Participants were instructed to fill in this second survey as soon as they could.

In total 233 people registered for the study, but 156 participants did not complete at least two valid observations, so were excluded from the data set. Thus, the final data set had 274 observations nested in 77 individuals (response rate of 30.9%) with an average cluster size of 3.6. On average, the first survey was completed at 2:30 pm (SD = 58 minutes), and the second survey was completed at 3:48 pm (SD = 1:34 hours). All participants worked in Chile, the mean age was 33 years (SD = 7.6), the average organizational tenure was 4 years (SD = 5.13), and 40% of the sample was female. 50.1% of the sample held a postgraduate degree, and

47% held a bachelor's degree. The sample came from a variety of industries, such as financial institutions, health care, logistics, mining, and consultancy.

7.2.2 Measures

Protocol and surveys can be found in Appendix D. The survey was in Spanish. The procedure described by Brislin (1970) was used to translate the scales that were not available in Spanish. First, all items were translated from English to Spanish. Then, two independent translators translated the items back from Spanish to English. Disagreements were discussed independently between the two independent translators and me to find the most appropriate translation into Spanish. All scales were answered with a 5-point Likert scale, and focused on the 'extent of which' participants behaved or felt in a particular way, being 1 'Not at all' and 5 'To a great extent'. To lessen the burden on participants and reduce attrition, most of our measures consisted of two to four items that were selected according to the highest factor loadings on their original scales or criterion validity. Further, all items were adapted to reflect the momentary nature of this study, following previous work (Fisher & To, 2012).

Relaxation. Relaxation was measured through four items from the Recovery Experience questionnaire (Sonnentag & Fritz, 2007). An example item is "During the lunch break, to what extent were you able to use your free time to relax?" (α = .70).

Affective rumination. Affective rumination was adapted from Querstret and Cropley (2012) and consisted of four items. An example item is "During the lunch break, to what extent did you think about a negative event at work?" (α = .83).

Problem-solving pondering. Problem-solving pondering was adapted from the measure developed by Querstret and Cropley (2012) and consisted of four items. An example

item is “During the lunch break, to what extent did you think about solutions to problems at work?” (α = .90).

Affective well-being. To measure affective well-being, the Spanish version of Warr's (1990) scale (Madrid & Patterson, 2014) was used and adapted into eight items. The eight items were chosen to represent the whole spectrum of the circumplex model of core affect (Yik et al., 2011), namely, two items for enthusiasm (α = .70), two items for anxiety (α = .38), two items for calm (α = .39), and two items for depression (α = .63). Some have argued that two items per dimension can create problems of reliability, thus biasing the results. Nevertheless, this issue is not as problematic in experience sample methodologies as in other types of designs (Fisher & To, 2012; Nezlek, 2012) because reliability is estimated differently. An example item for enthusiasm is: “Right now, to want extent do you feel: Enthusiastic”, for anxiety is: “Right now, to want extent do you feel: Anxious”, for calmness is: “Right now, to want extent do you feel: Calm”, and for depression is: “Right now, to want extent do you feel: Sad”.

Creativity. To assess creativity, people had to participate in the Alternative Uses Test (AUT; Guilford, 1967). The AUT is a task in which people are asked to provide alternative uses to common objects, such as bricks, pens, and bedsheets. As an example, if a participants proposed that a bedsheet could be used to dress as a ghost, this was noted as ‘costume’. Considering that originality is one of the most important features of creativity (Nijstad et al., 2010), the AUT was scored according to the AUT originality protocol. In this protocol, if an idea for an object was given by less than 1% of the sample, this awarded two points as it was considered extremely original. If an idea was given by less than 5% of the sample, this awarded one point as it was considered original. Everything else awarded zero points. After this, the originality score for each idea was calculated as mentioned above, and the overall originality score per observation was the sum of the originality of all of their ideas. To increase the reliability of this method, I employed three blind judges who independently noted the use for

each particular idea (IRR = .93). After scoring the AUT, the originality scores ranged from 0 to 30.

Control variables. We included break length as a control variable because past research has shown that it can influence the effect that breaks have on well-being (Bennett et al., 2019; Hunter & Wu, 2016).

7.2.3 Data analysis strategy

To assess the factor structure of the measures two sets of multilevel confirmatory factor analyses (MCFA) were conducted, one concerning break behaviours (relaxation, affective rumination, and problem-solving pondering), and one concerning affective well-being. This separation was done because the complete model has too many parameters compared to cluster size to reliably estimate a MCFA. Regarding break behaviours, the first MCFA model had relaxation, affective rumination, problem-solving pondering items loading into a single factor. The second model differentiated between relaxation and work-rumination (i.e., affective rumination and problem-solving pondering loading into the same factor), as work-rumination should share a degree of commonality. Finally, the third model differentiated between all three break behaviours. I followed a similar strategy concerning well-being measures. In the single-factor model, enthusiasm, anxiety, calm, and depression measures loaded on to a single factor. In the second model, we separated between positive and negative affect to depict two poles usually implemented in affect research. The third model differentiated between all four factors and was consistent with Warr's (1990) model.

To assess the reliabilities of the break behaviours and affect measures, we followed Nezlek's (2011, 2012, 2017) recommendations to consider the variance at both levels to estimate reliability for the level 1 scales. With this method, α is interpreted in the same way as

Cronbach's α, namely, a criterion of .70 is considered good reliability (Nezlek, 2017). Nevertheless, Nezlek (2017) also argues that this criterion should be more flexible than in single-level studies. To assess the reliability of the creativity measure I estimated the Inter-Rater Reliability (IRR) following Hallgren's (2012) recommendation. Specifically, a two-tailed model was used to estimate the degree of absolute agreement between judges, focusing on the final mean score of the three judges (Hallgren, 2012). With this method, values higher than .60 are considered good, and over .75 are considered excellent (Hallgren, 2012).

Considering that the data was nested (observations within individuals), I conducted a multilevel path analysis using the Lavaan package in R (Rosseel, 2012). A path model was chosen for three reasons. First, path models allow to test how multiple independent variables relate to multiple outcome variables, which provides an advantage over multiple regression analyses. Second, the factor structure and reliabilities provided evidence to support the aggregation of arithmetic means and use this value for estimating the paths. Finally, the high number of parameters that have to be estimated compared to the number of clusters (77), together with the low factor loading in some factors can lead to biased parameter estimates in an SEM model (Little, 2013; Wolf et al., 2013). Thus, multilevel path analysis was deemed the most appropriate and reliable analytical tool based on the data.

To test the hypotheses, I estimated a model that included all independent variables (correlated among themselves) with paths to the outcome variables (also correlated among themselves) at both levels. Within-level predictors (daily relaxation, daily problem-solving pondering, daily affective rumination, and daily break length) were group-mean centred. Centring the predictors to the group mean implies that estimates must be understood as daily fluctuations from the individual mean. This provides a more nuanced understanding of the within-level results.

7.3 Results

7.3.1 Measurement quality

Regarding the factor structure of break behaviours, the single factor model fitted poorly (χ^2 = 1070.18, df = 108, p < .01; CFI = .59; TLI = .50; RMSEA = .18 (.17, .19); $SRMR_{within}$ = .18, $SRMR_{between}$ = .64). The second MFCA concerning break behaviours that differentiated between relaxation and task engagement break behaviours (i.e., problem-solving pondering and affective rumination) also showed a poor fit (χ^2 = 610.79, df = 106, p < .01; CFI = .79; TLI = .74; RMSEA = .13 (.12, .14); $SRMR_{within}$ = .11, $SRMR_{between}$ = .60). The third MCFA separating all three break behaviours resulted in a good fit at the within level, but not at the between levels as depicted by the high SRMR at the between level (χ^2 = 159.80, df = 102, p < .01; CFI = .98; TLI = .97; RMSEA = .05 (.03, .06); $SRMR_{within}$ = .06, $SRMR_{between}$ = .13). A χ^2 difference test showed that indeed the three-factor model fits better that the two-factor model ($\Delta\chi^2$ = 450.98, Δdf = 4, p < .01, ΔAIC = 443, ΔBIC = 428.5), providing evidence that there are three underlying factors for the break behaviours: relaxation, problem-solving pondering, and affective rumination.

The affective well-being model by Warr (1990) was used as reference to test the factor structure of affective well-being. A model grouping all items into a single factor had poor fit (χ^2 = 283.57, df = 40, p < .01; CFI = .67; TLI = .54; RMSEA = .150 (.133, .167); $SRMR_{within}$ = .14, $SRMR_{between}$ = .254), as did the second model distinguishing between general positive and negative affect also presented poor fit (χ^2 = 210.85, df = 38, p < .01; CFI = .77; TLI = .65; RMSEA = .13 (.11, .15); $SRMR_{within}$ = .13, $SRMR_{between}$ = .222). The third measurement model differentiating between four quadrants of core affect resulted in good fit at both levels (χ^2 = 44, df =28, p < .05; CFI = .98; TLI = .96; RMSEA = .05 (.02, .07; $SRMR_{within}$ = .04, $SRMR_{between}$ = .06). Further, a χ^2 difference test showed that indeed the four-factor model fits better that the

two-factor model ($\Delta\chi^2$ =166.87, Δdf = 10, $p < .01$, ΔAIC = 146.9, ΔBIC = 110.8), providing evidence that there are four underlying factors to the well-being indicators: enthusiasm, anxiety, calm, and depression.

Looking at within-level reliabilities presented in Table 7.1, one can observe that most of them are at acceptable levels (α over .60), except for anxiety ($\alpha = .38$) and calm ($\alpha = .40$), which is taken into account when interpreting the findings.

7.3.2 Descriptive analyses

Table 7.2 presents means and standard deviations at the between level, intra-class correlations (ICC), reliabilities, and correlations. As one can observe, ICC scores are moderate to high (.18-.62), indicating moderate to high levels of within-subject variability in the study variables. These results suggest that the decision to use a multilevel approach was the correct one (Bliese et al., 2018).

On average, participants took lunch breaks of 51.36 minutes (SD = 20.27). Among break behaviours, relaxation had the highest mean score (3.21), followed by problem-solving pondering (1.71) and affective rumination (1.57). When looking at affective well-being variables, one can see that participants report higher scores of enthusiasm (3.02) and calm (2.84) compared to anxiety (2.17) and depression (1.38).

Table 7.2. Descriptive data, reliabilities, and correlation matrix in the event contingent diary study.

	Mean (SD)	ICC	1.	3.	2.	4.	5.	6.	7.	8.	9.
1. Relaxation	3.21 (.97)	.54	**.70**	-.20**	-.28**	.23**	-.08	.25**	-.14*	-.16**	.24**
2. Affective Rumination	1.57 (.57)	.18	-.20**	**.83**	.55**	.00	.18**	-.24**	.12*	.05	-.02
3. Problem-solving pondering	1.71 (.61)	.21	-.28**	.55**	**.90**	.07	.08	-.14*	.10	.04	-.09
4. Enthusiasm	3.02 (.86)	.60	.23**	.00	.07	**.70**	-.12*	.41**	-.28**	.05	.22**
5. Anxiety	2.17 (.89)	.62	-.08	.18**	.08	-.12*	**.39**	-.45**	.31**	.07	-.06
6. Calm	2.84 (.83)	.53	.25**	-.24**	-.14*	.41**	-.45**	**.39**	-.23**	-.06	.09
7. Depression	1.38 (.52)	.45	-.14*	.12*	.10	-.28**	.31**	-.23**	**.63**	-.04	-.05
8. Creativity	5.97 (3.67)	.50	-.16**	.05	.04	.05	.07	-.06	-.04	**.93**	.07
9. Break length	51.36 (20.27)	.50	.26*	-.06	-.12	.07	-.16	.27	-0.2	.03	-

Notes. **0 < .01, *p < .05. Mean and standard deviation are at the between level. ICC = Intraclass correlation. Reliabilities at level-1 are in the diagonal; In the case of Originality, the value represents the inter-rater reliability. Correlations above the diagonal are at level-1, and values were group mean-centred before conducting the correlation analysis; Correlations at level-2 are below the diagonal, and they were aggregated before conducting the correlations.

7.3.3 Hypothesis testing

Table 7.3 contains the results for the path model testing hypotheses concerning the relationship between relaxation, affective rumination, and problem-solving pondering with enthusiasm, anxiety, calm, depression, and creativity. The R^2 presented in Table 7.3 were estimated according to the pseudo-R^2 formula for multilevel modelling presented by Snijders and Bosker (2011). The within-level significant results are also depicted in Figure 7.2.

Table 7.3. Path analysis results in the event contingent diary study.

	Enthusiasm	Anxiety	Calm	Depression	Creativity
	Estimate (SE)	Estimate (SE)	Estimate (SE)	Estimate (SE)	Estimate (SE)
Level 1					
Break length	.01 (.00)*	.00 (.00)	.00 (.00)	.00 (.00)	.02 (.01)
Relaxation	.17 (.06)**	-.03 (.06)	.21 (.07)**	-.06 (.04)	-.76 (.31)*
Affective rumination	-.04 (.06)	.15 (.07)*	-.21 (.08)**	.05 (.05)	.11 (.34)
Problem-solving pondering	.13 (.06)*	-.03 (.06)	.04 (.08)	.01 (.05)	-.08 (.34)
R^2	.19	.09	.20	.18	.03
Level 2					
Intercept	2.05 (.52)**	1.92 (.58)**	1.43 (.49)**	1.20 (.32)**	6.92 (2.60)**
Break length	.00 (.00)	-.01 (.01)	.01 (.00)*	.00 (.00)	.00 (.02)
Relaxation	.28 (.10)**	-.06 (.11)	.28 (.09)**	-.03 (.06)	.12 (.48)
Affective rumination	-.44 (.17)*	.3 (.19)	-.36 (.17)*	.47 (.11)**	-1.09 (.86)
Problem-solving pondering	.43 (.16)**	.14 (.17)	.39 (.15)*	-.15 (.10)	.21 (.78)
R^2	.23	.11	.27	.26	.03

Notes. ** $p < .01$, * $p < .05$. All values are unstandardised. All variables were entered into the equation simultaneously. Predictor variables were correlated among themselves, and outcome variables were correlated among themselves.

Hypothesis 1a stated that relaxation during breaks will be positively related to affective well-being after the break. As can be seen in Table 7.3, daily relaxation is positively associated with enthusiasm ($\gamma = .17$, $p < .01$) and calmness ($\gamma = .21$, $p < .01$) after the break, but unrelated with anxiety ($\gamma = -.03$, $p = .58$) and depression ($\gamma = -.06$, $p = .13$). Hypothesis 1a is partially supported.

Hypothesis 1b stated that daily relaxation during breaks is positively associated with creativity after the break, but results show that this association is negative (γ = -.76, $p < .05$), rejecting hypothesis 1b.

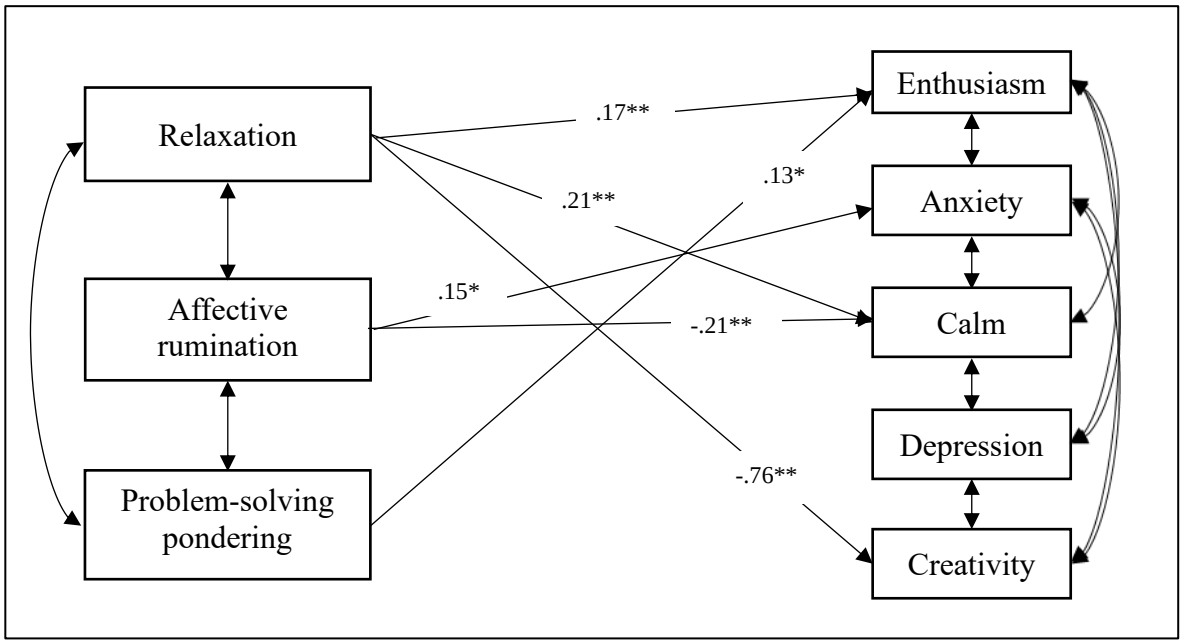

Figure 7.2. Level-1 associations between break behaviours and outcome variables. Only significant paths are shown.

Hypothesis 2a stated that affective rumination during breaks will be negatively associated with affective well-being after the break. Results show that daily affective rumination during breaks is positively related with anxiety (γ = .15, $p < .05$) and negatively related with calm (γ = -.21, $p < .01$) after the break, but unrelated with enthusiasm (γ = -.04, p = .53) and depression (γ = .05, p = .29). Thus, hypothesis 2a is partially supported.

Hypothesis 2b stated that problem-solving pondering during breaks will be positively associated with affective well-being after the break. Results show that daily problem-solving pondering is positively related with enthusiasm (γ = .13, $p < .05$) after the break, but unrelated

to calm (γ = .04, p = .66), anxiety (γ = -.03, p = .63), or depression (γ = .01, p = .87). Hypothesis 2b is partially supported.

Hypothesis 3a and 3b stated that affective rumination and problem-solving pondering during breaks is negatively and positively associated with creativity after the break, respectively. Results show that neither daily affective rumination (γ = .11, p = .75) nor problem-solving pondering (γ = -.08, p = .82) are related to creativity after the break. Thus, hypotheses 3a and 3b are rejected.

7.4 Discussions

7.4.1 Theoretical Implications

This study examined the differential effects of disengagement and task engagement break behaviours on affective well-being and creativity. This study has three important contributions. First, this study develops and tests a more comprehensive theoretical account of work breaks and break outcomes by showing a joint contribution of disengagement break behaviours with task engagement break behaviours. Specifically, this study considers that workers can disengage from and engage in work-related tasks and thoughts, and this has differential effects on well-being and creativity. Results indicate that both relaxation and problem-solving pondering are beneficial for well-being. These results provide further support for the importance of relaxation during breaks, but more importantly, they also show that there are other break behaviours aside from recovery that can promote well-being at work and that these effects are present even after controlling for relaxation.

A second theoretical contribution is that results extend our knowledge on how break behaviours relate to different dimensions of affective well-being. Initially, the hypotheses were

concerned with affective well-being, but after separating affective well-being into the four quadrants of core affect (Yik et al., 2011), an interesting pattern emerges. On one hand, relaxation is a generally positive experience that is related to general positive affect (i.e., enthusiasm and calm). In contrast, problem-solving pondering is only associated positively with enthusiasm, while affective rumination is associated with higher levels of anxiety and lower levels of calm. These results are in line with past research on work-rumination *after* work, where problem-solving pondering is usually associated with high energy positive affective experiences, such as work engagement and positive affect (Bennett et al., 2016; Kinnunen et al., 2017), while affective rumination *after* work is mostly related with negative experiences, such as fatigue and impaired sleep (Hamesch et al., 2014; Kinnunen et al., 2019). These results show that differentiating between the different contents of work-related thoughts is important to have a more nuanced understanding of task engagement break behaviours.

Finally, this study also sheds light on how break behaviours can be related to the behavioural outcomes of breaks, such as creativity. Initially, it was hypothesised that relaxation during breaks should be associated with greater creativity after the break because relaxation fosters higher levels of cognitive flexibility. This hypothesis, however, was rejected and relaxation during breaks was found to be associated with lower creativity after the break. The explanation for this result can come from the Episodic Model of Work Breaks, in which it is stated that break effectiveness is a function of what was done during the break with what is done after the break. Some have suggested that creative performance requires higher levels of activation to be performed properly (Warr et al., 2014), and relaxation during the break produces the opposite activation level (i.e., low activation). In terms of the Episodic Model of Work Breaks, there may be a lack of fit between the actual state of the individual after the break with the required state for the task after the break. Therefore, when looking at the relationship

between breaks and performance, it is important to understand what is done during the break (i.e., break behaviour) and what is done after the break. This also problematises the recovery perspective on breaks. Specifically, it has been previously argued that relaxation during breaks will lead to higher levels of energy and positive affect which, in turn, should lead to higher levels of performance overall (Hunter & Wu, 2016; Kim et al., 2018). Nevertheless, results here suggest that when there is a lack of congruency between the actual state (e.g., low activation level) and the required state for the task (e.g., high activation level), breaks may actually impair performance after the break. Therefore, to repeat Vahle-Hinz et al.'s (2017) claim, assuming that recovery during work breaks in general, and relaxation in particular, is universally beneficial is a limited approach. As discussed later, however, the results concerning creativity may be due to the way creativity was assessed. So, it is important to continue investigating how break behaviours in general, and relaxation in particular can contribute to employee creativity.

Finding no relationship between problem-solving pondering with creativity was also an unexpected result. Specifically, engaging in problem-solving pondering during the break should lead to higher levels of creativity after the break due to the perseverance pathway. Nevertheless, the lack of a significant result might be due to the research design, as opposed to a lack of effect. Specifically, there was no congruency between the independent variable and the creativity task. Alternatively, failure to observe this might come from the relationship that exists between problem-solving pondering and work engagement (Bennett et al., 2016). Employees who find their work engaging are more likely to engage in problem-solving pondering during their non-working time (Bennett et al., 2016). Consequently, workers who ponder about interesting work-problem might continue to think about that same problem after the break, thus creating competing off-task attentional demand as described in the episodic

model of performance and making it more difficult to devote the full attention to the alternative uses test (Beal et al., 2005).

Finally, results also fail to support the hypothesised negative relationship between affective rumination and creativity. Affective rumination in this study was associated with increased anxiety. This should impair working memory capacity and reduce creativity outputs. This, however, was not supported and results are in line with those observed by Vahle-Hinz et al. (2017). I argued that the non-significant results observed by Vahle-Hinz and colleagues might have been due to the long gap between observations (1 year-lag) and looking into affective rumination during breaks and immediate post-break creativity could yield different results. One explanation for the lack of a significant relationship between rumination and creativity can come from research on affect and creativity. This stream of research states that negative affect should impair creativity, but empirical results do not support this assertion, usually finding that there is no relationship between negative affect and creativity (Madrid & Patterson, 2018). Some argue that this lack of significant results is due to a dual tuning cognitive process, in which negative affect narrows the attentional focus and forces individuals to focus on problems, and when individuals shift to more positive moods they experience more expansive divergent thinking, novelty of ideas, and playfulness (George & Zhou, 2007). In combination, negative and positive affect lead to increased creativity (Bledow et al., 2013).

In the same way that negative and positive moods can interact to increase creativity, there could be an interaction between affective rumination and problem-solving pondering with creativity. Affective rumination is a problem-focused cognitive process in which individuals focus on how things went wrong, which mistakes were made, and how the situation they are ruminating about distresses them. Problem-solving pondering is a solution-focused cognitive process, in which individuals focus on finding solutions to problems. Thus, when affective

rumination and problem-solving pondering coexist, or when problem-solving pondering occurs after an episode of affective rumination, they can interact and help workers reach more creative solutions. Based on this, I argue that there could exist an interaction effect where affective rumination will lead to reduced creative performance when problem-solving pondering is low. Alternatively, affective rumination will increase creative performance when problem-solving pondering is high. I tested this interaction as a post-hoc analysis, however, the interaction effect was not significant ($\gamma = .42$, $p = .18$). This, however, is not surprising considering that the creativity task is unrelated to the actual job, and probably to the content of the ruminative thinking.

7.4.2 Limitations and future research

Despite the strengths of this study (i.e., multisource event contingent design), five important limitations affect the validity and generalizability of the results. First, predictors in this study were not externally manipulated thus they are endogenous. This means that the causal relationship between relaxation, problem-solving pondering, and affective rumination with affective well-being and creativity cannot be established because there are unmeasured variables that could explain the results presented in this chapter. Nevertheless, it is important to mention that past experimental and longitudinal studies suggest that the causal relationship is as the one proposed in this study. For example, a field experiment showed that when individuals engage in relaxation during breaks they report higher levels of well-being after the break (Blasche et al., 2018). In turn, a longitudinal study over two years shows that problem-solving pondering after work is associated with increased levels of vigour (Kinnunen et al., 2017), while affective rumination is associated with increased levels of fatigue (Kinnunen et

al., 2019). Nevertheless, future research should aim to experimentally manipulate break behaviours to understand their causal relationship with well-being and creativity.

A second limitation of this study is that all data but the creativity task was collected through self-report subjective measures, increasing common method variance errors, namely when covariance between measures is attributed to a common source of effect rather than true effects (Podsakoff et al., 2003). To ameliorate this issue, I temporarily separated the independent variables from the outcome variables. This is in line with the suggestions provided by Podsakoff et al (2003).

A third limitation is the low reliability of both anxiety and calm. In daily designs, such as the one presented here, low reliability indicates that the variance in a specific scale mostly comes from differences between waves because participants may have interpreted the same items differently across waves (Nezlek, 2017). As such, it is important to consider that anxiety and calmness scores might be qualitatively different across waves. Because of this, results about anxiety and calm are less trustworthy than those related to enthusiasm, depression, and creativity. In the future, studies should implement more reliable measures of anxiety and calm.

A fourth limitation in this study comes from the sampling strategy. Snowball sampling has the advantage that it allows the researcher to reach a large number of participants who share the desired characteristics in a short amount of time (Biernacki & Waldorf, 1981). Nevertheless, since the participants share a common focal point (i.e., the researcher who started the snowballing), participants are more similar to one another than if a different sampling strategy would have been used (Biernacki & Waldorf, 1981). Thus, results here might not be generalisable to other populations. Future research should seek to validate these results with a different sample and sampling strategy.

A fifth limitation pertains to the way creativity was measured. Specifically, the Alternative Uses Test is a general divergent thinking task that is unrelated to the work. This has two important implications. First, relaxation may impair general divergent thinking in the short term when the task is unrelated to the work. Moreover, relaxation could have long-term benefits for creativity throughout the day or even longer periods of time (Vahle-Hinz et al., 2017). Second, since the creativity task was unrelated to the work, task engagement break behaviours such as problem-solving pondering should have weaker effects on creativity in this study. Given the snowball sampling strategy, I expected to recruit participants from different professional backgrounds and industries. Therefore, it was not possible to develop a creativity task that was meaningful and relatable to everybody. Future research should focus on understanding the relationship between problem-solving pondering and work-creativity as opposed to general cognitive-related creativity processes, such as divergent thinking.

7.5 Conclusions

Overall, the study presented in this chapter aimed to answer the final research question that emerged from the Episodic Model of Work Breaks, namely: "how do break behaviours in the model relate to well-being and performance after the break?". Results of the event contingent design suggest that relaxation and problem-solving pondering during breaks foster affective well-being, while affective rumination during the break impairs affective well-being. Moreover, relaxation during the break was associated with decreased creative performance after the break, contrary to what was expected. Overall, the results presented in this chapter support the existence of different break behaviours that are not related to recovery processes, as proposed in the Episodic Model of Work Breaks. Moreover, the results also problematise

the recovery perspective on breaks in two ways. First, the recovery perspective suggests that thinking about work while on breaks should disrupt recovery processes and impair well-being. Here, I show that this is not the case, and sometimes, thinking about work during breaks might be beneficial for well-being. Second, if breaks are indeed opportunities to engage in recovery while on break (Trougakos & Hideg, 2009), relaxation during breaks should be related to increased creativity because of increased resources, broader cognitive flexibility, and increased working memory capacity (de Dreu et al., 2012). Again, results in this study contradict this assertion. Importantly, results concerning the relationship between relaxation and creativity support the claims put forward by the Episodic Model of Work Breaks, namely, break effectiveness is a function of the fit between the break episode with the post-break episode.

Chapter 8
Discussion

The opening chapters of this thesis stated that research about work breaks typically adopts an ergonomic perspective (which focuses on how to optimise the work schedule to maximise occupational health and productivity) or a recovery perspective (which focuses on why breaks may be effective in maximising occupational health and performance). Although both perspectives have been instrumental to deepen the theoretical and empirical understanding of work breaks, three limitations were outlined. First, it remains still unclear why workers take breaks. Second, it is still unclear why workers engage in different break behaviours. Third, breaks research has mostly considered breaks as isolated events at work, which I argue to be problematic. Therefore, this thesis aimed to develop and test a more integrated account of work breaks that overcomes the aforementioned limitations in breaks research. This model was named the Episodic Model of Work Breaks.

8.1 Theoretical and empirical implications

Overall, this thesis makes two theoretical contributions that help overcome the theoretical issues outlined above and reorientate breaks research. First, the Episodic Model of Work Breaks reconceptualises work breaks. Past research has argued that breaks are opportunities to recover previously spent resources so that employees can stay energetic and efficient throughout the workday (Fritz et al., 2011; Trougakos & Hideg, 2009). Accordingly, previous research on breaks assumes that workers take breaks for recovering purposes and the main mechanisms that explain break effectiveness are recovery processes (Bosch & Sonnentag,

2019; Trougakos & Hideg, 2009). In contrast, the Episodic Model of Work Breaks draws on different perspectives to develop a unified framework that provides a more nuanced understanding of work breaks. Specifically, this thesis draws upon research about recovery, work rumination, prospective thinking, episodic performance, emotion regulation, and coping to propose a dual pathway that explains why workers take breaks, why workers engage in different behaviours during breaks, and why breaks are effective in promoting positive employee outcomes (e.g., increased well-being and performance). This dual pathway suggests that on one hand, workers would choose to take breaks to reward themselves *after* completing a performance episode that elicited a negative experience, such as a negative social interaction, boredom, or high levels of fatigue. This path was labelled reactive. On the other hand, the model proposed that workers would choose to take break *before* engaging in the next performance episode to prepare for it. This path was labelled proactive. Therefore, the Episodic Model of Work Breaks does not assume that breaks are recovery opportunities and instead states that work breaks, their underlying psychological processes, and their effectiveness are a function of the performance episodes that happened before and the anticipation of performance episodes that may happens after the break.

Therefore, from a theoretical perspective, this thesis goes beyond the breaks as recovery perspective and argues that workers can take breaks for a myriad of reasons, among which, recovery is one option. This is important because, on one hand, past empirical research does not always support the recovery perspective, finding that workers' need for recovery and fatigue levels are sometimes not associated with taking breaks. Moreover, psychological detachment, a key recovery experience, is not related to post-break employee outcomes. Thus, by integrating emotion regulation and coping processes with recovery theory allows to explore other process that may explain the process of work breaks.

Gaining a more nuanced understanding of work breaks has also important practical value. Specifically, scholars usually recommend that organisations need to facilitate work environments where workers are allowed to take breaks when fatigue levels are sufficiently high (Bosch & Sonnentag, 2019; Feyer & Williamson, 1995). Nevertheless, as was previously mentioned fatigue does not always lead to taking breaks and other processes, such as wanting to obtain a reward, is (Bosch & Sonnentag, 2019). Thus, telling employees to take breaks only when they feel fatigued may omit other relevant processes. Further, breaks that are not needed, nor required, can sometimes feel as work interruptions, which have negative effects on well-being (Boucsein & Thum, 1997; Jett & George, 2003). Understand the work break better, then, will lead to more comprehensive break-related interventions.

Second, this thesis provides a more integrated account of break behaviours. Until now, most research on work breaks focused on recovery experiences during breaks (e.g., relaxation, psychological detachment). Nevertheless, past empirical research on work breaks from a recovery perspective has shown conflicting results. On one hand, workers sometimes engage in break behaviours that should be beneficial for well-being (e.g., psychological detachment) but research shows that they are not (Bosch et al., 2017). On the other hand, workers sometimes engage in break behaviours that are detrimental to well-being (e.g., thinking about work) but fail to actually impair well-being (Berman & West, 2007). To address these conflicting results, the Episodic Model of Work Breaks proposes a new categorisation of break behaviours with distinct underlying processes that integrate recovery processes with coping and emotion regulation strategies. These behaviours are disengagement break behaviours (i.e., disengaging from work activities to improve one's mood), task engagement break behaviours (i.e., effortful mental engagement with work-related issues to cope with them), and physiological break behaviours (i.e., behaviours to address basic physiological needs, such as drinking beverages,

snacking, or going to the bathroom). Moreover, the Episodic Model of Work Breaks suggests that it is not the break behaviour in itself that is beneficial or detrimental for employee-related outcomes, but the fit between the performance episode after the break with the behaviour during the break. For example, relaxation during the break, thought to be a universally positive break behaviour has the potential to impair performance if the psychophysiological state does not match the required state for the task after the break (see Chapter 7).

From a theoretical standpoint, the Episodic Model of Work Breaks helps overcome the limitations of previous break research in the following ways. First, this model directly acknowledges that work breaks are embedded in the context of other performance episodes and hypothesises the influences of these performance episodes on work breaks. Second, to understand why workers take breaks, the Episodic Model of Work Breaks suggests focusing on the dual pathway outlined above, instead of focusing only on the previous performance episodes, as has been generally studied to date (Bosch et al., 2017; Kim et al., 2018). Failing to differentiate between the influence of previous and anticipated performance episodes will likely bias the study results and lead to problematic confounding and suppression effects which can result in a non-significant or incorrect test of hypothesis (see MacKinnon et al., 2000). This is because part of the sample will be unaffected by the influence of previous performance episodes, while another part of the sample will be unaffected by the anticipation of future performance episodes. Third, the Episodic Model of Work Breaks moves away from the current recovery conceptualisation of work breaks and acknowledges that different break behaviours can be functional to positive employee outcomes dependent on the performance episodes before and after the break.

On top of the theoretical contributions, this thesis makes two important empirical contributions. First, by defining the different mechanisms that precede work breaks and break

behaviours, this thesis contributes to the generation of new research questions such as the ones examined here. Specifically, acknowledging that breaks depend on past and future performance episodes can lead to researchers investigating how different performance episodes throughout the workday influence why workers take breaks, why workers engage in different break behaviours, and why breaks are effective. The second empirical contribution pertains the empirical examination of the Episodic Model of Work Breaks with more robust and causally identified research designs. The empirical examination presented in this thesis has two implications. First, it overcomes some of the methodological limitations that are present in current breaks research such as endogeneity and a lack of causal inference (see Chapter 4). Second, the empirical causal evidence supports the need for the Episodic Model of Work Breaks.

Results in Chapter 5 confirmed some of the hypotheses regarding why workers may decide to take breaks. Specifically, results showed that it is not what workers have done, nor what they anticipate doing after what determines whether someone takes a break or not, but a combination of both. Preliminary, workers who complete a monotonous task are more likely to take a break before continuing with their next task compared to workers who complete a complex task. Upon closer examination, one can see that this is only the case if workers anticipate engaging in a complex task after the break, compared to a monotonous one. These results show the importance of considering the performance episodes that surround the break. This insight can lead to a reinterpretation of the findings of Bosch and Sonnentag's (2019) who attempted to understand why workers take breaks. Bosch and Sonnentag (2019) found that feeling tired was unexpectedly not associated with taking a break. They proposed that this is because fatigue builds up over time and workers can put up with it. An alternative explanation is that there is a moderating variable that can explain if and when fatigue can lead to taking

breaks. Based on the results of this thesis, one could argue that the need for recovery would be associated with taking breaks only if workers expect a complex or difficult task after finishing another task. This is because workers may be in need to recover some energy or mental resources (e.g., attention or concentration cognitive resource) before, for example, reading a thesis. If the task that is anticipated is not complex or difficult, workers may not be in need to take the break because, as Bosch and Sonnentag (2019) suggest, they can cope with their own fatigue levels for a while longer because the following task is not too demanding.

Results in Chapter 6 expanded on the current understanding of why workers engage in different break behaviours and shows that there are break behaviours that seem to be mostly reactive, while there are others that are mostly proactive. For example, turning the attentional focus towards the performance episode immediately *before* the break may prompt employees to engage in relaxation during the break. This was hypothesised to be caused by employees self-regulatory mechanisms in which they compare their expectations with their current performance and decide to take a break as a reward for the job done (Bandura, 1976; Carver & Scheier, 1998). Alternatively, workers who shift their attention towards the performance episode immediately *after* the break will be more likely to engage in problem-solving pondering or worry about the specific task that needs to be performed. This was thought to be an anticipatory coping strategy in which workers seek to pre-emptively cope with potential stressors that emerge from anticipated job demands. Moreover, the specific task characteristics of the performance episodes before and after the break also influence what workers do during their break. For example, emotional demands are more closely related to affective tinged break behaviours, such as affective rumination and worry, while cognitive demands after the break are closely related to cognitive-related break behaviours, such as problem-solving pondering. Interestingly, when workers are performing a task that is not enjoyed, they may decide to take

a break and engage in relaxation in the middle, presumably to unwind for a short time and improve their mood before carrying on with the task. These results are in line with past research on person-break fit, which states that workers will seek break behaviours that match their needs to maximise break effectiveness (de Jonge et al., 2012; Venz et al., 2019). Therefore, studying the characteristics of the performance episodes before and after a break is crucial to understand why workers engage in different break behaviours. Taking an episodic approach can also help explain why previous attempts have failed to unveil workers' motivations to engage in different break behaviours. For example, Zacher et al. (2014) examined whether fatigue or vitality levels before the break would be related to what workers do during the break (i.e., micro-breaks). Zacher and colleagues (2014), however, did not find any statistical relationships. In light of the results reported here, this might have been because they did not consider that certain break behaviours are reactive and others are proactive and that certain break behaviours are more related to specific task characteristics before and after the break.

Finally, results in Chapter 7 suggest that testing a more comprehensive model for break behaviours is crucial to understand the effects of different break behaviours on well-being and performance after the break. On one hand, engaging in relaxation during the break seems to be positively related to general positive affect after the break, while problem-solving pondering seems positively related only to high activated positive affect (i.e., enthusiasm). In turn, affective rumination during the break is associated with the anxiety-calm continuum, such that affective rumination is positively associated with anxiety (i.e., high activated negative affect) and negatively associated with calm (i.e., low activated positive affect). Contrary to what was expected, relaxation during the break was associated with reduced creativity after the break. From a theoretical standpoint, these results show that there are other break behaviours aside from recovery processes that are related to break effectiveness supporting the need to

distinguish and study them. Additionally, these results also deepen our understanding of the relationship between break behaviours and behavioural outcomes (i.e., creativity). Specifically, relaxation during breaks may not be beneficial for all forms of performance.

8.2 Practical implications

The results of this thesis also have an important practical value. This study provides new insights into how companies may schedule work breaks. Previous studies have attempted to understand how to create the best schedule in terms of length and frequency of breaks (see Chapter 2). Based on the results presented here, an alternative approach is that instead of focusing on the time that has passed, companies may want to focus on the tasks that are done throughout the day to schedule breaks when workers would normally need them (e.g., after an objective dislikeable task).

Moreover, this thesis also extends the understanding of how better design breaks to maximise their effectiveness. For example, most break interventions focus on mental or physical relaxation (e.g., Blasche et al., 2018; Scholz et al., 2017; Steidle et al., 2017). Nevertheless, break interventions may benefit from attempting to match specific break behaviours with specific job demands. Based on the results presented here, one way of improving break effectiveness would be for companies to provide the appropriate facilities and resources to address different performance episode characteristics. For example, companies could provide a place for workers to engage in their preferred activities to improve their mood after engaging in emotionally demanding tasks. Alternatively, companies may want to provide quiet spaces for workers to reflect on their upcoming tasks and how to address them.

Additionally, companies could provide training for employees to identify how different performance episode characteristics affect them and to choose congruent break behaviours. If, for example, workers just completed emotionally demanding tasks, based on the results presented in this thesis, workers should be trained to engage in effective emotion regulation strategies during the break to improve their mood. If, on the contrary, workers anticipate cognitively demanding tasks after the break, they could engage in activities that facilitate the resolution of such performance episodes (e.g., problem-solving pondering).

It is important to note that these suggestions are examples generated by the findings of this thesis and empirical research should attempt to better understand how breaks are influenced by or impact the performance episodes before and after the break before attempting to modify the work environment.

8.3 Limitations and future directions of the Episodic Model of Work Breaks

In each of the empirical chapters, some important limitations that posit threats to the validity of the results were outlined. Therefore, in this section, I discuss some general limitations that emerge from the model in itself. Specifically, the Episodic Model of Work Breaks only considered fit as a potential moderation in the relationship between break behaviours and post-break employee outcomes. Presumably, there are a number of other moderators that could influence the break. Two variables are particularly important: individual differences and the social context in which work takes place. Concerning individual differences, conscientiousness may prompt workers to not take extra breaks and finish work quickly and then go home. Alternatively, extroverts may decide to engage in more breaks when there are more co-workers. People high in need for cognition may engage in more problem-

solving pondering during breaks. The social context can also be important for break research. For example, the decision to take or not take breaks can sometimes be socially driven (Oliver et al., 2021). A recent study suggested that workers may sometimes not take breaks because they feel that doing so may put an extra burden on co-workers (Oliver et al., 2021). Alternatively, workers may sometimes take breaks even if they do not really need them as a form of counterproductive behaviour if they feel that the organisation or their manager is being unjust (Oliver et al., 2021). There can also be a social influence on breaks. For example, workers often take breaks with their colleagues (von Dreden & Binnewies, 2017), past research has suggested that people, in general, can feel more refreshed or drained after resting with different interaction partners (Quinn et al., 2012). Thus, with whom the break is taken can also affect break effectiveness in fostering well-being. Considering individual differences, social characteristics, and other potential moderators can help generate a broader understanding of work breaks.

A second limitation that is present in the Episodic Model of Work Breaks is that only considered individual behaviours. Nevertheless, workers often take breaks with colleagues (von Dreden & Binnewies, 2017) and could potentially engage in social task engagement break behaviours. For example, past research has shown that workers sometimes seek colleagues out to vent or receive emotional support about work-related issues (Colbert et al., 2016). These types of behaviours during breaks could be conceptualised as a form of group affective rumination. Alternatively, workers sometimes seek their colleagues to obtain task-related support, such as asking employees how to solve a task (Colbert et al., 2016). Task support during a break could be conceptualised as a form of group problem-solving pondering. Considering that social support is closely related to the dyadic interaction between the supporter and the recipient (Colbert et al., 2016; LaRocco et al., 1980), it would be incorrect to

assume that emotional and task support during breaks have the same antecedents and effects as individual affective rumination and problem-solving pondering during breaks. Therefore, future studies should aim to examine team processes to understand how the social context can shape whether workers take breaks, what workers do during breaks, and break effectiveness.

There are also some limitations regarding the test of the model itself that must be addressed. One of the most salient limitations is that none of the studies considered physiological behaviours in this thesis. This decision was made under the assumption that the benefits of physiological behaviours effects are due to confounding mechanisms. Namely, when workers engage in, for example, snacking, they usually also engage in relaxation (Kim et al., 2017, 2018). Therefore, physiological behaviours could carry important confounding effects with the other break behaviours. This, however, is a testable assumption and in the future, a more comprehensive test of the full model of break behaviours is required.

Second, the examination concerning past research on what is classified as disengagement break behaviours revealed a dual mechanism that explains why workers disengage from work during their breaks. On one hand, workers may engage in disengagement break behaviours to unwind and recover from job demands. On the other hand, workers may engage in disengagement break behaviours as a form of emotion regulation strategy because their role seems to be to foster positive affect. Nevertheless, this assumption was not tested as the main focus in this thesis was to establish that, on one hand, workers do engage in task engagement break behaviours during breaks, and on the other hand, that disengagement and task engagement break behaviours have different causes and consequences. Therefore, future studies should attempt to compare recovery processes with emotion regulation strategies to understand whether they share the same underlying mechanisms, there is a degree of similarity, or are separated processes.

Third, and also related to disengagement break behaviours, this thesis only compared relaxation to other break behaviours, such as problem-solving pondering. This decision was made following past empirical results concerning recovery experiences during breaks where relaxation had the most consistent effect (e.g., Bosch et al., 2017; Kim et al., 2017, 2018). Nevertheless, previous studies examining recovery experiences during breaks usually do not consider other forms of break behaviours. Because of this, it is necessary to statistically model break behaviours simultaneously to disentangle differential effects and avoid confounding effects (MacKinnon et al., 2000).

Fourth, this study did not test how the fit between the break behaviour and the episode characteristics moderate the relationship between break behaviours and different employee-related outcomes. For example, it has been assumed and shown that affective rumination is detrimental to well-being. However, affective rumination as an emotion-focused coping strategy is not necessarily harmful (Lazarus & Folkman, 1984). In fact, focusing on negative emotions could be a way to better cope with them, thus, making affective rumination functional for well-being (Schutte et al., 2009). Therefore, future studies should attempt to understand how the fit between breaks and performance episodes before and after the break can influence break effectiveness.

Finally, and probably the most important limitation is that the Episodic Model of Work Breaks proposes a dual pathway that explains why workers take breaks and what they do during the break. It was argued that the reactive pathway is triggered after finishing tasks that are disliked or elicit negative experiences (e.g., performing monotonous tasks), while the proactive pathway is triggered when workers anticipate stressful tasks. Consequently, reactive breaks behaviours are thought to be primarily emotion regulation strategies (i.e., strategies to improve one's mood), while proactive break behaviours are thought to be primarily anticipatory coping

strategies (i.e., behaviours to pre-emptively cope with potential stress). Although the results of the thesis do support these assumptions, more research is needed to discard or discover other potential mechanisms. For example, some participants may find the complex task used in the vignette online experiment (i.e., create a haiku poem) exciting and engaging, which would lead to thinking about that task during the break. In this case, the underlying mechanism would be engagement with the task, as opposed to coping with stress. This and other mechanisms can be tested through experimental designs. For instance, a researcher may want to create a similar experiment to ones presented here in which the first task is equal across all groups and where the second task is complex and generates stress but varies in appeal (i.e., high vs low appeal). This would allow disentangling the motivation/coping effect in problem-solving pondering. Similar designs could be used to test other underlying mechanisms of other break behaviours.

8.4 Concluding remarks

This thesis was kickstarted by the question: do workers take breaks because of what they have done, or because of what they anticipate doing later? Although Covid-19 severely impacted two of the three planned empirical studies, alternative designs were developed, and theoretically important results were generated. Specifically, this thesis shows that taking breaks is a function of what workers do prior the break and the anticipated performance episodes after the break. Moreover, workers also engage in different behaviours during breaks based on what they do or expect to be doing. Importantly, these break behaviours seem to have unique effects on post-break outcomes. Overall, this thesis supports the need to consider the context in which breaks are taken to fully understand their effects.

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Appendix A
Instructions, materials, and measures used in the laboratory study (Chapter 5 – Study 1)

This section contains all the material and instructions that were used for the laboratory experiment (Study 1) presented in Chapter 5. The information was presented in the following order:

Initial briefing → Instructions → Task 1 → Break decision question → After break questions → Task 2 → Debriefing

A.1 Initial briefing

Before the start of the experiment, the following briefing was verbally given to the participants:

Hi, my name is Maximiliano Escaffi, and I am a PhD student at the Alliance Manchester Business School. Today you have been invited here to participate in a study about how people manage different tasks and their time to increase their performance. In this study we are simulating a selection process with two real-work tasks. After the first task, you are free to take a short 10-minute break and then continue to the second task, or if you prefer, directly after the first task you can do the second task. Remember that we are interested in your performance, so please feel free to take the break if you want to. On the other hand, if you feel that you do not need it, that is fine as well. Basically, do what you feel is right to perform the best you can in both tasks. If you decide to take the break, you will be moved to the next task to not bother the participants that remain, so please take your stuff with you.

You have been randomly assigned to one of four groups in which the order of the tasks varies. Throughout the experiment we will be asking you some questions through different surveys about your experience in this experiment. After you have finished with all tasks, you will receive a £5 Love2Shop. Further, if your performance in both tasks is in the top 20% of your experimental group, you will be entered into a draw prize for an extra £50 voucher, if you agree to it. You can use these vouchers in many different shops throughout the UK. After the

study you will receive an email with the results of your personality assessment, together with information of whether you are eligible for the extra voucher based on your performance in this session.

In your folder, you will first find the participant information sheet in relation to this experiment. You will find two copies of the informed consent form. Please sign both of them, as one is for you to keep, and the other one is for us to keep. Then, you will find the instructions and the material that you will need for the experiment.

Before you start, it is important to make clear that once the experiment begin, it is not possible to stop until the break, hence if you wish to go to the bathroom, please do it now. Toilets are___

If you don't have any question, please open the folder and follow the instructions.

A.2 Instructions for the study

Each participant was given a folder with the printer material that they needed for the study.

A.2.1 Monotonous – complex group

For the first task, we need to send several invitation letters to a charity event. This charity is concerned with tackling the lack of education in poor neighbourhoods. You will have **30 minutes** to:

- Check that the names and addresses of the letters match with those on the list in the Excel file open in your computer.
- Mark in the system those entries that are correct.
- Mark in the system if the name is misspelled or the address is incorrect

For the second task, you will need to prepare a short report (~3200 characters ~ 500 words) to answer the following question: "**Should developing countries transition in the same way to renewable energies as developed countries?"**. For this, we will provide you

with some material that you may want to review in order to create the argument, however you are welcome to use your own knowledge as well. You can take the documents out of the sleeves and make notes on them if you wish. You will have **30 minutes** to:

- Read the material provided and search for other sources if you wish.
- Write the report

For the extra voucher your performance will be evaluated in both the first and the second task and remember that after you finish the first task, you can take a 10-minute break.

If you wish to withdraw your participation, you can do it now. If at any time you feel uncomfortable and wish to leave the experiment, you may do so. If at the end of the experiment you wish your results to be removed, they can be. Rest assured that all data will be kept strictly confidential and only members of the research team (i.e. my supervisors and me) will have access to it.

Now please turn the page to find the code you will need to enter to start the experiment at the back of this sheet.

A.2.2 Complex – monotonous group

For the first task, you will need to prepare a short report (~3200 characters ~ 500 words) to answer the following question: "**Should developing countries transition in the same way to renewable energies as developed countries?"**. For this, we will provide you with some material that you may want to review in order to create the argument, however you are welcome to use your own knowledge as well. You can take the documents out of the sleeves and make notes on them if you wish. You will have **30 minutes** to:

- Read the material provided and search for other sources if you wish.
- Write the report

For the second task, we need to send several invitation letters to a charity event. This charity is concerned with tackling the lack of education in poor neighbourhoods. You will have **30 minutes** to:

- Check that the names and addresses of the letters match with those on the list in the Excel file open in your computer.
- Mark in the system those entries that are correct.
- Mark in the system if the name is misspelled or the address is incorrect

For the extra voucher your performance will be evaluated in both the first and the second task and remember that after you finish the first task, you can take a 10-minute break.

If you wish to withdraw your participation, you can do it now. If at any time you feel uncomfortable and wish to leave the experiment, you may do so. If at the end of the experiment you wish your results to be removed, they can be. Rest assured that all data will be kept strictly confidential and only members of the research team (i.e. my supervisors and me) will have access to it.

Now please turn the page to find the code you will need to enter to start the experiment at the back of this sheet.

A.2.3 Monotonous – monotonous group

For the first task, we need to send several invitation letters to a charity event. This charity is concerned with tackling the lack of education in poor neighbourhoods. You will have **30 minutes** to:

- Check that the names and addresses of the letters match with those on the list in the Excel file open in your computer.
- Mark in the system those entries that are correct.
- Mark in the system if the name is misspelled or the address is incorrect

For the second task, you will need to continue the previous task but with a new list of names and addresses. For each tasks you will have 30 minutes. For the extra voucher you will be evaluated for both the first and the second task.

For the extra voucher your performance will be evaluated in both the first and the second task and remember that after you finish the first task, you can take a 10-minute break.

If you wish to withdraw your participation, you can do it now. If at any time you feel uncomfortable and wish to leave the experiment, you may do so. If at the end of the experiment you wish your results to be removed, they can be. Rest assured that all data will be kept strictly confidential and only members of the research team (i.e. my supervisors and me) will have access to it.

Now please turn the page to find the code you will need to enter to start the experiment at the back of this sheet.

A.2.4 Complex – complex group

For the first task, you will need to prepare a short report (~3200 characters ~ 500 words) to answer the following question: "**Should developing countries transition in the same way to renewable energies as developed countries?"**. For this, we will provide you with some material that you may want to review in order to create the argument, however you are welcome to use your own knowledge as well. You can take the documents out of the sleeves and make notes on them if you wish. You will have **30 minutes** to:

- Read the material provided and search for other sources if you wish.
- Write the report

For the second task you will be required to prepare a second short report (~3200 characters ~ 500 words) report to answer the following question: **"Should recreational marijuana be legalised?"**. For this, I will also provide you with some material that you may want to review in order to create the argument, however you are welcome to use your own knowledge as well. You will have **30 minutes** to:

- Read the material provided and search for other sources if you wish.
- Write the report

For the extra voucher your performance will be evaluated in both the first and the second task and remember that after you finish the first task, you can take a 10-minute break.

If you wish to withdraw your participation, you can do it now. If at any time you feel uncomfortable and wish to leave the experiment, you may do so. If at the end of the experiment you wish your results to be removed, they can be. Rest assured that all data will be kept strictly confidential and only members of the research team (i.e. my supervisors and me) will have access to it.

Now please turn the page to find the code you will need to enter to start the experiment at the back of this sheet.

A.3 Monotonous task

A.3.1 Instructions monotonous task

"Educate For the Future" is a charity that is concerned with funding adults under the poverty line who cannot afford to pay for their education. They have asked us to help them prepare a number of invitations for one of their charity events. For this task, we need you to do the following:

1. You will need to check that the names and addresses stated on the Excel sheet, which is already open in your computer, match with those written on the list provided on the next page.
2. In the case that the name AND address are correct, mark them as correct on the list.
3. In the case that the name OR address are incorrect, mark them as incorrect on the list.

You will be measured in this task by the number of correct and incorrect letters identified. For every letter incorrectly identified, you will lose one point. You will have 30 minutes for this task. You are unlikely to finish, but we ask you to do as much as you can.

Once you are ready to start, click continue and the timer will start!

A.3.2 Example monotonous task

Please compare this list with the Excel sheet

	Correct	Incorrect
Mr. Cedric Fox - 4 Avenue Terrace, Yeadon, LS19 7AT	◉	○
Mr. Boyd Jordan - 5 Eastmore Court, Yarmouth, PO41 0NH	◉	○
Mr. Perry Waters - 50 Dam Road, Barton-Upon-Humber, DN18 5AU	○	◉
Mr. Leslie Gross - Ty Mawr, Upper Denbigh Road, St Asaph, LL17 0RX	○	◉
Ms. Carol Bass - 15 Baythorne Road, Liverpool, L4 9TJ	○	◉
Ms. Rosa Robbins - 14 Northerwood Avenue, Lyndhurst, SO43 7DU	◉	○
Mr. Shane George - Apartment 2, Hever Hall, Conisbrough Keep, Coventry, CV1 5PB	◉	○

	A	B
1	Full name	Correct address
2	Mr. Cedric Fox	4 Avenue Terrace, Yeadon, LS19 7AT
3	Mr. Boyd Jordan	5 Eastmore Court, Yarmouth, PO41 0NH
4	Mr. Perry Waters	16 Manod Road, Blaenau Ffestiniog, LL41 4DE
5	Mr. Leslie Gross	1 Baldwin Court, Okehampton, EX20 1WJ
6	Ms. Carol Bass	17A Ann Street, Shiremoor, NE27 0QR
7	Ms. Rosa Robbins	14 Northerwood Avenue, Lyndhurst, SO43 7DU
8	Mr. Shane George	Apartment 2, Hever Hall, Conisbrough Keep, Coventry, CV1 5PB

A.4 Complex tasks

A.4.1 Instructions complex task 1

We have been requested by a parliament member to write a very short summary (3400 characters ~ roughly 500 words) report around the following topic: "**Should developing countries transition in the same way as developed countries to renewable energy sources?**". Someone already compiled a bunch of documents that will serve as groundings for this report. Your role in this task will be to:

1. Revise the different documents
2. Write a short report about it. The report needs to be half an A4 format page (3400 characters ~ 500 words approximately). Use the template in the computer provided.

For this task, you will have 30 minutes to both revise the material and write the report. We understand that this time is limited, and that you are unlikely to revise all the documents in depth. You will need to be very mindful about how to manage your own time.

For this task you will be measure by the quality, clarity, and coherence of the report.

Once you are ready to start, click continue and the timer will start!

A.4.2 Material complex task 1

The following material was printed, put inside a folder, and presented in this exact order to all participants.

A.4.2.1 Blog articles

Kariuki, D. (2018, January 25). Barriers to Renewable Energy Technologies Development [Blog post]. Retrieved from https://www.energytoday.net/economics-policy/barriers-renewable-energy-technologies-development/

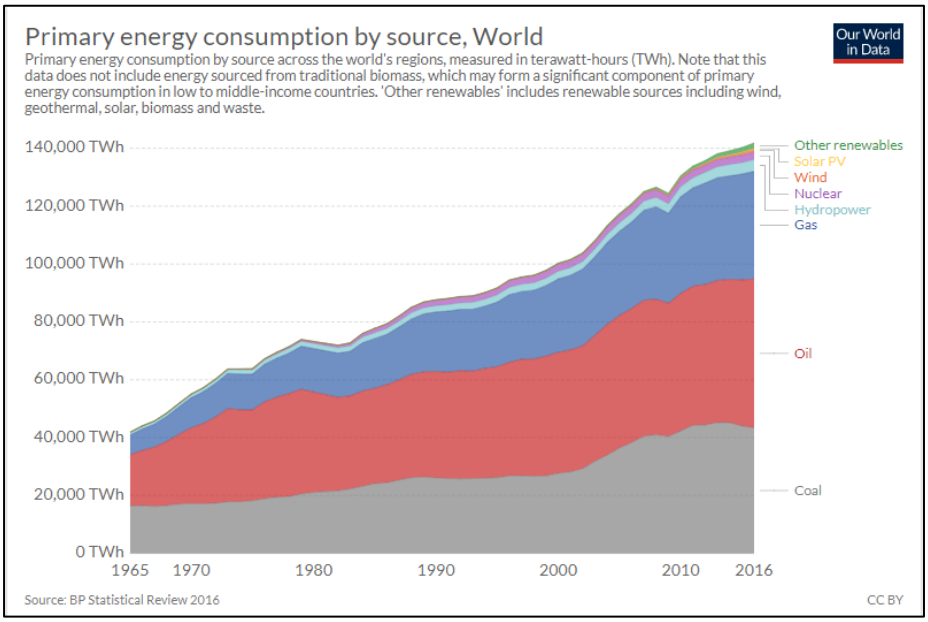
A.4.2.2 Journal articles

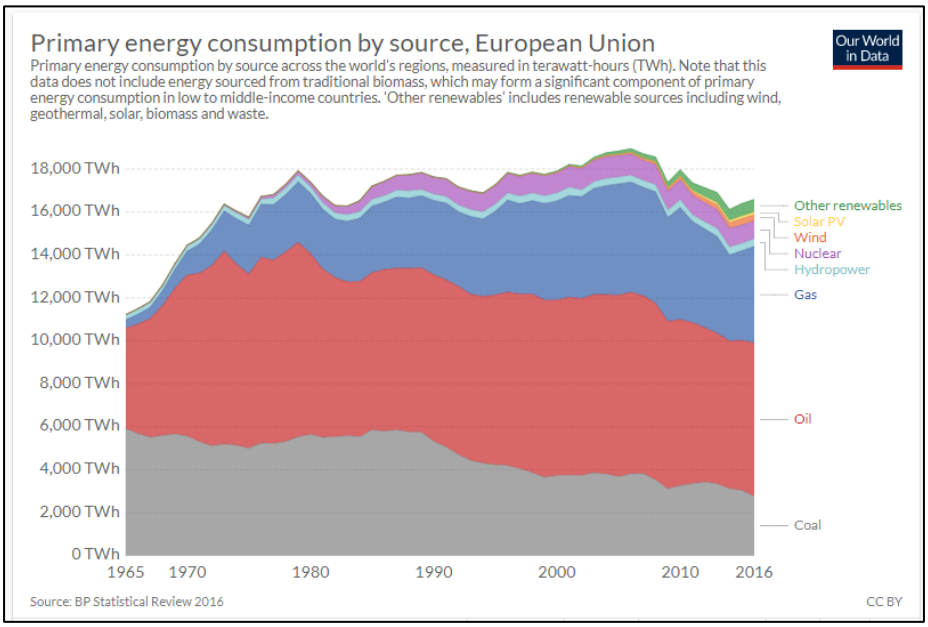
Kaygusuz, K. (2021). Energy for sustainable development: A case of developing countries. *Renewable and Sustainable Energy Reviews, 16,* 1116-1126.

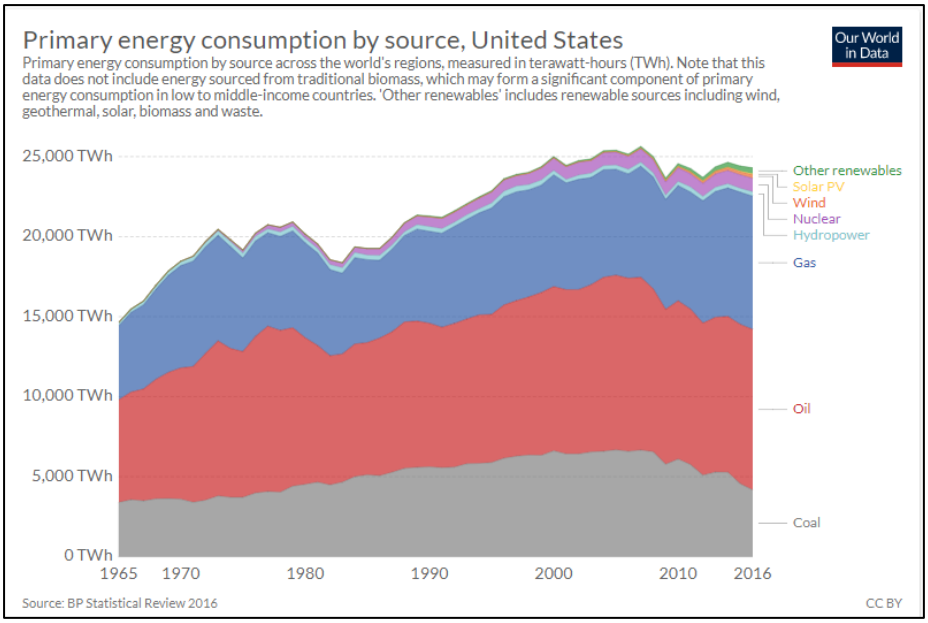
Wei, T., Dong, W., Yan, Q., Chou, J., Yang, Z., & Tian, D. (2016). Developed and Developing World Contributions to Climate System Change Based on Carbon Dioxide, Methane and Nitrous Oxide Emissions. *Advances in Atmospheric Sciences, 33* (May), 632-643.

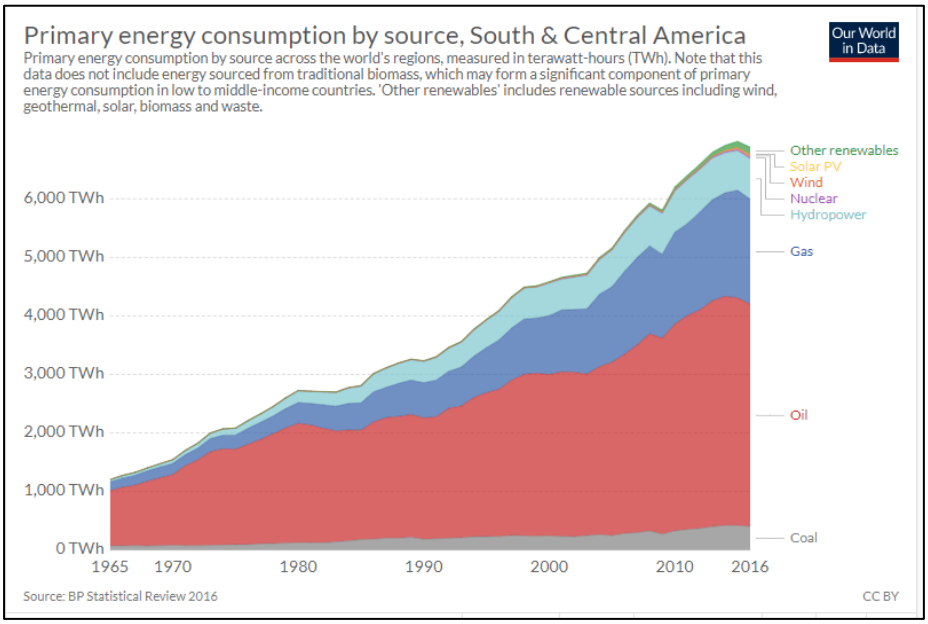
A.4.2.3 Graphical resources

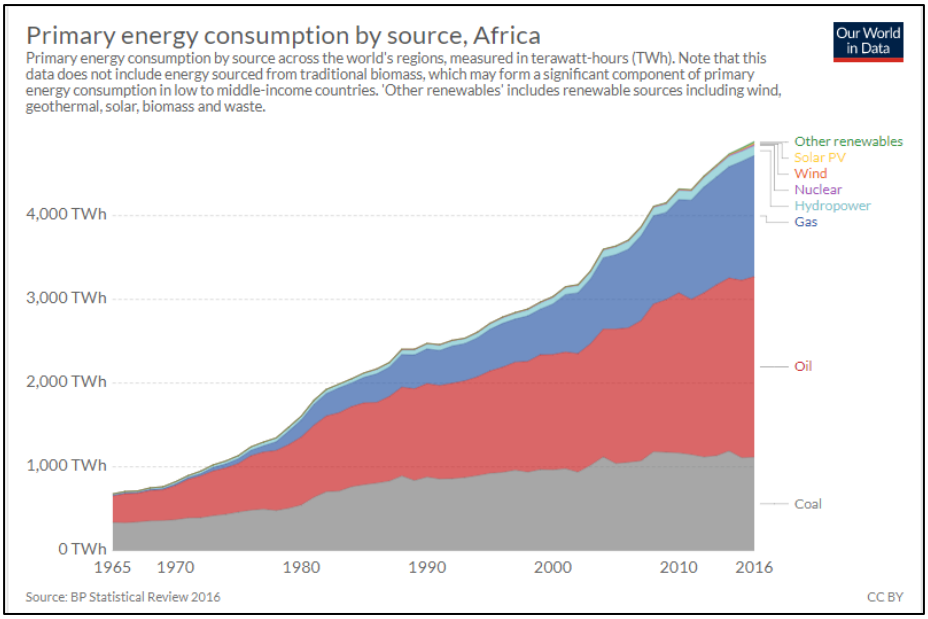
The following graphs were presented in colour to all participants in this exact order. They were retrieved from https://ourworldindata.org/electricity-mix

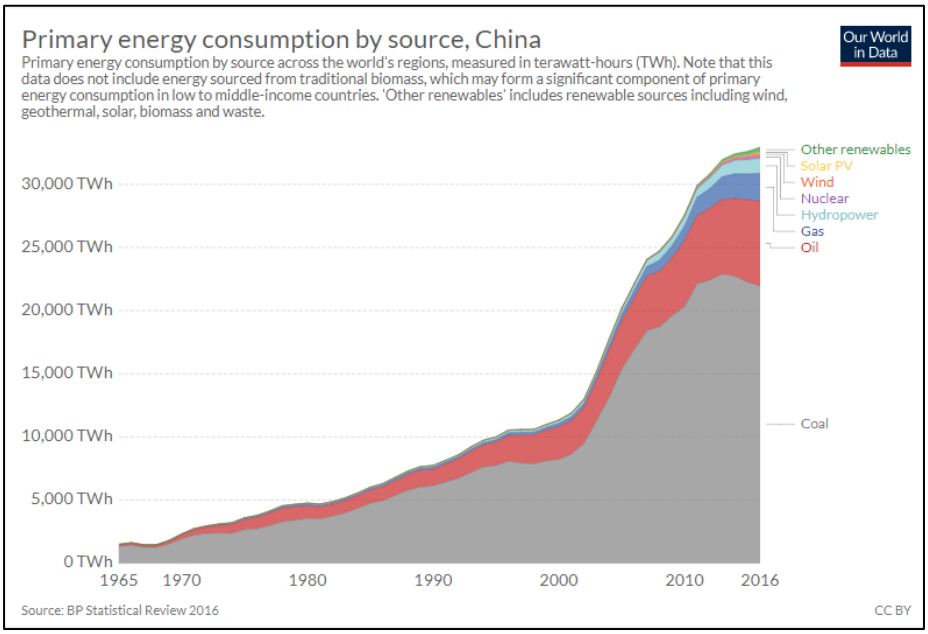


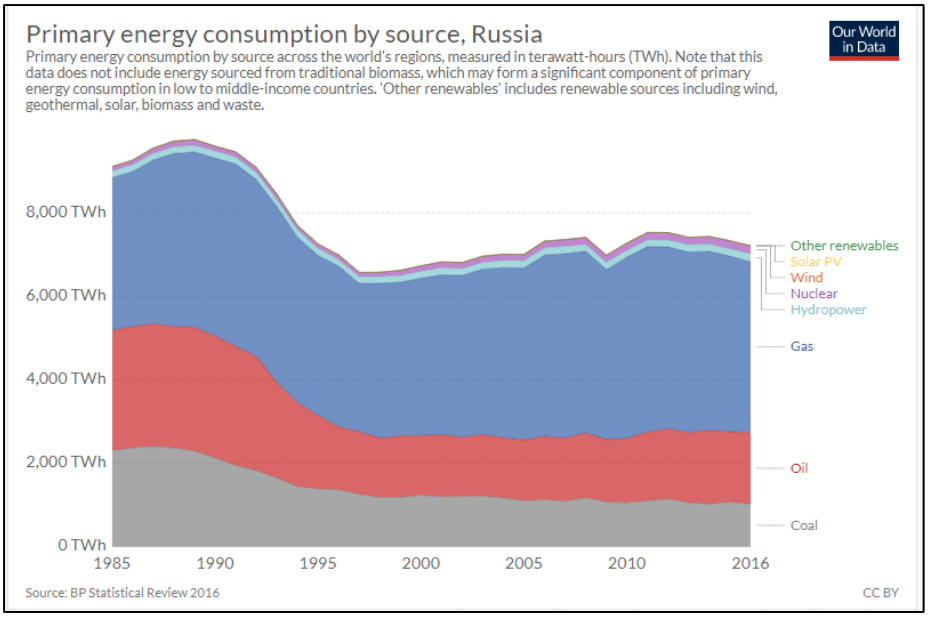


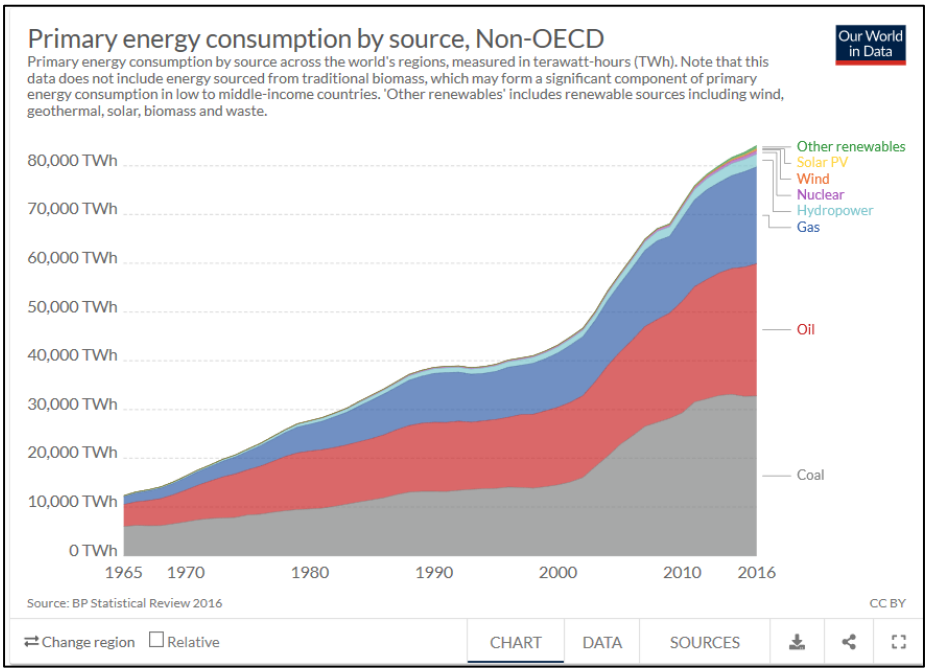

Primary energy consumption by source, United States
Primary energy consumption by source across the world's regions, measured in terawatt-hours (TWh). Note that this data does not include energy sourced from traditional biomass, which may form a significant component of primary energy consumption in low to middle-income countries. 'Other renewables' includes renewable sources including wind, geothermal, solar, biomass and waste.
Our World in Data
25,000 TWh
20,000 TWh
15,000 TWh
10,000 TWh
5,000 TWh
0 TWh
1965
1970
1980
1990
2000
2010
2016
Other renewables
Solar PV
Wind
Nuclear
Hydropower
Gas
Oil
Coal
Source: BP Statistical Review 2016
CC BY

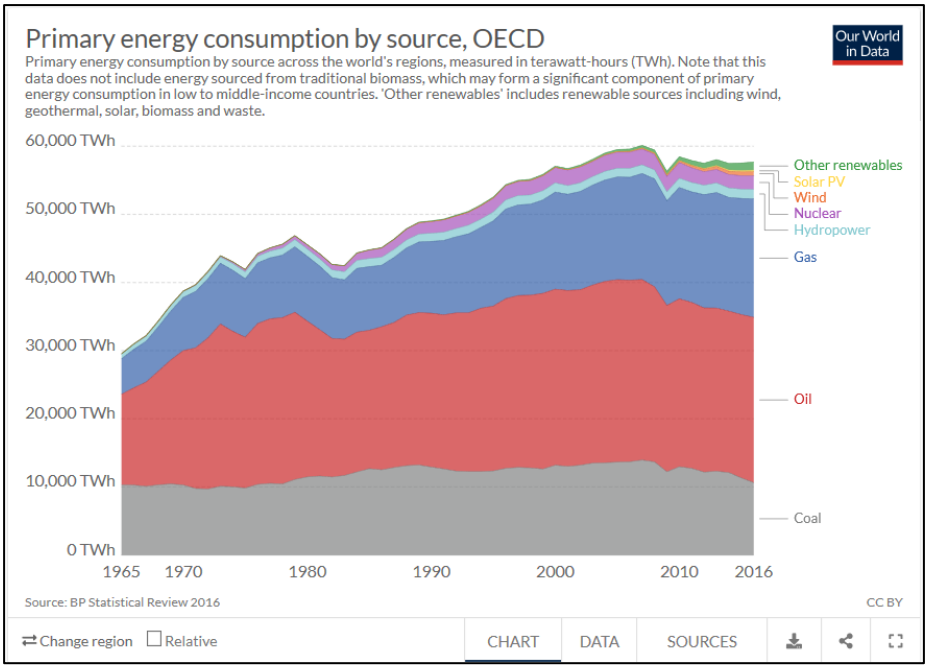

Primary energy consumption by source, South & Central America
Primary energy consumption by source across the world's regions, measured in terawatt-hours (TWh). Note that this data does not include energy sourced from traditional biomass, which may form a significant component of primary energy consumption in low to middle-income countries. 'Other renewables' includes renewable sources including wind, geothermal, solar, biomass and waste.
Our World in Data
6,000 TWh
5,000 TWh
4,000 TWh
3,000 TWh
2,000 TWh
1,000 TWh
0 TWh
1965
1970
1980
1990
2000
2010
2016
Other renewables
Solar PV
Wind
Nuclear
Hydropower
Gas
Oil
Coal
Source: BP Statistical Review 2016
CC BY


Primary energy consumption by source, Africa
Primary energy consumption by source across the world's regions, measured in terawatt-hours (TWh). Note that this data does not include energy sourced from traditional biomass, which may form a significant component of primary energy consumption in low to middle-income countries. 'Other renewables' includes renewable sources including wind, geothermal, solar, biomass and waste.
Our World in Data
Other renewables
Solar PV
Wind
Nuclear
Hydropower
Gas
Oil
Coal
4,000 TWh
3,000 TWh
2,000 TWh
1,000 TWh
0 TWh
1965
1970
1980
1990
2000
2010
2016
Source: BP Statistical Review 2016
CC BY


Primary energy consumption by source, China
Primary energy consumption by source across the world's regions, measured in terawatt-hours (TWh). Note that this data does not include energy sourced from traditional biomass, which may form a significant component of primary energy consumption in low to middle-income countries. 'Other renewables' includes renewable sources including wind, geothermal, solar, biomass and waste.
Our World in Data
Other renewables
Solar PV
Wind
Nuclear
Hydropower
Gas
Oil
Coal
30,000 TWh
25,000 TWh
20,000 TWh
15,000 TWh
10,000 TWh
5,000 TWh
0 TWh
1965
1970
1980
1990
2000
2010
2016
Source: BP Statistical Review 2016
CC BY


Primary energy consumption by source, Russia
Primary energy consumption by source across the world's regions, measured in terawatt-hours (TWh). Note that this data does not include energy sourced from traditional biomass, which may form a significant component of primary energy consumption in low to middle-income countries. 'Other renewables' includes renewable sources including wind, geothermal, solar, biomass and waste.
Our World in Data
8,000 TWh
6,000 TWh
4,000 TWh
2,000 TWh
0 TWh
1985
1990
1995
2000
2005
2010
2016
Other renewables
Solar PV
Wind
Nuclear
Hydropower
Gas
Oil
Coal
Source: BP Statistical Review 2016
CC BY


Primary energy consumption by source, Non-OECD
Primary energy consumption by source across the world's regions, measured in terawatt-hours (TWh). Note that this data does not include energy sourced from traditional biomass, which may form a significant component of primary energy consumption in low to middle-income countries. 'Other renewables' includes renewable sources including wind, geothermal, solar, biomass and waste.
Our World in Data
80,000 TWh
70,000 TWh
60,000 TWh
50,000 TWh
40,000 TWh
30,000 TWh
20,000 TWh
10,000 TWh
0 TWh
1965
1970
1980
1990
2000
2010
2016
Other renewables
Solar PV
Wind
Nuclear
Hydropower
Gas
Oil
Coal
Source: BP Statistical Review 2016
CC BY
Change region
Relative
CHART
DATA
SOURCES



A.4.3 Instructions complex task 2

We have been requested by a parliament member to write a very short summary (3400 characters ~ roughly 500 words) report around the following topic: "**Should recreational marijuana be legalised**". Someone already compiled a bunch of documents that will serve as groundings for this report. Your role in this task will be to:

1. Revise the different documents
2. Write a short report about it. The report needs to be half an A4 format page (3400 characters ~ 500 words approximately). Use the template in the computer provided.

For this task, you will have 30 minutes to both revise the material and write the report. We understand that this time is limited, and that you are unlikely to revise all the documents in depth. You will need to be very mindful about how to manage your own time.

For this task you will be measure by the quality, clarity, and coherence of the report.

Once you are ready to start, click continue and the timer will start!

A.4.4 Material complex task 2

The following material was printed, put inside a folder, and presented in this exact order to all participants.

A.4.4.1 Journal articles

Wilkinson, S. T., Yarnell, S., Radhakrishnan, R., Ball, S. A., & Cyril D'Souza, D. (2016). Marijuana Legalization: Impact on Physicians and Public Health. *Annual Review of Medicine, 67*, 453-466.

Estoup, A. C., Moise-Campbell, C., Varma, M., & Stewart, D. G. (2016). The Impact of Marijuana Legalization on Adolescent Use, Consequences, and Perceived Risk. *Substance Use & Misuse, 51* (14), 1881-1887.

Hajizadeh, M. (2016). Legalizing and Regulating Marijuana in Canada: Review of Potential Economic, Social, and Health Impacts. *International Journal of Health and Policy Management, 5* (8), 453-456.

Li, G., Brady, J. E., & Chen, Q. (2013). Drug use and fatal motor vehicle crashes: A case-control study. *Accident Analysis and Prevention, 60*, 205-201.

A.4.4.2 Policy reports

Miron, J. A. (2003). The Budgetary Implications of Marijuana Legalization in Massachusetts. *Report to Change the Climate*.

A.5 Debriefing

Thank you very much for your valuable contribution in this study. At this stage, we want to mention that assessing how people manage different tasks was not the main aim in this study. In reality, we wanted to evaluate how different tasks influence whether people take breaks or not, and how break characteristics are influenced. We surmised that revealing the main aim of this study may have influenced your break behaviours. If for this reason you wish

to withdraw your participation, please let me know and your data will be erased from the dataset. Please remember that all the information is confidential, and your names will not be mentioned in any way while writing the thesis.

To explore this question, we separated participants into four groups, in which the complexity of the tasks before and after the break was manipulated. In the first group we first presented the monotonous task, and then the complex one; in the second group, we first presented the complex task, and then the monotonous one; for the third group we presented two monotonous tasks; and in the fourth group we presented two complex tasks. We organised our experiment in this way as we wanted to understand whether people take breaks to rest from what they have done, or to prepare for what they will be doing later. Because of this, we needed to have all possible combinations across our observation (hence, the four groups). If you want to discuss the experiment further, you are welcome to approach Maximiliano to do so.

Again, thank you very much for your time and valuable contribution. You will receive your feedback once the data collection is completed and assessed. The data collection is scheduled to end by September 2020. For this same reason, the prize draw will be conducted around that date as well.

A.6 Survey questions

Break decision question

For your next task, you will need to ***[INSERT DESCRIPTION OF TASK 2]*** Would you like to take a 10-minutes break before this task? ***Yes___ No___***

Problem-Solving pondering measure

DURING THE BREAK, to what extent did you

	Not at all	To a small extent	To some extent	To a great extent	To a very great extent
Think about how to improve your performance for the next task?					
Think about how to do the next task?					
Think about solutions to potential problems for the next task?					
Organise your thoughts for the next task?					

Relaxation measure

DURING THE BREAK, to what extent did you

	Not at all	To a small extent	To some extent	To a great extent	To a very great extent
Use your time to relax?					
Use your time for leisure?					
Use your time to rest?					
Emptied your mind to relax?					

Appendix B
Instructions, materials, and measures used in the online vignette experiment (Chapter 5 – Study 2)

This section contains all the material and instructions that were used for the online vignette experiment (Study 2) presented in Chapter 5. The information was presented in the following order:

Initial briefing → CEO video → Lime manager video – presentation video → Line manager video task 1 → Practice task 1 → Task 1 → Line manager video task 2 → Practice task 2 → Break decision question → Break questions → Task 2[3] → Demographics → Debriefing.

B.1 Initial briefing

Thank you very much for your interest in this study about work-breaks. Here we aim to understand how the tasks that people do influence whether they decide to take breaks or not.

In this study, you will be presented with:

1- An hypothetical scenario in which you are a newly hired industrial designer at a marketing and design company.

2- Pre-recorded videos of the CEO and your Line Manager to welcome you and give you your assigned tasks.

3- Two tasks that you will have to perform. You will practice the tasks before you need to complete the real ones.

4- Attention is important, therefore in some of the tasks, you will have to comply with certain instructions. If you fail to do so, your payment might not be processed.

[3] Participants can decide to skip task 2 and go directly to the demographics section.

If you require more information, you can click here to access the Participant Information Sheet which contains more detailed information on the aims of this study, ethics application, how the information will be used, and contact details.

B.2 Videos and scripts

B.2.1 CEO Video

Hello, my name is Ariel Smith, and I'm the CEO of Creation Designers, a design *and* advertising company. Congratulations on staring work at our organisation. You beat some tough competition to be here. Our company's greatest pride is our ability to provide smart, cool design and advertising solutions to our clients. As a lead designer, you will be central to this process, and will be involved both complex challenging and exiting tasks, as well as, inevitably, some more simple mundane tasks. I expect great things from you and look forward seeing you progress within our organisation. You will be working with your line manager Adam who will give you more detailed information on what you will be doing on a day to day basis.

Link: https://mbs.az1.qualtrics.com/CP/File.php?F=F_bmErV2DQrRFYcAZ

B.2.2 Line manager videos

B.2.2.1 Presentation video

Hello, and welcome to Creation designers. I'm Adam and I will be your line manager. I'm here to help and support you as needed. I've already heard some really good things about you from our team and very I'm excited that we get to work together. As a start to your work, today, I need you to do two important tasks and they must be completed in the following order.

Link: https://mbs.az1.qualtrics.com/CP/File.php?F=F_432qslc8jQYpXbD

B.2.2.2 Monotonous task video

Our marketing team has identified potential product testers. And what we need you to do is to check that the names and addresses match those on our central database. You will be provided with two lists to check. This task is important, simple, mechanical, and straightforward. Please, be as thorough as you can.

Link: https://mbs.az1.qualtrics.com/CP/File.php?F=F_e9crWsy9POEaXAx

B.2.2.3 Complex task lamp video

We need you to help create the marketing campaign for a futuristic lamp influenced by Japanese art and culture. We want you to focus on developing an advertising slogan in a haiku format. This task is important, complex, creative, and imaginative. Please, be as creative as you can.

Link: https://mbs.az1.qualtrics.com/CP/File.php?F=F_5BeKVur2vjVMvgF

B.2.2.4 Complex task 2 – product: Radio

We need you to help create the marketing campaign for a futuristic radio influenced by Japanese art and culture. We want you to focus on developing an advertising slogan in a haiku format. This task is important, complex, creative, and imaginative. Please, be as creative as you can.

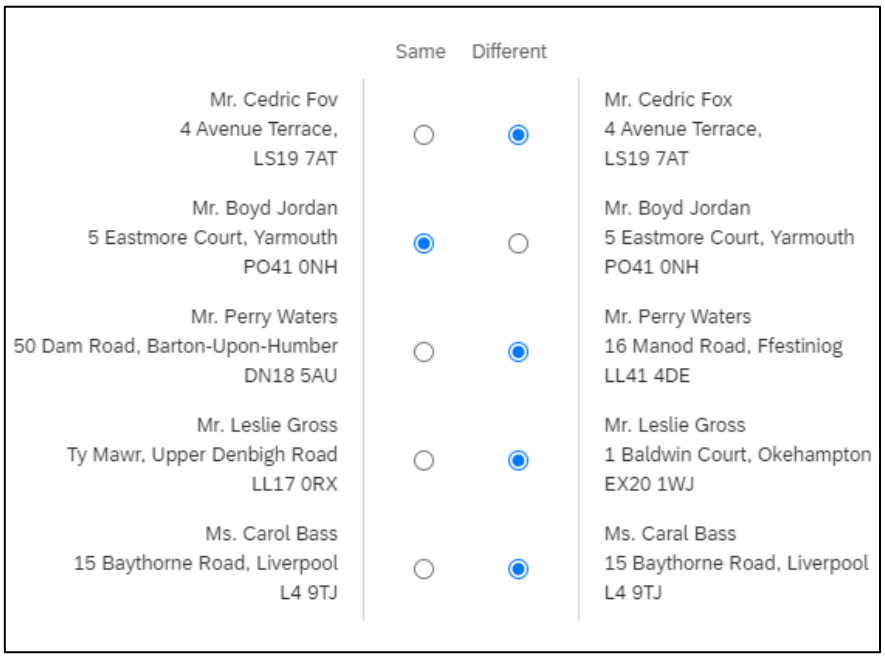
Link: https://mbs.az1.qualtrics.com/CP/File.php?F=F_cNmXMXN6qVC06cR

B.3 Task instructions

B.3.1 Monotonous task

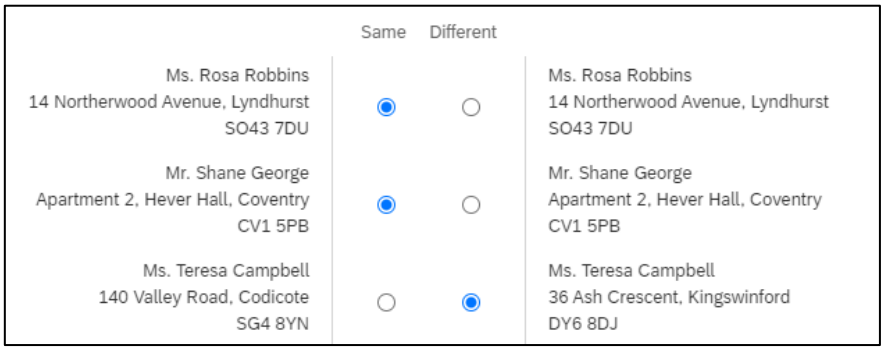
Please compare the list that the marketing team provided (on the right) with the one that is in the customer directory (on the left). You will first practice this task as a form of training, and then perform the real task.

What you need to do is check whether the two entries are exactly the same. For example, you can see in the example that the first case, the name has an error. The second entry is correct. In the third entry, the address does not match. Please continue with the next 2 cases.



When you have completed the practice training and are ready to do the real task, please click next to continue.

This is a fragment of the 1000 list that the marketing team asked you to check. Please mark whether the entry on the left is equal to the entry on the right. **Sometimes, you will be asked to select a specific option**[4]. Please do so when it is required.



[4] These options were attentional checks to ensure that participants were mindful in their participation.

Thank you very much for inspecting this list. Your work will now be sent to Adam for review.

Checking this 70-entry list is part of what you would need to do in this job in real life.

You would need to inspect a total of 1000 entries, together with fixing those that are wrong in the central database.

Altogether this inspection and correction should take about 2 hours. With this in mind, please click next to learn about your next task.

B.3.2 Complex task

In this task, you will need to write a marketing slogan in a Haiku poem format. You will first practice the task by rewriting the last sentence of a finished Haiku that was already presented to a client.

A Haiku is a poem that revolves around a topic and how this makes you feel. They have the following structure: three lines with 5-7-5 syllables each. Here you have some tips that you may find useful:

- A Haiku is direct, so avoid rhymes, metaphors, and other rhetorical devices.

- Create an emotional response in the reader by presenting what caused your emotion rather than the emotion itself.

- A Haiku focuses on one brief moment in time and employs colourful imagery.

Please write an alternative last sentence (i.e., for Blissful warm soft feet) for the following Haiku:

Winter cold crawls slow

Standing barefoot on the rug

Blissful warm soft feet

Alternative ending:_____

Over the next 10 minutes you will perform the same task that you just practiced, but you will need to write the a full Haiku that fulfills the client's requirement. The core aspect of the Haiku has to be **joy and the object is a futuristic lamp**.

Here you have some tips that you may find useful for this task:
- A Haiku has typically 3 lines, with 5-7-5 syllables each.
- A Haiku is direct, so avoid rhymes, metaphor, and other rhetorical devices.
- Create an emotional response in the reader by presenting what caused your emotion rather than the emotion itself.
- A Haiku focuses on one brief moment in time and employs colourful imagery.
- In line four write the letter K in upper case[5]

Line 1:_____

Line 2:_____

Line 3: _____

Line 4: _____

Thank you very much for developing the first draft of the Haiku, this will now be sent to Adam for review.

Developing the Haiku is part of what you would need to do in this job in real life.

Imagine that in addition to the Haiku that you just developed, you also developed a radio advert with a jingle, and a poster advert for a large billboard.

Altogether, the jingle, the radio advert, and the poster should take about 2 hours. With this in mind, please click next to learn about your next task.

[5] This was an attentional check to ensure that participants were mindful in their participation

B.4 Debriefing

Thank you very much for your participation in this study as part of a PhD thesis at the University of Manchester!

With this study we attempt to answer the following research question: **do people take breaks because of what they have done or because of what they expect to be doing later?** You were randomly assigned to one of four experimental conditions that manipulated the tasks and order in which these tasks were presented. These four experimental conditions were:

1) Monotonous - Complex; in which people were first presented with a monotonous task and then a complex one.
2) Complex - Monotonous; in which people were first presented with a complex task and then a monotonous one.
3) Monotonous - Monotonous; in which people were presented with two monotonous tasks.
4) Complex - Complex; in which people were presented with two complex tasks.

Again, thank you very much for your valuable contribution, and if you have any question, you can email me at: maximiliano.escaffischwarz@manchester.ac.uk

B.5 Survey questions

Break decision question

If this was a real job, would you take a break before your second task?

Consider that your first task was ***[INSERT TASK 1]***, and that after this you need to ***[INSERT TASK 2]***.

I definitely wouldn't take a break____

I probably wouldn't take a break____

I probably would take a break____

I definitely would take a break____

Problem-Solving pondering measure

DURING THE BREAK, to what extent did you

	Not at all	To a small extent	To some extent	To a great extent	To a very great extent	Factor loading
Ponder on how to do your **next task**?						.85
Ponder on how to improve your performance in your **next task**?						.82
Ponder on how to do all the steps required for your **next task**?						.89
Ponder on new ways of doing your **next task**?						.67

Relaxation measures

DURING THE BREAK, to what extent did you

	Not at all	To a small extent	To some extent	To a great extent	To a very great extent	Factor loading
Use your time to relax?						.67
Use your time for leisure?						.62
Use your time to rest?						.59
Emptied your mind to relax?						.70

Skip task question

Thank you very much for participating up to this point.

You have already completed the minimum we need for our study. If you wish to skip until the end, you can do so. It will by no means impact your participation. You can also carry on to your second task if you wish to.

Remember that your next task is ***[INSERT TASK 2].***

Skip to the end____

Continue with task 2____

Demographic questions

To what extent did you feel immersed in:

The role: slider 1-Not very immersed; 5-Very immersed

The tasks: slider 1-Not very immersed; 5-Very immersed

Please state your gender

Male___

Female___

Other___

Prefer not to say___

Please state your age in years____

How long in years have you been working in your current job____

Please select your highest educational level achieved____

Appendix C
Instructions, materials, and measures used in the field experiment (Chapter 6)

This section contains all the material and instructions that were used for the field experiment presented in Chapter 6. This information was presented in the following order:

Briefing → Pre-screening survey instructions → Questions about the instructions → Pre-break survey instructions → Task description as per experimental group → Post-break survey instructions → Break behaviours questionnaire → Debriefing

C.1 Briefing

Do you take breaks? Please support my research by participating in my online study that looks into how what people do during breaks influence how they feel after the break. This is a two-stage study. The stage you are completing now is a pre-screening survey that will explain the study in detail so that you can decide if you want to participate. At a later date I will inform the start of the second stage. To participate, you need to be working at the moment, not be a student, have autonomy to take breaks when you need to, be 18+ years old, and proficient in the English language, as instructions are in English.

Please read the Participant Information Sheet here: {LINK}. Further, you can access the University's Privacy Notice for Research here: {LINK}.

C.2 Pre-screening survey

C.2.1 Pre-screening survey instructions

Thank you for your interest in this study about breaks at work. This is a screening survey to invite potential candidates for the actual study. Please read carefully the instructions on the next page and decide whether you want to participate.

I will ask you questions about these instructions to ensure that you understood them correctly. **If you answer one of them incorrectly, your participation will be rejected and the payment will not be processed.**

Please read the Participant Information Sheet and the University of Manchester Privacy Policy for more information:

Participant Information Sheet

University Privacy Policy

What you have to do:

- **Three surveys**: screening survey (this one), one immediately **before the break**, and one immediately **after the break**. You will need to complete **all three surveys** for your data to be usable.
- **Work-break**: any period of time at work you spend doing something other than work (e.g., coffee break, a break to chat with someone, or a lunch break).
- If you agree to participate, I will send you a message every morning to remind you of this study if you have not completed it yet.

Important considerations:

- You **must complete Survey 2 and Survey 3** while at work. If not, your data will not be valid and the payment will not be processed.
- **Survey 2** must be completed **before** **Survey 3**. If not, your data will not be valid and the payment will not be processed.
- **Survey 2** and **Survey 3** must be completed on the **same day.** If not, the data will not be valid and the payment will not be processed.
- All your surveys will be checked to see whether you adhered to these instructions.
- Survey 2 and Survey 3 will be available simultaneously, therefore you need to make sure to complete Survey 2 first. If you believe you have made an error, please contact me through Prolific internally.

The surveys:

- **Survey 1**: screening survey. You will be paid £0.25 for an estimated 2-minute survey.

- **Survey 2**: questions about your job. You will be paid £0.79 for an estimated 7-minute survey.
- **Survey 3**: questions about your break and how you feel. You will be paid £1.70 for an estimated 7-minute survey.
- If you complete all three surveys, you will be paid £2.54 in total, which is **above the Prolific standard**.
- The invitation for Survey 2 and Survey 3 will be extended via Prolific after the pre-screening process has been completed.
- Please remember that **Survey 2 needs to be completed immediately <u>BEFORE</u> a break, and Survey 3 needs to be completed immediately <u>AFTER</u> that same break.**

Please answer the following questions		
I have read the information and understood that participation is voluntary	Yes	No
I agree to participate in the next stage		
I agree my data to be used anonymously for research publications		

C.2.2 Questionnaire in pre-screening survey

Questions about the instructions

How many surveys do you need to fill in in total, considering this one?

When during the day do you need to respond Survey 2?

When during the day do you need to respond Survey 3?

What will the Survey 3 ask you about?

General questions about your workday

At what time do you normally **start work**?

This information will be used to assess whether you are responding to Survey 2 and 3 within your normal working time.

At what time do you normally **end work**?

This information will be used to assess whether you are responding to Survey 2 and 3 within your normal working time.

C.3 Pre-break survey

C.3.1 Pre-break survey instructions

This is the **first of two surveys** that you will need to complete **TODAY** for your participation to be valid. In this survey, we will ask some questions about your work and the break you will be taking now. **Remember that right after** the break you will need to complete your second survey.

C.3.2 Reactive group pre-break survey

Please tell me what you were working on **immediately before the break**.

Please write the name of your task (e.g., working on excel, serving a customer)?

Please describe this task

Please describe the main steps to complete this task

How long is this task?

Did you finish this task?

How enjoyable is this task? 1-Not at all; 7-A lot

Cognitive demands

To what extent do you agree or disagree on the following sentences about the task you **JUST DESCRIBED**

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree	Factor loading
This task demanded a lot of concentration						.81
I had to be attentive to many things at the same time for this task						.80
This task demanded a great deal of carefulness						.68

Emotional demands

To what extent do you agree or disagree on the following sentences about the task you **JUST DESCRIBED**

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree	Factor loading
This task demanded a lot from me emotionally						.75
I was confronted with things that affects me personally in this task						.68
This task put me in emotionally upsetting situations						.85

What is the current time?

C.3.3 Proactive group pre-break survey

Please tell me what you expect to work on **immediately after the break**.

Please write the name of your task (e.g., working on excel, serving a customer)?

Please describe this task

Please describe the main steps to complete this task

How long is this task?

Will you finish this task in one go?

How enjoyable is this task? 1-Not at all; 7-A lot

Cognitive demands

To what extent do you agree or disagree on the following sentences about the task you **JUST DESCRIBED**

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree	Factor loading
This task will demand a lot of concentration						.80
I will have to be attentive to many things at the same time for this task						.57
This task will demand a great deal of carefulness						.83

Emotional demands

To what extent do you agree or disagree on the following sentences about the task you **JUST DESCRIBED**

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree	Factor loading
This task will demand a lot from me emotionally						.73
I will be confronted with things that affects me personally in this task						.85
This task will put me in emotionally upsetting situations						.81

What is the current time?

C.3.4 Control group pre-break survey

Could you please **describe your work** in general terms?

Can you name your role (e.g., analyst, customer service agent)?

Please describe this job

Please describe the main tasks in your job

How enjoyable is this job? 1-Not at all; 7-A lot

Cognitive demands

To what extent do you agree or disagree on the following sentences about the task your **JOB**

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree	Factor loading
My job demands a lot of concentration						.67
In my job I have to be attentive to many things at the same time						.48
My job demands a great deal of carefulness						.64

Emotional demands

To what extent do you agree or disagree on the following sentences about the task your **JOB**

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree	Factor loading
My job demands a lot from me emotionally						.84
In my job I am confronted with things that affect me personally						.97
My job puts me in emotionally upsetting situations						.89

What is the current time?

C.4 Post-break survey

This is the final survey.

Please bear in mind that there might be attentional checks. To continue, please click next.

Is the task that you were doing before your break the same as the one that will be doing after the break? ***Yes/No***

What time is it now?_____

Affective rumination

DURING THE BREAK,

	Not at all	A little	A moderate amount	A lot	A great deal	Factor loading
Were you annoyed by issues related to your task before the break?						.89
Were you irritated by issues related to your task before the break?[6]						.89
Did you become tense by issues related to your task before the break?						.85
Were you troubled by issues related to your task before the break?						.85

Relaxation

DURING THE BREAK, did you

	Not at all	A little	A moderate amount	A lot	A great deal	Factor loading
Use your time to relax?						.85
Use your time for leisure?						.64
Use your time to rest?						.79
Do relaxing activities?						.76

Problem-solving pondering

DURING THE BREAK, did you think about

	Not at all	A little	A moderate amount	A lot	A great deal	Factor loading
Solutions to problems about the task you expect to do after the break?						.87
How to improve your performance at the task you expect to do after the break?						.89
How to do the task you expect to do after the break?						.86
New ways of doing the task you expect to do after the break?						.79

[6] This item was left out because it caused high levels of misfit due to its correlation with other items, in particular, item 1.

Worry

DURING THE BREAK,

	Not at all	A little	A moderate amount	A lot	A great deal	Factor loading
Were you annoyed by issues related to the task you will do after the break?						.87
Were you irritated by issues related to the task you will do after the break?						.88
Did you become tense by issues related to the task you will do after the break?						.89
Were you troubled by issues related to the task you will do after the break?						.87

C.5 Debriefing

Thank you very much for your participation in this study as part of a PhD thesis at the University of Manchester!

With this study we attempt to answer the following research question: do the tasks that you have done or expect to be doing after the break affect what you do during the break? You were randomly assigned to one of two experimental conditions that manipulated whether we asked you to think about what you have done before the break, or what you expected to do after the break. Additionally, there was a control group in which we asked participants to generally describe their work.

In your case, you were assigned to [INSERT GROUP].

Again, thank you very much for your valuable contribution, and if you have any questions, you can email me at: maximiliano.escaffischwarz@manchester.ac.uk

Appendix D
Instructions, materials, and measures used in the event contingent diary study (Chapter 7)

This section contains the two questionnaires that were used for the event contingent diary study presented in Chapter 7. Importantly, the questionnaire was presented in Spanish.

D.1 Survey 1 – post-break survey

How long in minutes was your break? _____

Problem-solving pondering

DURING THE BREAK, to what extent did think about	Factor loading (within level)	Factor loading (between level)
Solutions to problems at work?	.82	.97
How to improve your performance at work?	.91	.99
How to do tasks required at work?	.84	1.00
New ways of doing tasks at work?	.82	.98

Affective rumination

DURING THE BREAK, to what extent did think about	Factor loading (within level)	Factor loading (between level)
A negative work-related event?	.96	.96
A bad thing that happened at work?	.96	1.00
A stressful event that happened at work?	.78	1.00
A mistake I made at work?	.47	.46

Relaxation

DURING THE BREAK, to what extent did think about	Factor loading (within level)	Factor loading (between level)
Use your time to relax?	.76	1.00
Use your time for leisure?	.70	.90
Use your time to rest?	.80	.90
Do relaxing activities?	.72	.71

D.2 Survey 2 – outcomes survey

Affective well-being

DURING THE BREAK, to what extent did think about	Enthusiasm		Anxiety		Calm		Depression	
	Within	Between	Within	Between	Within	Between	Within	Between
Enthusiastic	.86	.86						
Happy	.61	.82						
Anxious			.42	.90				
Tense			.88	.94				
Relaxed					.81	.95		
Calm					.70	1.00		
Depressed							.75	1.00
Sad							.66	.93

Creativity

Over the next three minutes, please write as many uses you think of for a: **[paperclip, brick, newspaper, bedsheet, screwdriver, button]**. Be as creative as you can.