The recovery effect of within-workday breaks on momentary burnout

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Scientific Introduction

Burnout has been recognized as an occupational hazard in various people-oriented professions including human services, health care, and education (Maslach & Leiter, 2016). Nowadays even occupations that had little to no involvement with people are becoming more oriented around customer service, resulting in more interactions between people. This change towards a more people-oriented society makes the appearance of burnout more common and also relevant for a wider range of occupations than in previous years (Maslach & Leiter, 2016). Because burnout is nowadays becoming more common, companies are interested in knowing how they can help employees recover from burnout complaints. Similarly to working adults, students can suffer from burnout symptoms as well and even though students are not “employees”, from a psychological perspective their studies consist of structured activities such as attending class and submitting assignments, which in turn can be considered as the equivalent of “work”(Lin & Huang, 2014). Furthermore, literature shows that burnout is negatively related to academic success and can lead to a lower performance of students (Schaufeli, Martinez, Pinto, Salanova & Bakker, 2002). For universities and other educational institutes the well-being of their students is important and so is the academic success of their students. Because of these reasons educational institutes are interested in knowing how they can help their students to recover from burnout complaints.

To give a better impression of how many people suffer from burnout, a study from Shanafelt et al. (2012), suggested that 45% of US physicians reported at least one burnout symptom, which is very high due to their constant involvement with people. Another study in the Netherlands by Prins et al. (2010) reported that 15% of all Dutch residents fulfil the criteria for moderate burnout, meaning one or more burnout complaints. Other studies like the CBS and TNO (2018) show similar numbers, indicating that 16% of Dutch employees suffer from burnout complaints and in a follow-up study by CBS and TNO (2020), this percentage has increased to 17% of Dutch employees suffering from burnout complaints.

People that suffer from burnout are more likely to reduce work hours or stop working at all, which can result in high healthcare costs for companies and society (Han et al., 2019). Over the past years, many studies have been conducted about recovering from burnout complaints. For example the recovery effects of sleeping (Sonnenschein et al., 2008; Söderström et al., 2012), smartphone usage (Derks & Bakker, 2014) and off-job recovery (De Jonge et al., 2012; Oerlemans & Bakker, 2014). These studies each contribute to answering the question of how to recover from burnout complaints. Doing activities after work that are not related to work help people to recover from the burnout complaints they experienced on a working day (Sonnentag, 2001; Oerlemans & Bakker, 2014; De Jonge et al., 2012; Sonnentag & Fritz, 2007). However, very little is known about how to recover from burnout complaints during working hours even though people generally work for 8 hours a day. During a workday people often have all kinds of different breaks: coffee breaks, lunch breaks, toilet visits, and they also vary in duration. A study by Hunter and Wu (2016) aims to understand how breaks during worktime can help improve the well-being and health of employees and a more recent study by De Jonge (2020) looks at the perspective of both the off-job and on-job recovery to explain what a good break from work is to recover from burnout. Previously mentioned literature all help in finding an answer on what role on-job recovery can play for people who suffer from burnout complaint. However, on-job recovery is still a very novel topic in burnout literature so little is known about the effects of within-workday breaks and burnout.

The purpose of this paper is to contribute to the concept of on-job recovery by extending on previously mentioned studies. More specifically, this study aims to provide more insight into the relationship between within-workday breaks and the momentary burnout of employees and students. As potential moderators, the effects of smartphone usage and workload will be explored. Breaks are an important part of employees and students their day and it helps them relax and have time to detach themselves from work (Hunter & Wu, 2016). Breaks are therefore very likely to play an important role in recovering from momentary burnout and on-job recovery. Smartphone usage on the work floor is something that has become more common and relevant on the work floor over the past years. A survey done by CareerBuilder and CNBC (2016) showed that many people used their phone for personal usage and that 70% of the employees have their smartphone within “eye contact” near them on the work floor. And this even resulted in some companies implementing smartphone rules or etiquette on the work floor. Furthermore, for a student it is not uncommon to use their smartphones during lectures, breaks or self-study, due to smartphones being used a lot by people during the day, it is expected that smartphone usage can be a potential moderator on the relationship between within-workday breaks and burnout.

Historical background of burnout

The earliest usage of the term burnout comes from Freudenberger (1974), who defined burnout as a state of fatigue or frustration for professionals that failed to produce the expected rewards. This concept was developed even further due to the need for an instrument that could assess this experienced burnout. Maslach and Jackson (1981) build upon the foundations laid by Freudenberger to develop the Maslach Burnout Inventory (MBI). The MBI scale became the most popular and accepted scale to measure the symptoms of burnout on three dimensions: emotional exhaustion, depersonalization, and personal accomplishment (Maslach & Jackson, 1981). Besides introducing the MBI, Maslach (1982) claimed that burnout can occur amongst all professionals who work with other people. This claim made the definition of burnout more specific by including a wide range of human service workers (Maslach, 1982).

As a better scientific understanding of burnout arose, more studies about burnout were conducted and many of those studies were later reviewed by Maslach and Schaufeli (1993). Maslach and

Schaufeli concluded that amongst the many differences in scope and definitions of burnout there were five common elements identified: (1) Predominance of fatigue symptoms; (2) atypical physical distress symptoms may occur; (3) Burnout-symptoms are work-related; (4) the symptoms manifest in persons that do not suffer from psychopathology and (5) decreased effectiveness and work performance may occur (Maslach & Schaufeli, 1993; Schaufeli et al., 2001). In 1998, the definitions and developments amongst the concept of burnout were reviewed by Schaufeli and Enzmann (1998) and they made an extensive list of more than 130 possible symptoms that can be associated with burnout (Schaufeli & Enzmann, 1998, pp. 20-31).

In their critical analysis, Schaufeli and Enzmann elaborate on the changes that were recently made to Maslach's original definition of burnout (Maslach, 1982). They proposed that burnout should be viewed as a psychological condition that develops gradually over time amongst individuals and is often the result of inadequate coping strategies that are associated with the syndrome. The notion that burnout should be perceived as a process comes from Leiter (1993). He developed a process model where factors such as workload, supervisor support, and interpersonal conflict are related to the three main dimensions of burnout; emotional exhaustion, depersonalization, and personal accomplishment (Leiter, 1993). The main idea behind this model is that time is one important dimension and from this perspective, people do not become burned out all of a sudden, but burnout is a process that occurs through a personal reaction to all of the factors involved in the work environment (Leiter, 1993). The process model by Leiter brings a very interesting perspective to on-job recovery, as well as the question of whether momentary fluctuations on burnout complaints are possible in the short term.

In the end, all the critique that was reviewed by Schaufeli and Enzmann led to another adaptation of the MBI scale: The Maslach Burnout Inventory – General Survey (MB-GS; Maslach, Jackson & Leiter, 1996), and this instrument was specifically developed to measure burnout in other occupational groups besides the human service sector. A study by Leiter and Schaufeli (1996) tested the consistency of burnout across different kinds of occupations and concluded that the MBI-GS could be applied to a wider range of occupational industries outside the human services sector. The MBI-GS measures the relationship with the respondent towards work and not as one’s relationship with people at work and unlike the original MBI scale, the MBI-GS uses the three dimensions: Exhaustion, Cynicism, and Professional Efficacy (Maslach et al., 1996). The exhaustion items in the MBI-GS are generic and include both emotional and physical fatigue (Maslach et al., 1996). Furthermore, the professional efficacy is similar to Personal accomplishment however, unlike the MBI, it includes both social and non-social aspects (Maslach et al., 1996). The biggest difference from the original MBI scale is the new dimension Cynicism instead of depersonalization. Cynicism reflects the distant attitude towards work and not the interpersonal relationship at work (Maslach & Jackson, 1981; Maslach et al., 1996).

Despite the improvements to the Maslach Burnout Inventory, the MBI-GS scale was still being criticized for having some flaws regarding measurements and inconsistency, the items exhaustion and cynicism are phrased negatively, while Professional efficacy is phrased positively which is considered a big flaw (Demerouti & Nachreiner, 1996; Demerouti & Bakker, 2008). Other studies showed that the internal consistencies of the MBG-GS scale are deemed satisfactory (Schutte, Toppinen, Kalimo & Schaufeli, 2000; Demerouti, Bakker, Vardakou & Kantas, 2003). Despite most researchers rejecting that the internal inconsistency was a flaw, there was still a common concern about the barely satisfactory consistency of the cynicism scale and one specific item that had a questionable to even poor consistency in certain subsamples (Schutte, Toppinen, Kalimo & Schaufeli, 2000). A study by Demerouti, Bakker, Vardakou, and Kantas (2003) looked at the convergent validity of both the MBI-GS and the OLBI scale and confirmed the previously mentioned problems associated

with the MBI-GS scale, while at the same time mentioning some problems with the OLBI scale in regard of internal correlations.

Two distinct features of the Oldenburg Burnout Inventory (OLBI) scale compared to the MBI-GS are the different core dimensions and the broader definition of the concepts used. First of all, the OLBI assesses the two core dimensions of burnout: Exhaustion and disengagement with items that are both negatively and positively phrased as to include both ends of the dimensions, those items are included in the subscales and relate to their opposites as well (Demerouti & Bakker, 2008). Secondly, Contrary to the MBI-GS scale, where the exhaustion items are generic without an emphasis on emotional, cognitive, or physical aspects (Maslach, Jackson & Leiter, 1996), the OLBI scale includes a wider definition of the concept of exhaustion by having questions that relate not only to the emotional aspect of exhaustion but also to the cognitive and physical aspect of exhaustion (Demerouti & Bakker, 2008). Due to these two distinct features of the OLBI, the Oldenburg Burnout Inventory will be used as the alternative for the MBI-GS to measure burnout throughout this paper.

How do burnout complaints develop and the role of recovery

The Job Demand and Resources model (JD-R Model) by Demerouti, Bakker, Nachreiner and Schaufeli (2001a) is one of the most well-known models about the relationship between burnout and job characteristics. The JD-R model encompasses both the Job demand-control (DC) theory from Karasek (1979) and the Job demand-control-support (DCS) model by Johnson and Hall (1988). By building upon the two psychosocial job characteristics, “Psychological demands” and “decision latitude” and applying them to the work environment the concepts of “Job demand” and “Job resources” can be associated with burnout. (Demerouti et al., 2001b).

The main idea behind the JD-R model is the interaction between job demands and job resources and the model describes the process of how burnout occurs amongst employees (Demerouti et al., 2001ab). When job demands are high employees experience an increased level of exhaustion and when job resources are lacking the employee will experience a feeling of disengagement (Demerouti et al., 2001ab; Bakker & Demerouti, 2014; Bakker, Demerouti & Verbeke, 2004). When an employee experiences both exhaustion and disengagement at the same time this person is more likely to suffer from burnout complaints in the nearby future (Demerouti et al., 2001a; Bakker & Demerouti, 2014). Even though the JD-R model does not directly relate to the recovery of burnout and cannot answer how to recover once employees already suffer from burnout complaint it does explain the process of how burnout symptoms come about (Bakker & Demerouti, 2014). Knowledge about how burnout symptoms occur is crucial in figuring out how to recover from these burnout symptoms. The JD-R model has been used in practice to test the role of recovery by Kinnunen, Feldt, Siltaloppi and Sonnentag, (2011) and explains the role of recovery on the relationship between work characteristics and occupational well-being.

Job Recovery Experiences and recovery by off-job activities

A study by Sonnentag and Fritz (2007) points out that the recovery process of an employee is not related to doing one specific activity like reading a book or going for a walk, but rather it is the underlying psychological experience, which involves the thought process and state of mind of a person, that is crucial for the recovery process. The same authors define four key job recovery experiences: psychological detachment from work, relaxation, mastery, and control and they present a new instrument to assess these recovery experiences. A definition of these four recovery experiences is given by Sonnentag and Fritz (2007), who define *Psychological detachment* as individuals becoming psychologically detached from their work and have the feeling they are being away from their work, this implies not engaging in work-related activities after working hours

(Sonnentag & Fritz, 2007). *Relaxation* is associated with leisure time and refers to deliberately chosen activities that relax the body and mind of the individual. These activities differ from person to person however, generally speaking, many people receive some form of relaxation from activities that put few social demands on them and require little to non, physical and cognitive effort (Sonnentag & Fritz, 2007). *Mastery experiences* refer to those off-job activities that the individual perceives as challenges or learning opportunities, some examples include climbing a mountain, learning a new hobby, or taking languages classes. And the main idea behind these activities is to keep the individual's mind distracted from their job (Sonnentag & Fritz, 2007). *Control* refers to an individual's desire to control the events that happen in their life and can be described as the ability to pick from two or more options. More specifically the experience of control during leisure time will be measured as it is a good indication of how individuals can satisfy their desire for control and may act as an external resource that enhances recovery from work after working hours (Sonnentag & Fritz, 2007).

The study by Sonnentag (2001) explains that recovery experiences can be applied in practice by doing activities in one's leisure time which can be anything like going for a walk, watching a movie, or playing games. The results of Sonnentag's study show that work-related activities after working hours and before going to sleep negatively impact a person's well-being, whereas social activities and physical activities had a positive effect (Sonnentag, 2001). A more recent study by Oerlemans and Bakker (2014), adopts a slightly different perspective and examines whether employees who are at risk of burnout (High burnout complaints) react differently to the time they spend on their off-job activities and whether these specific activities hinder or help the individual recover from work. One of the conclusions drawn by Oerlemans and Bakker (2014) is that employees that are at low risk of burnout, are not in immediate danger when they partake in work-related activities in their leisure time and their daily recovery ability is not (yet) affected. Contrary, when employees, who are at high risk of burnout, partake in work-related activities a decline in their daily recovery abilities can be observed (Oerlemans & Bakker, 2014). The levels of physical vigour, cognitive liveliness, and recovery of these employees will decrease and this is because employees who are at high risk of burnout already feel chronically exhausted and disengaged with their work (Demerouti, Mostert & Bakker, 2010). Lastly, employees that spend their off-job time on social or physical activities recover better on all daily recovery outcomes, and individuals who are at high risk of burnout benefit more than individuals who are at low risk of burnout (Oerlemans & Bakker, 2014).

Furthermore, the study by Sonnentag and Fritz (2007) states that those four recovery experiences serve as a way to reduce the experienced stress and get an individual's level of stress back to its baseline. A study by Demerouti et al. (2009) supports this by showing evidence that work demands are negatively associated with recovery experiences and that thus a good recovery can help to reduce stress. Literature elaborates that recovery experiences can be both considered a mediator and a moderator between the relationship of work characteristics (Job demand, Job resources) and well-being outcomes (with poor well-being related to burnout) (Demerouti et al., 2009; Kinnunen et al., 2011; Bennet et al., 2018).

The study by Kinnunen et al., (2011) defines the theoretical job-demand-resources-recovery (JD-R-R) model, which utilizes the concept of both recovery experiences and the JD-R model as an explanation of how occupational well-being can be improved (Kinnunen et al., 2011). The results showed that the recovery experiences, psychological detachment, and relaxation can serve as a moderator in the relationship between work characteristics (job demands and job resources) and occupational well-being (fatigue at work and work engagement) (Kinnunen et al., 2011). Recovery experiences are important for the recovery process as every individual need to maintain a certain level of physical and psychological state, for them to stay energetic, engaged, and healthy (Sonnentag & Fritz, 2015). While there is a lot of research done about recovering from stressors after work (Sonnentag & Fritz, 2007; Sonnentag, 2001; Oerlemans & Bakker, 2014) the same holds for maintaining a healthy level of physical and psychological states during working hours

Additionally, a recent meta-analytic study by Bennett, Bakker and Field (2018) elaborates further on the study by Demerouti et al, (2009) and shows evidence that all recovery experiences, except

mastery, are negatively related to job demands (Challenge demands & Hindrance demands) and are positively related to job resources (Bennet et al., 2018), this means that recovery experiences indeed can help to reduce stress and improve the employee well-being. From the results of the study by Benett et al. (2018), we can conclude that out of all the four recovery experiences, psychological detachment has the largest effect size in reducing fatigue (exhaustion) and helps to increase employee well-being. This is consistent with an earlier study conducted by Sonnentag, Kuttler and Fritz (2010) who states that low psychological detachment is related to a high level of emotional exhaustion and the need for recovery (Sonnentag, Kuttler & Fritz, 2010). And that high workload is negatively related to psychological detachment, meaning that when individuals suffer from a high workload they will have trouble with psychologically detaching themselves from work, which in turn results in a high level of emotional exhaustion and the need for recovery (Sonnentag, Kuttler & Fritz, 2010).
Furthermore, Bennet et al. (2018) state that besides being a moderator, recovery experiences also have a mediating effect between work characteristics and well-being outcomes. Employees experience work demands and resources during work and recovery experiences after work with both being related to well-being outcomes (Bennet et al., 2018). However, for on-job recovery, it is expected that this mediating effect will be not presented because it does not unfold over time as is the case with off-job recovery. The recovery experiences for on-job recovery will now occur during working hours. Moreover, we can conclude that out of the four recovery experiences psychological detachment is the most relevant and strongest process that can help an individual to recover from high levels of job stressors and can help to reduce burnout levels(Sonnentag & Fritz, 2015).

Combining recovery experiences and off-job activities: DISC-R Model

A model that combines the principles of off-job recovery with psychological detachment is the Demand-Induced-Strain Compensation Recovery (DISC-R) model by De Jonge et al. (2012). The DISC-R model will be used as a core model for this study and similar to the study by De Jonge (2020) it will be applied to the concept of on-job recovery to help identify the relationship between breaks and burnout.

The DISC-R model builds upon the assumption of the triple match principle from the DISC model (De Jonge & Dormann, 2003). This principle assumes that for an individual to have positive well-being, three relationships have to be present. Job demand should match the right job resources, job resources should match the well-being outcomes and lastly, job demand should meet the well-being outcomes (De Jonge & Dormann, 2003). The DISC makes a distinction between three types of job resources and demand: physical, emotional, and cognitive (De Jonge & Dormann, 2003). This means that for an employee to reduce job strains the most effective way to deal with it is to first identify the type of job demand that causes those strains, which can be either physical, emotional, or cognitive. Then by matching the type of job demand with the corresponding type of job resources no burnout symptoms should arrive (De Jonge & Dormann, 2003; 2006). The DISC-R adds upon the DISC model by including the recovery aspect of psychological detachment (De Jonge et al., 2012). If prevention of burnout symptoms from surfacing cannot be done because the job demand is too much or there is a lack of job resources to deal with the high job demands, then the DISC-R model explains how to recover from these burnout symptoms. The DISC-R model claims that to recover from burnout symptoms it is important to engage in off-job activities. During those off-job activities, it is most effective to engage in activities that use the other systems, that are not related to the same system as the job demand itself(De Jonge et al., 2012). This means that when the job demand is physical the most effective way to recover from this job stresses is by physical detachment, which in turn implies that the off-job activity itself is either cognitive or emotional so it does not further stress the physical systems of that individual (De Jonge et al., 2012). By detaching oneself during their off-job time, a full

off-job recovery can be achieved when the cognitive, physical, and emotional systems used during work return to their baseline levels after work (De Jonge et al., 2012).

On-Job Recovery

The same dynamics and principles that hold for off-job recovery as described in the DISC-R model (De Jonge et al., 2012) will be applied to the context of on-job recovery. Because these principles are applied in a different context and period, burnout will be measured through a variant of the OLBI-questionnaire: the daily and momentary OLBI (OLBI: Demerouti & Bakker, 2008). Throughout a working day, it is possible that fluctuations in an employee's level of burnout complaints can occur (Leiter, 1993) and to test whether on-job recovery does occur during working hours it is important to measure these momentary burnout levels. The daily OLBI is used to the average level of burnout during the day, while the momentary OLBI is used to identify how much the burnout levels fluctuate. Besides the slight adjustments to the OLBI-questionnaire, the idea behind on-job recovery is similar to off-job recovery, however instead of detachment during the off-job time the detachment process will take place during work breaks (De Jonge, 2020).

A study by Hunter and Wu (2016) explains how work-break activities can help with the recovery process. First of all, a within-day work break can be defined as a period during a workday, where work-related tasks and activities are not required nor expected from the employee and when the employee's attention is not focused on work (Hunter & Wu, 2016). Breaks can vary in activity and length however, during regular workdays employees are likely to have formally scheduled breaks like coffee breaks, smoking breaks, and lunch breaks, as well as different types of informal breaks like taking a stroll or reading new messages on your phone (Trougakos & Hideg, 2009). Overall, any type of break can be an effective solution to fight fatigue from occurring amongst employees and to increase productivity (Trougakos & Hideg, 2009). However, the nature of the activities people engage in during their work break is most important (Trougakos & Hideg, 2009). A study by Trougakos, Hideg, Cheng and Beal (2014) showed evidence that relaxing lunch breaks were negatively related to fatigue and social or work-related lunch breaks were positively related to fatigue. In general, activities that remove or reduce demands, work-related or otherwise tend to result in more positive recovery outcomes (Trougakos & Hideg, 2009). Moreover, the timing of break during the day is very important for the effectiveness of the breaks, having breaks at the end of the day will result in fewer post-break resources(job resources) which are needed to recover (Hunter & Wu, 2016). To conclude, the most effective breaks, which show the lowest scores on somatic symptoms and emotional exhaustion, are the breaks in which employees engage in preferred non-work-related activities early in the day (Hunter & Wu, 2016). This means that effective breaks can help reduce emotional exhaustion, which is a core component of burnout (Hunter & Wu, 2016). Furthermore, Hunter and Wu (2016) look at the recovery process of breaks from a resource perspective as explained in the effort-recovery model by (Meijman & Mulder, 1998). When employees do not focus on activities related to work and detach themselves from work during a break they will not use any resources that would otherwise be used for their work demands. Because of this employees will not drain their resource pool and are more likely to recover from job stressors and emotional exhaustion(Hunter & Wu, 2016).

When looking at an individual's daily resource level it is expected that emotional exhaustion will be influenced the most due to fluctuations in resource levels throughout the workday (Trougakos & Hideg, 2009). As previously explained, emotional exhaustion is considered to be one of the core dimensions of burnout (Maslach, 1982) and therefore there is an indication that breaks and burnout

are related to each other. However, emotional exhaustion does not take into account the "cognitive and physical dimensions of exhaustion" as per the OLBI definition of burnout (Demerouti et al., 2003). Moreover, the relationship between breaks and the other dimension of burnout "Disengagement" is not explored yet. In this study, the concept of within-workday breaks and burnout will be explored more in-depth. This will be done by measuring the burnout levels of the participants throughout the workday and by including the principles of detachment from the DISC-R in breaks. To get a better idea of the activities people do during their within-workday break(s): The number of breaks will consist out of the number of times employees took within-workday break to cognitively, physically, and emotionally distance themselves from their work. The definition of breaks used in this study implies that when employees take more breaks they will also psychologically detach themselves more. This is in line with the definition of breaks given by Hunter and Wu (2016) and the definition of psychological detachment by Sonnentag & Fritz (2007)

To conclude, Trougakos and Hideg (2009) suggest that breaks will help to maintain and recover individuals' level of resources and that employees with a low level of resources will have a high level of emotional exhaustion. Based on this reasoning it is expected that taking breaks will help to reduce burnout symptoms, this means it is expected that employees that have more within-workday breaks will have a lower level of burnout while employees that have fewer within-workday breaks will have a high level of burnout.

Moderators affecting momentary burnout.

One possible moderator of the relationship between workload and burnout could be within-workday breaks. Workload is the amount of perceived work an individual has to do (both quantitatively and qualitatively) and it adds to the dimension of job demand as explained in the JD-R model (Demerouti et al., 2001ab). According to the JD-R model, increasing the workload will result in a higher level of job demands for the employee, which in turn can lead to an increased level of exhaustion. Breaks on the other hand will help the employee detach themselves from work and not drain their resource pools, letting them experience a low level of job demand and resources (Hunter & Wu, 2016).

A study by Spurgeon, Harrington and Cooper (1997) points out the various health and safety problems that are associated with long working hours and that it can lead to potential stressors and a negative effect on psychological wellbeing, which in turn can result in mental health disorders. Greenglass, Burke, and Fiksenbaum (2001) conducted a study about workload and burnout in nurses and the results show a positive correlation between workload, emotional exhaustion, and cynicism and a negative relationship between workload and professional efficacy. Indicating that a higher workload will lead to more burnout complaints (Greenglass et al., 2001). Furthermore, a more recent study by Hu, Chen and Cheng (2016) supports these findings after conducting a study about the effect of working hours and burnout amongst 1560 full-time employees in China. The results show that long working hours are significantly correlated with burnout. Furthermore, it is expected that when an individual has long working hours, suffering from burnout will make it more difficult to distance oneself from work (Hu, Chen & Cheng, 2016).

Another possible moderator on the relationship between within-workday breaks and burnout could be smartphone usage. Nowadays, smartphones are being used by many people and also for a large portion of their day, on average females use their smartphones for about 167 minutes per day while males spend approximately 154 minutes per day on their phones (Andone et al., 2016). When and where people decide to use their phones varies per person, but it is safe to say that employees use their phones during work time as well. Be it during a toilet break, a lunch break, or just to quickly answer a new incoming message. Not only that, but many jobs also expect employees to use and

work with a (smart)phone, so that their boss can reach them or that they can reply to work-related messages fast (Davis, 2002). This brings rise to the question of whether smartphone use during work time is something positive that helps them to recover or whether it is just an extension of work.

A study by Jarvenpaa and Lang (2005) provides insight into the phenomena of using a phone during work. The results show that even though using a phone helps to be more flexible and it is easier and more efficient to communicate and coordinate tasks and people it also takes away the freedoms of employees (Jarvenpaa & Lang, 2005). Less personal time increased work pressure and the inability to try to separate and keep distance from work have been things participants in the study by Jarvenpaa and Lang (2005) often mentioned. Furthermore, a recent study by Derks and Bakker (2014) shows that intensive smartphone users have a higher level of work-home-interference(WHI) than low-smartphone users, which can result in burnout symptoms occurring (Derks & Bakker, 2014). The reason why the level of WHI for intensive smartphone users is high is that these people perceive their phones not as something they use for relaxation but as something to use for work-related activities, such as messaging colleagues and making client calls (Derks & Bakker, 2014). Furthermore, it is found that daily recovery experiences (psychological detachment & relaxation) result in a lower WHI, which means that detachment and relaxation help to decrease WHI and possibly decrease the chances of getting burnout. However, the relationship between recovery experiences and WHI is negatively moderated by smartphone usage (Derks & Bakker, 2014). Employees with a high level of smartphone usage will have a higher level of WHI than employees with a low level of smartphone usage (Derks & Bakker, 2014).

A study by Wang, Wang, Gasking and Wang (2015) looks at it from a different perspective, they suggest that people use their phones to relieve stress or entertain themselves. To entertain oneself and to escape reality are two functions that may help people to relax. (Lowry, Gasking & Moody, 2015). This is important because only a small minority of smartphone users experience problematic outcomes, which makes it safe to say that most smartphone users feel relaxed when using their phones (Wang et al., 2015). A similar effect will be expected for smartphone usage during within-workday breaks, it is expected that individuals that use their phone more often during breaks can relax more and therefore have a lower level of burnout than individuals who rarely use their phone during within-workday breaks.

Conclusion

Based on what has been discussed in the previous sections five hypotheses are proposed. First of all, literature provides evidence that within-workday breaks can serve the same purpose as leisure time after work when the breaks are used as a moment for employees to distance themselves from work (Hunter & Wu, 2016; De Jonge et al., 2012). Therefore it is expected that within-workday breaks are negatively related to momentary burnout levels. Secondly, the concept of workload is related to job demand, which means that when the workload of an employee increases their job becomes more demanding. Consequently, a higher level of job demand is associated with an increased level of exhaustion and momentary burnout levels(Demerouti et al., 2001ab). Thirdly, smartphone usage during work can is associated with a higher recovery aspect assuming that people do not use their phone for work but instead use it to entertain themselves or relieve stress. This aspect of phone usage helps people relax and disengage more from their work and will result in lower levels of momentary burnout. Fourthly, smartphone usage is expected to moderate the relationship between the number of within-workday breaks and the momentary burnout levels. The reason for this is that personal phone usage is (often) not allowed during work time or study time, instead, there are only a few moments during the day where people can use their phones freely and this is during small breaks like a toilet break or a smoke break and large breaks like lunch. Assuming employees use their

phones more during these breaks, people would then relax more and be more disengaged from their work which makes their breaks more effective and help with recovering from momentary burnout (Lowry, Gasking & Moody, 2015). And lastly, it is expected that within-workday breaks can serve as a moderator between the relationship of workload and momentary burnout. When employees have more breaks they have room and time to relax and distance themselves from work. By doing so they do not drain on their resource pool and the perceived level of workload after the break will be lower than before and by having within-workday more often the overall perceived workload will be lower and this results in lower levels of momentary burnout. To sum up, these hypotheses will be listed below this section.

To test the proposed hypotheses both employees and students will take part in a one-day study in which they have to fill in the momentary OLBI questionnaire several times during their workday or study day. In this study, students will be measured together with employees, which means that when employees are mentioned students will be included as well. The dimensions of burnout, exhaustion and disengagement, as well as the other variables workload, within-workday breaks and smartphone usage apply to students as well. Given that empirical research has shown that burnout concerns people irrespective of their occupation (Leiter & Schaufeli, 1996). And that based on the characteristics of the tasks that students have to fulfil, it resembles the tasks of employees in many other occupations (Schaufeli, Martinez, Pinto, Salanova & Bakker, 2002). Based on this it can be said that students are considered as employees as well but within a specific occupational domain (Lin & Huang, 2014). As with any occupation and companies, there will be small differences in the amount of perceived workload, regulation for smartphone use and even the amount of within workday-breaks for the employees. The participants of this study have a wide range of occupations such as health-care, the financial sector or the agricultural sector and by including students in this study, the general population will be represented more and the results can be applied to the whole occupational sector, of which students can be considered to be a large percentage of.

To provide a good overview of the fluctuation in momentary burnout levels of the participants the momentary OLBI questionnaire will be sent about once every hour. Before the start of the one-day study, an intake questionnaire is used to identify the demographics of every participant such as gender, occupation, and working hours. At the end of the workday, a concluding questionnaire will be filled in to measure the daily burnout level and to reflect upon the day. This questionnaire will be used to determine their smartphone usage and the amount of within-workday breaks the employees and student had that day to cognitively, emotionally, and physically distance themselves from their work or their study.

Hypothesis 1: The number of within-workday breaks (physical, cognitive and emotional) is negatively related to changes in momentary burnout levels. Employees with a low number of breaks will have a high level of momentary burnout while employees with a high number of breaks will have a low level of momentary burnout.

Hypothesis 2: Daily workload is positively related to changes in momentary burnout levels. Employees with a high workload will suffer from higher levels of momentary burnout than employees with a low workload.

Hypothesis 3: Smartphone usage is negatively related to changes in momentary burnout levels. Employees who use their smartphones more intensively will have a lower level of momentary burnout than employees who rarely use their smartphones.'

Hypothesis 4: Smartphone usage moderates the relationship between the number of within-workday breaks (physical, cognitive and emotional) and momentary burnout. Employees and students who

use their smartphones more intensively will have more effective within-workday breaks than employees who rarely use their smartphones, resulting in a lower level of momentary burnout.

Hypothesis 5: The amount of within-workday breaks (physical, cognitive and emotional) moderates the relationship between daily workload and momentary burnout. Employees with a high number within-workday breaks will have a lower level of perceived daily workload than employees with a low number of within-workday breaks, resulting in a lower level of momentary burnout.

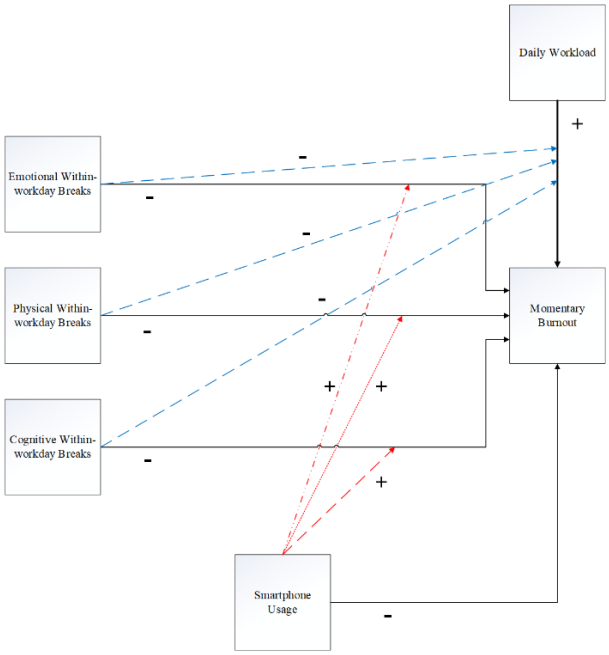

Figure 1: Conceptual Model

Method

Participants

For this study, both students and working adults living in the Netherlands and Guatemala have been recruited to take part in this study. This study is focussing on participants in the Netherlands, however, due to it being a part of a larger study setup it also included participants in Guatemala, although it is expected that there will be slight differences between the people in Guatemala and the Netherlands in terms of perceived exhaustion and disengagement, taking both countries into account will give a slightly more representation of the general population. Furthermore, it is expected that the students overall will have a little more burnout symptoms than adults because students

To recruit participants for the study, a snowball sample technique was carried out by two Industrial Engineering (IE) bachelor students and three master students with an Operations Management and Logistics (OML) or Innovation Management (IM) background. The bachelor and master students each asked people from their network of friends and family to participate in the study and ask them to recruit their colleagues or friends as well. In the end, the total number of participants recruited for this study was 163, with 117 Dutch-speaking persons (71.78%) and 46 Spanish-speaking persons (28.22%). Furthermore, the presence of students in this study accounted for 41.07% of the total sample size and working adults for 58.93%. The average age of the students was 22.31 years and the average age of working adults was 33.84 years. Moreover, the male to female ratio was almost equal in this sample with approximately 47.3% of the participants being male and 52.7% female.

Additionally, the participants had a wide range of educational backgrounds, ranging from VMBO/ Lower general secondary education to WO/University or PhD degree. The occupational backgrounds amongst working adults varied quite heavily with participants being employed in 16 different work sectors such as the agricultural Sector, catering sector or the financial sector. The number of working hours ranged between 10 and 90 hours per week for working adults and 0 to 64 hours per week for students.

Procedure

The study is set up in three stages and the participant has to fill in their answers on their smartphone by using a third-party application called MetricWire. MetricWire is a platform that allows questionnaires to be assigned to participants during specific times and depending on the date of the study the participant will receive notifications when the questionnaires are available to them. Before, recruiting the participants for the study, a short pilot study with the bachelor and master students was conducted to test the MetricWire application and identify errors. The pilot test helped to identify some colour-layout issues, which made it more difficult to fill in the questionnaires and a couple of grammar issues. The issues were swiftly resolved and no further problems were found.

The entire study was set up for a total of 11 working days over three working weeks: the last three working days of the first week, five working days of the second week, and the first three working days of the third week. Recruiting the participants was mostly done by direct messages (DM's) through chat applications such as WhatsApp and Facebook and mouth-to-mouth with family members and friends. Furthermore, the people that agreed to partake in the study were also asked if they knew colleagues or friends that would possibly be interested in participating.

After the recruitment was over and participants picked their preferred day out of the 11 available days, the participants could immediately start with the study. In the first stage, the participant is asked to fill in a digital in-take questionnaire, this questionnaire is immediately available in the app when the participants agree to participate in the study. The in-take questionnaire has questions regarding the demographic information of the participants.

In the second stage, a longitudinal study to measure momentary burnout will be conducted during a single work-day of the participant. Throughout the workday, they picked the participant will receive a maximum of 7 notifications on their phone which are scheduled between 9:00 AM and 5:00 PM to fill in the questionnaire. The questionnaires will only be active for roughly 20 minutes and when the participant does not fill in the questionnaire within 20 minutes of receiving the notification they will have one less measuring point. The high number of notification is picked to leave room for error and allow participants to miss a few measure points.

Lastly, in the third stage, a closing questionnaire that reflects upon the workday will be sent to the participants. Here are questions about the number of breaks taken during their workday and how often they used their smartphone during their work.

After all the questionnaires have been collected in the MetricWire Database, it has been anonymised to prevent data being linked to the participants. The data is then exported and logged in a .xls file where it can be further analysed by using SPSS and R. To determine whether the questionnaires filled in by the participants are valid and can be used during the analysis, a simple check was executed. Valid questionnaires are those from whom the in-take and closing questionnaire are present and out of the seven momentary burnout questionnaires at least two have been filled in. This results in a cut-off value of (2 >= momentary burnout questionnaires). Participants that filled to fill in more than two

momentary burnout questionnaires were excluded from the data. In the end, four participants did not meet this cut-off value and were excluded from the sample size, making the final sample size a total of 159 participants.

Questionnaires

In this study, the variables included are the burnout dimensions: exhaustion and disengagement, the number of within-workday breaks to cognitively, emotionally and physically distance oneself from work and smartphone usage. Table 1, shows the Cronbach's alpha values of the different disengagement and exhaustion items as well as the construct of within-workday breaks.

Table 1

Reliability analysis burnout and within-workday breaks constructs

Construct	Cronbach's Alpha (Range)	Number of Items
General Disengagement[a]	0.753	8
General Exhaustion[a]	0.826	8
General Burnout[a]	0.666	2
Daily Disengagement[b]	0.835	8
Daily Exhaustion[b]	0.895	8
Daily Burnout[b]	0.743	2
Momentary Disengagement[c]	0.743-0.816	8
Momentary Exhaustion[c]	0.900-0.940	8
Momentary Burnout[c]	0.667-0.787	2
Number of Within-workday breaks[d]	0.651	3

Note. a: General OLBI questionnaire, b: Daily OLBI questionnaire, c: Momentary OLBI questionnaire

d: adjusted DISC-R questionnaire to fit the context of breaks

Momentary, daily and general disengagement and exhaustion

To measure burnout amongst the participants of this study, six different versions of the OLBI questionnaire were used. First, of all the distinction was made between the academic (for students) and regular (for working adults) version of the OLBI questionnaire. Secondly, every participant had to fill in three different OLBI questionnaires: The general OLBI questionnaire, the momentary OLBI questionnaire, and the daily OLBI questionnaire. And Lastly, these six questionnaires have been translated and peer-reviewed into Dutch and Spanish versions by the researchers of the entire study setup. The OLBI questionnaire consists of two scales: Exhaustion & Disengagement, with every 8 questions, to measure burnout. This is consistent throughout all the versions of the OLBI questionnaire, however, minor adjustments were made to fit the context better. The difference between the regular and the academic version of the OLBI is that the questions in the academic version are specifically aimed towards students while the regular version is aimed towards working adults. The difference between the momentary, daily, and general OLBI questionnaire is that the momentary version has questions that relate to how the participants feel at the moment of answering (Right now, I….), the daily version relates to how the participant experienced his workday

today (Today, I….) and the general version relates to the general state of the participants (I always find…).

These questionnaires are translated in Dutch, with two example questions from the academic general OLBI questionnaire being: “Het gebeurt steeds vaker dat ik me afstandelijk over mijn studie uitlaat” or “De studiedruk is heel goed te verdragen”. Two example questions from the Dutch momentary OLBI questionnaire being “Op dit moment, voel ik me vermoeid” and “Op dit moment, voel ik mij emotioneel uitgeput”. And similarly two example questions of the daily OLBI questionnaire being “Vandaag, heb ik mij afstandelijk over mijn studie uitgelaten” and “Vandaag had ik het helemaal gehad met mijn studie”. The general OLBI questionnaire has an answer range from 1 to 4 with 1 being “Totally Agree” and 4 being “Totally Disagree”. While the momentary and daily OLBI questionnaires have an answer range from 1 to 7, with 1 meaning ”Totally Agree” and 7 meaning ”Totally Disagree”.

Reliability of disengagement and exhaustion scales

The verify the reliability of exhaustion & disengagement scales used in all the different OLBI versions four exhaustion items (Exh1, Exh2, Exh4, and Eh6) and four disengagement items (Dis2, Dis3, Dis5, and Dis 6) had to be reverse coded before the Cronbach’s alpha could be calculated. The results of the reliability analysis for the Momentary OLBI are that the exhaustion scale has a Cronbach’s alpha of 0.923 and the disengagement scale has a Cronbach’s alpha of 0.822. The results for the Daily OLBI are that the exhaustion scale has a Cronbach’s alpha of 0.895 and disengagement scale has a Cronbach’s alpha of 0.835 and the results for the General OLBI are that the exhaustion scale has a Cronbach’s alpha of 0.826 and disengagement scale has a Cronbach’s alpha of 0.753. This means that the internal consistency of all Momentary and Daily OLBI questions was good to excellent and that the internal consistency of the General OLBI questions was “good” on the exhaustion scale while only being “acceptable” on the disengagement scale.

Within-workday breaks and Smartphone usage

Besides the OLBI questionnaires, four other relevant questions were asked during this study. Three questions to determine how often participants took a within-workday break to distance themselves cognitively, physically, or emotionally from their work/study and one question to measure the smartphone usage of the participants. The three within-workday break questions are based on the DISC-R model but have been slightly adjusted to fit the context of on-job recovery (DISC-R Version NL: Jonge, Sonnentag & Spoor, 2011), An example question is “Hoe vaak heeft u vandaag tijdens uw werk een pauze genomen om de gedachten over uw werk van u af te schuiven?”. The answer range of these three questions is from 0 to 4, with 0 being “Never” and 4 being “Always”. The question related to the smartphone usage of the participant is based on one item from the study by Derks & Bakker (2014). The question “Vandaag maakte ik veel gebruik van mijn smartphone” has an answer range from 1 to 5 with 1 being “Strongly Disagree” and 5 being “Strongly Agree”

Statistical Analyses

Before testing the hypotheses, first, the dataset in this study had to be cleaned up, participants who filled in less than two questionnaires during the study were excluded from the dataset as well as any duplicate answers due to exporting/importing complications. In this study, missing data were treated with casewise deletion to maximize all data available and increase power in the analyses. Furthermore, a short descriptive analysis was conducted to explore the differences between employees and students.

Before testing the hypotheses a multilevel analysis was conducted to determine if it would be useful to look at the momentary burnout changes throughout the workday. To accurately measure the changes of momentary burnout throughout the day, the variable moment is essential in all the analyses. Moments in this study are treated as semi-random, there is a total of 7 moments throughout a workday and each of those has a range of one hour for the participants to fill it in. To decide whether the variable moments should be treated as a continuous or categorical variable in the models, an ANOVA test was conducted to compare the models and choose the best fitting model.

To test hypotheses 1,2 and 3, three separate conditional growth models were conducted to test if changes in momentary burnout were influenced by breaks, workload or smartphone usage. For hypothesis 1, a conditional growth model with cognitive, emotional and physical breaks as a predictor of changes in momentary burnout was conducted. For hypothesis 2, a conditional growth model with daily workload as the predictor of changes in momentary burnout was conducted and lastly to test hypothesis 3, a conditional growth model with smartphone usage as the predictor of changes in momentary burnout was conducted.

To test hypotheses 4 and 5, conditional moderator analyses were conducted these moderator analyses include both the two-way and three-way interactions. For hypothesis 4, the three-way interaction between smartphone usage, moments and breaks as well as the two-way interaction between moments and breaks, smartphone usage and moments and smartphone usage and breaks was tested. For hypothesis 5, the three-way interaction between breaks, moments and workload as well as the two-way interaction between moment and workload, breaks and moment and breaks and workload was tested.

For the exploratory analysis, it would be interesting to see how the different variables used in this study relate to the average momentary burnout of participants as well. To test this a multiple regression analysis will be conducted with momentary burnout as the dependent variable. As independent variables daily workload, smartphone usage, age, gender, country, cognitive breaks, emotional breaks and physical breaks will be used. Furthermore, the moderation Process by Hayes (2016) will be conducted in SPSS to test if breaks moderates the relationship between average momentary burnout and workload. And to test if smartphone usage moderates the relationship between average momentary burnout and breaks.

Results

Differences between Employees and Students

Before testing the hypotheses, some descriptive statistics of the dataset and the differences between students and employees were examined. Overall, students score higher on all measurements than the average employee does. As can been seen in table 2, Students score higher on momentary burnout (M= 3.65, SD = 1.07) than employees (M = 3.06, SD = 0.95). To test if the means of students and employees significantly differ from each other independent-samples T-Test will be conducted to check this. The results from the T-test shows that the means of momentary burnout for students is significantly higher than those from employees (t(833) = -8.29, p=.024) with a difference of -.59 (95% CI, -.73 to -.45). Furthermore, the descriptive analysis showed that students take on average more within-workday breaks (M = 2.65, SD= 0.69) than employees (M = 2.09, SD = 0.72). However, the results from the T-test show that the means do not significantly differ from each other (t(834) = -10.925, p=.453).

Table 2: *Means, standard deviations for employees and students*

Measure	Total		Employees		Students	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
1. Age	29.65	11.50	33.91	12.71	22.67	2.38
2. Gender (Male = 0, Female = 1)	0.51	0.50	0.48	0.50	0.56	0.50
3. Country (Netherlands = 1, Guatemala =2)	1.24	0.43	1.35	0.48	1.06	0.24
4. Disengagement	2.33	0.47	2.24	0.57	2.48	0.45
5. Exhaustion	2.46	0.49	2.31	0.48	2.69	0.42
6. General Burnout	2.39	0.41	2.28	0.41	2.58	0.35
7. Daily Disengagement	3.47	1.09	3.25	1.00	3.83	1.13
8. Daily Exhaustion	3.10	1.17	2.79	1.05	3.60	1.17
9. Daily Burnout	3.29	1.00	3.02	0.88	3.72	1.03
10. Momentary Disengagement	3.50	1.11	3.33	1.05	3.78	1.16
11. Momentary Exhaustion	3.07	1.25	2.79	1.15	3.53	1.26
12. Momentary Burnout	3.28	1.04	3.06	0.95	3.65	1.07
13. Number of Within-workday breaks	2.30	0.76	2.09	0.72	2.65	0.69
14. Emotional breaks	2.10	0.96	1.86	0.91	2.49	0.91
15. Physical breaks	2.02	1.03	1.91	0.95	2.21	1.13
16. Cognitive breaks	2.79	0.97	2.52	0.93	3.24	0.86
17. Daily Demand	3.63	1.57	3.64	1.63	3.62	1.45
18. Smartphone Usage	2.43	1.11	2.50	1.10	2.32	1.12

Note. N_{total} = 835 answers, $N_{employees}$ = 519 Employees answers, $N_{students}$ =316 Students answers

Furthermore, as can be seen in table 3, there are many different working sectors besides Students (36%). These work sectors are Business Services (11.8%), Industrial Sector (9.3%), Healthcare Sector (8.1%), Financial Sector (6.8%), Trade Sector (5.6%), Communication and Journalism Sector (5.6%), Educational Sector (4.3%), Governmental Sector (4.3%), Agricultural Sector (3.1%), Construction Industry (1.9%), Arts and Culture Sector (0.6%) and other work sectors (2.5%).

Table 3: *Distribution of Participant's Work sectors*

	Frequency	Percent
Agricultural sector	5	3.1
Communication and Journalism sector	9	5.6
Construction Industry	3	1.9
Arts and Culture Sector	1	0.6

	Financial Sector	11	6.8
	Healthcare Sector	13	8.1
	Trade Sector	9	5.6
	Industrial Sector	15	9.3
	Educational Sector	7	4.3
	Government Sector	7	4.3
	Business Services	19	11.8
	Other Work sector	4	2.5
	Students	58	36.0
	Total	161	100.0

Note: Participants filled in the sector/industry to which their current job would apply most.

In further analysis, no distinction has been made between students and employees. While it is true that there is a significant difference between employees and students in momentary burnout. The results showed that there is no significant difference between how often employees take breaks and how often students take breaks. Further analysis is done by considering employees and students as part of the same population (participants) the reason for this is that all further analyses take breaks into account.

Multilevel Analysis

To test all the hypotheses a multilevel analysis on momentary burnout was conducted. This multi-level analysis is used to look at the change of burnout over time and to see if the change of momentary burnout over time is influenced by smartphone usage and breaks. Before starting with the multi-level analysis, a null model with participants on the group level was conducted to check the variance amongst participants. Results indicate an ICC of 0.76 meaning that 76% of the variance can be explained between the participants and 24% of the variance can be explained on a lower level. This allowed for a multi-level analysis as variance can be explained on both the 2nd (group) level and 1st (individual) level.

To see how momentary burnout changes during a workday an unconditional model was performed. In this model, momentary burnout was used as the dependent variable and moment was used as the fixed predictor on the individual level, participants were used as the group-level with a random intercept. The results showed that momentary burnout levels increased slowly for later moments during the workday (B = .08, se = .01, $t(683)$= 8.91, p <.001). A visualisation of the means and distribution of all seven moments throughout the workday is given in figure 2.

Next an unconditional growth model was conducted in order to check if including the random slopes of moments per participants adds more variance to the model. Results show an ICC value of 0.86, meaning that including a random slope of moments does explain more variance. Furthermore, to check if the means of the 7 moments throughout the workday significantly differ from each other the same model was conducted again. However instead of moments being treated as a continuous variable, moments were treated as a categorical variable in order to test this. The results show that only a few moments significantly differ from each other, moments early on the workday only differ significantly with moments at the end of the workday. Moment 1 significantly differs with moment 5 (B = -.26, se = .07, $t(440)$= -3.59, p =.007), moment 6 (B = -.29, se = .08, $t(299)$= -3.66, p =.006) and moment 7(B = -.38, se = .09, $t(217)$= -4.45, p <.001). Moment 2 significantly differs with moment 4 (B = -.21, se = .06, $t(677)$= -3.56, p =.007), moment 5(B = -.32, se = .07, $t(595)$= -4.89, p <.001), moment

6 (*B* = -.34, se = .07, *t(*405*)*= -4.89, *p* <.001) and moment 7 ((*B* = -.44, se = .08, *t(*271*)*= -5.67, *p* <.001). Moment 3 significantly differs from moment 5(*B* = -.21, se = .06, *t(*674*)*= -3.40 *p* =.013), moment 6 (*B* = -.23, se = .07, *t(*602*)*= -3.59 *p* =.007) and moment 7 (*B* = -.33, se = .07, *t(*402*)*= -4.64, *p* <.001) and lastly, moment 4 significantly differs from moment 7 (*B* = -.23, se = .06, *t(*558*)*= -3.57 *p* =.007). An ANOVA test was conducted to check whether moments should be treated as a continuous variable or as a categorical variable in further analysis. The results indicate that the model that treats moments as a continuous variable is significant (*p* <.001), while the model that treats moments as a categorical variable is not significant (*p* = .338). Because of this, in the upcoming analyses the moments throughout the day were considered to be a continuous variable instead of a categorical variable.

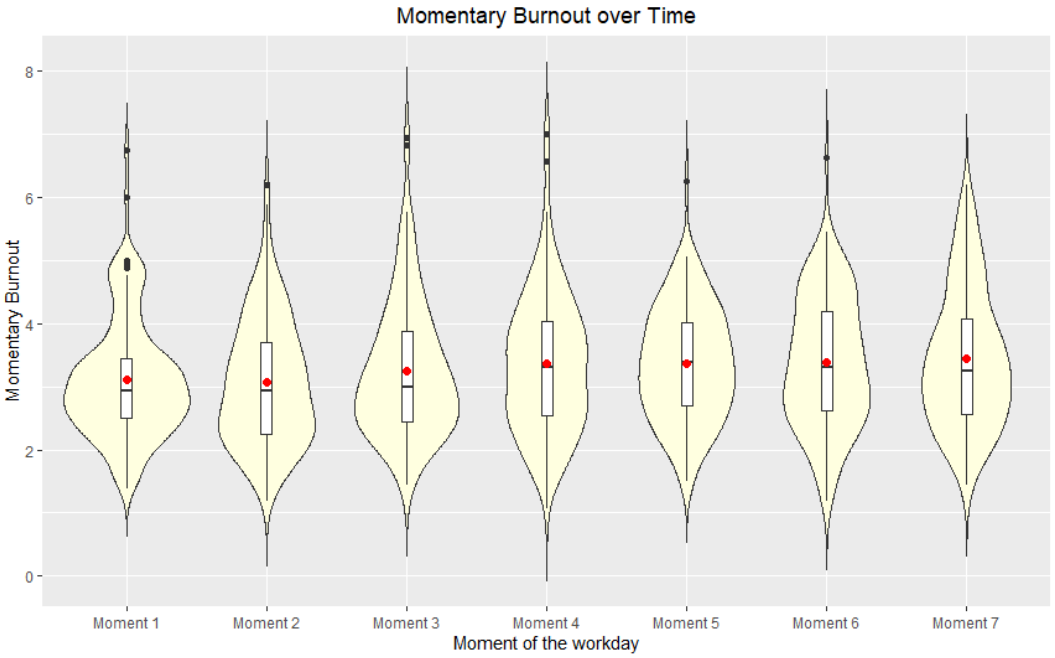

Figure 2: The average momentary burnout levels of all students and employees over time.

Breaks as a predictor of changes in momentary burnout

To test hypothesis 1, and analyse whether cognitive breaks, emotional breaks and physical breaks influence the changes in momentary burnout three separate conditional growth models were conducted. All the models used as the dependent variable momentary burnout, with participants on a group level and both the intercept and the slopes of moments per participant being treated as random. Predictors of the model included all types of breaks (Cognitive, Physical and Emotional), the only thing that differs between the three conditional growth models is the two-interaction between moments and either cognitive, emotional or physical breaks.

The first conditional growth model, tested if cognitive breaks affect the changes of momentary burnout throughout the day and for this, the two-way interaction between cognitive breaks and moments was being tested. The results showed that the two-way interaction between cognitive breaks and moments is not significant (*B* = .01, *se* = .01, *t(*154.2*)*= .56, *p* =.579), indicating that cognitive breaks do not affect the changes of momentary burnout throughout the day. Furthermore, as a predictor of momentary burnout the relationship between cognitive breaks and momentary burnout is significant (*B* = .22, *se* = .10, *t(*170.8*)*= 2.27, *p* =.025).

The second conditional growth model, tested if emotional breaks affect the changes of momentary burnout throughout the day and for this, the two-way interaction between emotional breaks and

moments was being tested. The results showed that the two-way interaction between emotional breaks and moments is not significant (*B* = -.00, *se* = .01, *t(*139.9*)*= -.22, *p* =.823), indicating that emotional breaks do not affect the changes of momentary burnout throughout the day. Furthermore, as a predictor of momentary burnout the relationship between emotional breaks and momentary burnout is not significant (*B* = -.02, *se* = .10, *t(*159.3*)*= -.20, *p* =.840).

The third conditional growth model, tested if physical breaks affect the changes of momentary burnout throughout the day and for this, the two-way interaction between physical breaks and moments was being tested. The results showed that the two-way interaction between physical breaks and moments is not significant (*B* = .00, *se* = .01, *t(*142.8*)*= .37, *p* =.710), indicating that physical breaks do not affect the changes of momentary burnout throughout the day. Furthermore, as a predictor of momentary burnout the relationship between physical breaks and momentary burnout is not significant (*B* = .13, *se* = .09, *t(*166.9*)*= 1.42, *p* =.157).

Results from the three conditional growth models showed that cognitive, emotional and physical breaks do not affect the changes of momentary burnout throughout the workday. This means that no support has been found for hypothesis 1.

Daily workload as a predictor of changes in momentary burnout

To test hypothesis 2, and analyse if the daily workload influences the changes in momentary burnout throughout the workday a conditional growth model was conducted. In this model, the dependent variable was momentary burnout, with participants on a group level and both the intercept and the slopes of moments per participant being treated as random. The independent variables used in this model are Daily Workload and moments, the purpose of this analysis is the test the two-way interaction between daily workload and moments and see how daily workload affects the changes of momentary burnout throughout the workday. The results of the analysis showed that the two-way interaction between daily workload and moments is not significant (*B* = .00, *se* = .01, *t(*153.7*)*= .34, *p* =.735), indicating that for different moments of the day daily workload does not affect the changes in momentary burnout levels. Furthermore, as a predictor of momentary burnout, the relationship between daily workload and momentary burnout is not significant (*B* = -.03, *se* = .04, *t(*158.5*)*= -.78, *p* =.434). This means that no support has been found for hypothesis 2.

Smartphone usage as a predictor of changes in momentary burnout

To test hypothesis 3, and analyse if smartphone usage influences the changes in momentary burnout throughout the workday a conditional growth model was conducted. In this model, momentary burnout was used as the dependent variable, with participants on a group level and both the intercept and the slopes of moments per participant being treated as random. As the predictor of momentary burnout, two-way interaction between smartphone usage and moments was tested to see how smartphone usage affects changes of momentary burnout during the workday. The results showed that the two-way interaction between smartphone usage and moments is not significant (*B* = -.01, *se* = .01, *t(*154.4*)*= -.94, *p* =.351), meaning that for different moments on the day smartphone usage does not affect the change in momentary burnout. Furthermore, as a predictor of momentary burnout, the relationship between smartphone usage and momentary burnout is not significant as well (*B* = -.04, *se* = .08, *t(*155.6*)*= -.51, *p* =.614). This means that no support has been found for hypothesis 3.

Conditional model: three way interaction with smartphone usage as moderator

To test hypothesis 4 and analyse if smartphone usage could serve as a moderator between cognitive, emotional, or physical breaks and changes in momentary burnout three separate moderator analyses

were conducted. For every moderator analysis, the same initial model was used, with the same predictors, however, only the two-way interactions and three-way interaction differ slightly. In this model momentary burnout is the dependent variable and the independent variables were cognitive breaks, emotional breaks, physical breaks, smartphone usage and the moments throughout the workday. The first moderator analysis examined the moderating effect of smartphone usage on the relationship between cognitive breaks and changes in momentary burnout. To test this the three-way interaction between smartphone usage, moments and cognitive breaks was analysed. The results from the analysis showed that smartphone usage did not moderate the relationship between cognitive breaks and changes in momentary burnout (*B* = .01, *se* = .01, *t*(150.1)= 1.01, *p* = .313, Δ*r*2 = .11%).

The second moderator analysis examined the moderating effect of smartphone usage on the relationship between emotional breaks and changes in momentary burnout. To test this the three-way interaction between smartphone usage, moments and emotional breaks was analysed. The results from the analysis showed that smartphone usage did not moderate the relationship between emotional breaks and changes in momentary burnout (*B* = -.00, *se* = .01, *t*(133.7)= -.13, *p* = .896, Δ*r*2 = .09

The third moderator examined the moderating effect of smartphone usage on the relationship between physical breaks and changes in momentary burnout. To test this the three-way interaction between smartphone usage, moments and physical breaks was analysed. The results from the analysis showed that smartphone usage moderated the relationship between physical breaks and changes in momentary burnout (*B* = .02, *se* = .01, *t*(142)= 2.02, *p* = .046, Δ*r*2 = .02%). Furthermore, a simple slope analysis was conducted to explore the significance of the slopes during different moments of the day. The results showed that early on the day (moment is - 1SD) and for low levels of smartphone usage (-1SD), physical breaks has a significant slope with momentary burnout (*B* = .25, *se* = .11, *t*(142)= 2.28, *p* = .024) and for high levels of smartphone usage (+1SD) the slope of physical breaks was not significant related to momentary burnout (*B* = .04, *se* = .10, *t*(142)= .37, *p* = .715). Moreover, at later moments of the day (moment is +1SD) and for low levels of smartphone usage (-1SD), physical breaks has a non-significant slope with momentary burnout (*B* = .16, *se* = .12, *t*(142)= 1.38, *p* = .170) and for high levels of smartphone usage (+1SD) the slope of physical breaks was also not significantly related to momentary burnout (*B* = .14, *se* = .11, *t*(142)= 1.29, *p* = .198).

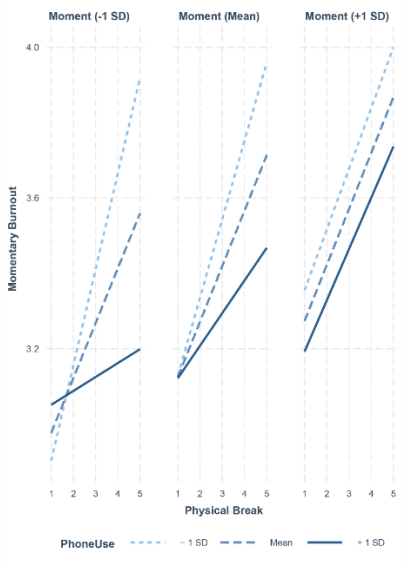

Figure 3: Three-way interaction of the moderator Smartphone usage on the relationship between physical breaks and changes in momentary burnout

Results from the three moderator analyses showed that smartphone usage only moderated the relationship between physical breaks and changes in momentary and did not moderate the relationship between cognitive breaks and changes in momentary burnout or the relationship between emotional breaks and changes in momentary burnout. This means there is only partial support found for hypothesis 4.

Conditional model: three way interaction with cognitive, emotional and physical breaks as moderator

To test hypothesis 5 and analyse if cognitive breaks, emotional breaks or physical breaks could serve as a moderator between daily workload and changes in momentary burnout three separate moderator analyses were conducted. The model used in three moderator analyses all had the same initial model with momentary burnout as the dependent variable and as independent variables breaks, daily workload and the moments throughout the workday. The three moderator analyses differ slightly from each other by looking at different two-way and three-way interactions of breaks.

The first moderator analysis examined the moderating effect of cognitive breaks on the relationship between daily workload and changes in momentary burnout. To test this the three-way interaction between cognitive breaks, moments throughout the day and the daily workload was analysed. The results from the moderator analysis showed that cognitive breaks moderate the relationship between daily workload and changes in momentary burnout (*B* = .02, *se* = .01, *t*(140.9)= 3.28, *p* = .001). Furthermore, a simple slope analysis was conducted to explore the significance of the slopes during different moments of the day. The results showed that early on the day (moment is - 1SD) and for low levels of cognitive breaks (-1SD), daily workload has an non-significant slope with momentary burnout (*B* = .05, *se* = .05, *t*(140.9)= 1.03, *p* = .305) and for high levels of cognitive breaks (+1SD) the slope of daily workload was also not significantly related to momentary burnout (*B* = .02, *se* = .04, *t*(140.9)= .46, *p* = .644). Moreover, at later moments of the day (moment is +1SD) and for low levels of cognitive breaks (-1SD), daily workload has an non-significant slope with momentary burnout (*B* = -.02, *se* = .05, *t*(140.9)= -.31, *p* = .760) and for high levels of cognitive breaks (+1SD) the slope daily workload was not significantly related to momentary burnout (*B* = .08, *se* = .04, *t*(140.9)= 1.97, *p* = .050).

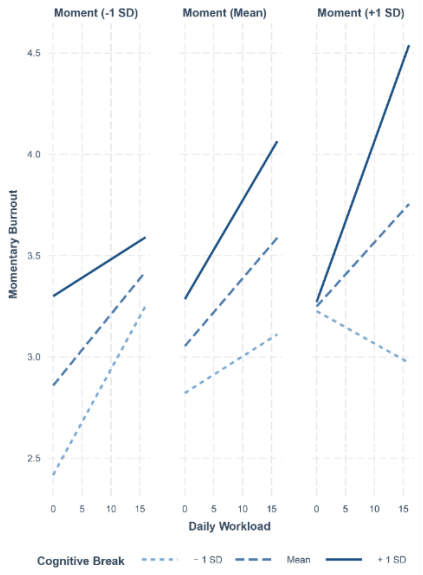

Figure 4: Three-way interaction of the moderator cognitive breaks on the relationship between daily workload and changes in momentary burnout

The second moderator analysis examined the moderating effect of emotional breaks on the relationship between daily workload and changes in momentary burnout. To test this a three-way interaction between emotional breaks, moments throughout the day and the daily workload was analysed. The results from the moderator analysis showed that emotional breaks did not moderate the relationship between daily workload and changes in momentary burnout (*B* = .01, *se* = .00, *t*(130)= 1.38, *p* = .171).

The third moderator analysis examined the moderating effect of physical breaks on the relationship between daily workload and changes in momentary burnout. To test this a three-way interaction between physical breaks, moments throughout the day and the daily workload was analysed. The results from the moderator analysis showed that the moderating effects of physical breaks on the relationship between daily workload and changes in momentary burnout are marginally significant (*B* = .01, *se* = .00, *t*(136.7)= 1.76, *p* = .080). Furthermore, a simple slope analysis was conducted to explore the significance of the slopes during different moments of the day. The results showed that early on the day (moment is - 1SD) and for low levels of physical breaks (-1SD), daily workload has an non-significant slope with momentary burnout (*B* = -.01, *se* = .05, *t*(136.7)= -.15, *p* = .885) and for high levels of physical breaks (+1SD) the slope of daily workload was also not significantly related to momentary burnout (*B* = -.01, *se* = .04, *t*(136.7)= -.36, *p* = .719). Moreover, at later moments of the day (moment is +1SD) and for low levels of physical breaks (-1SD), daily workload has an non-significant slope with momentary burnout (*B* = -.04, *se* = .05, *t*(136.7)= -.82, *p* = .416) and for high levels of physical breaks (+1SD) the slope daily workload was also not significantly related to momentary burnout (*B* = .02, *se* = .04, *t*(136.7)= .45, *p* = .656).

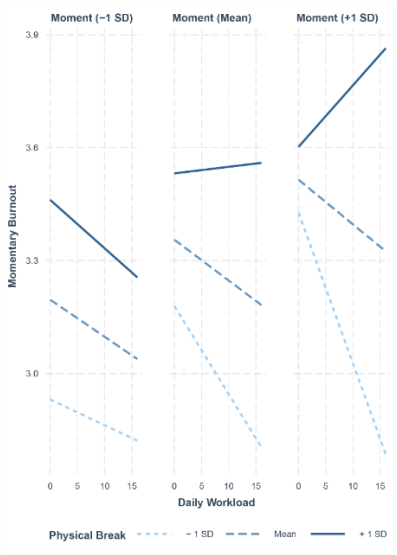

Figure 5: Three-way interaction of the moderator physical breaks on the relationship between daily workload and changes in momentary burnout

The results from the three moderator analyses showed that both cognitive breaks and physical breaks moderate the relationship between daily workload and changes in momentary burnout.

However, emotional breaks do not moderate the relationship between daily workload and changes in momentary burnout. This means that there is only partial support for hypothesis 5.

Exploratory Results

Predictors of average momentary burnout

For the exploratory results, the relationship between the variables used in this study and the average momentary burnout of the participants was examined. To test this a multiple linear regression analysis was conducted. Furthermore, the moderating effect of breaks on the relationship between workload and average momentary burnout was explored. As well as the moderating effect of smartphone usage on the relationship between breaks and average momentary burnout was explored. The model used in the multiple linear regression analysis had average momentary burnout as the dependent variable and as independent variables workload, cognitive breaks, emotional breaks, physical breaks and smartphone usage were picked. Furthermore, the model controlled for the demographics of the participants (age, gender and country).
The results of the multiple linear regression showed that cognitive breaks are positively related to average momentary burnout (B = .21, p < .001) and also that physical breaks is positively related to average momentary burnout (B = .23, p < .001). However, emotional breaks showed an insignificant relationship with average momentary burnout (B -.03, p = .372). Furthermore, the daily workload is positively related to average momentary burnout (B = .11, p < .001) and lastly, smartphone usage is marginally significantly related to average momentary burnout (B -.05, p = .075).

Moderating effect of smartphone usage

For the moderator smartphone usage, three separate moderator analyses were conducted to examine the moderator effect of smartphone usage on the relationship between breaks and average momentary burnout. In all three moderator analyses, average momentary burnout was the dependent variable and as independent variable smartphone use, cognitive breaks, emotional breaks and physical breaks. The three moderator analyses differ slightly from each other, by testing a different interaction term between smartphone usage on the relationship between breaks (cognitive, emotional or physical breaks) and average momentary burnout.

For the first moderator analysis, the moderating effect of smartphone usage on the relationship between cognitive break and momentary burnout were examined. The results showed that Smartphone usage did not moderate the relationship between cognitive breaks and average momentary burnout (B = .02, se = .03, $t(831)$= .65, p = .514, $\Delta r2$ = -.05 %).

For the second moderator analysis, the moderating effects of smartphone usage on the relationship between emotional breaks and average momentary burnout were examined. The results showed that Smartphone usage did not moderate the relationship between emotional breaks and average momentary burnout (B = .04, se = .03, $t(831)$= 1.25, p = .211, $\Delta r2$ = .06 %).

For the third moderator analysis, the moderating effects of smartphone usage on the relationship between physical breaks and average momentary burnout were examined. The results showed that smartphone usage did not moderate the relationship between physical breaks and average momentary burnout (B = -.01, se = .03, $t(831)$= -.21, p = .833, $\Delta r2$ = -.09 %).

Moderating effect of cognitive, emotional and physical breaks

For the moderator breaks, again three separate moderator analyses were conducted to examine the moderator moderating effects of breaks on the relationship between daily workload and average momentary burnout. In all three moderator analyses, average momentary burnout was the

dependent variable and as independent variable cognitive breaks, emotional breaks, physical breaks and daily workload. The three moderator analyses differ slightly from each other by testing a different interaction term between breaks (cognitive, emotional or physical breaks) on the relationship between daily workload and average momentary burnout.

For the first moderator analysis, the moderating effects of cognitive breaks on the relationship between daily workload and average momentary burnout was examined. The results showed that cognitive breaks did not moderate the relationship between daily workload and average momentary burnout (*B* = .01, se = .01, *t(*831*)*= .37, *p* = .712, Δ*r*2 = -.08 %).

For the second moderator analysis, the moderating effects of emotional break on the relationship between daily workload and average momentary burnout was examined. The results showed that emotional breaks moderated the relationship between daily workload and average momentary burnout (*B* = .03, se = .01, *t(*831*)*= 2.24, *p* =.025, Δ*r*2 = .37 %). Furthermore, the results of the simple slope analysis in figure 6, showed that for low levels of emotional breaks (-1SD), daily workload was related to average momentary burnout (*B* = 0.07, se = .03, *t(*831*)*= 2.62, *p*=.009). and for high levels of emotional breaks(+1SD) daily workload was also related to average momentary burnout (*B* = 0.13, se = .02, *t(*831*)*= 7.18, *p* <.001).

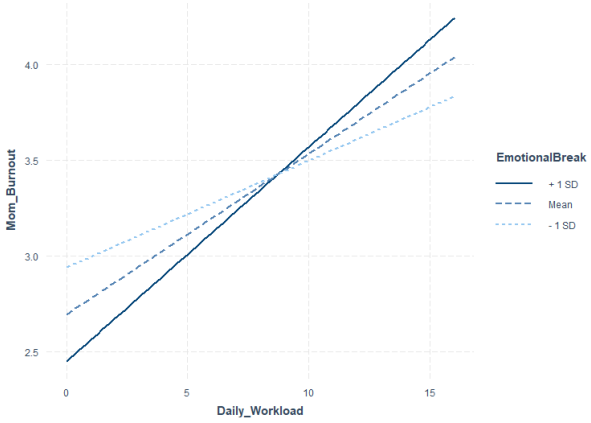

Figure 6: Moderating effect of Emotional breaks on the relationship between Daily Workload and average momentary burnout

For the third moderator analysis, the moderating effects of physical break on the relationship between daily workload and average momentary burnout was examined. The results showed that physical breaks did not moderate the relationship between daily workload and momentary burnout (*B* = -.01, se = .01, *t(*831*)*= -.61, *p* =.544, Δr^2 = -.06 %).

Scientific Discussion

Cognitive, Physical and Emotional Breaks

The results from the analyses show that there was no support for hypothesis 1. Cognitive, emotional and physical breaks do not influence the change in momentary burnout throughout the workday. This is contrary to what is expected in hypothesis 1, as having more breaks should lead to more resource recovery and lower levels of momentary burnout. Work demands require people to use cognitive, physical and emotional resources (Hunter & Wu, 2016). For example, cognitive and physical activities such as exercises, class homework or running an errand require the use of

resources (Hunter & Wu, 2016). Emotional activities are a self-regulatory resource and emotion regulation is necessary to perform one's work well, especially when it involves interactions with other people (Kim, Park & Headrick, 2018). Furthermore, the effort-recovery model from Meijman and Mulder (1998), highlights that taking timely respites is important to recover the diminished self-regulatory resources and allows their functional systems (Emotional and Cognitive) to recuperate from load reaction of continuous working such as fatigue. To recover the diminished resources used during work people need to take breaks.

However, the most likely reason why cognitive, emotional and emotional breaks seem to be unrelated to changes in momentary burnout is that no resource-recovery occurred during the within-workday breaks in this study. Even when a person has a break with the intent to recover their diminished resources, resource depletion could still occur during a break if employees are engaging in regulatory actions (e.g. chores) or are engaging in a behaviour that one does not want to engage in (such as talking to colleagues). Furthermore, employees are inhibited to engage in their preferred behaviour resource recovery cannot take place as well (Trougakos et al., 2008; Kim, Park & Headrick, 2018; Trougakos & Hideg, 2009). To conclude, no resource recovery takes place if the break conditions are not sufficient, and when no resource recovery takes place during a break it is not strange that the changes in momentary burnout are not influenced by cognitive, emotional or physical breaks at all.

Daily workload

The results from the analyses show that there was no support for hypothesis 2. Daily workload does not affect the changes in momentary burnout. This might seem like a strange result, as you would expect people with a high level of daily workload to have a larger change in momentary burnout than people who have a low level of workload. Findings in the literature mention that longer working hours can lead to stressors that negatively affect psychological wellbeing (Greenglas et al., 2001) and that a high workload will eventually lead to more burnout complaints (Hu et al., 2016).

When people are at low risk of burnout they are not in immediate danger of developing burnout symptoms when their workload is temporarily increased (Oerlemans & Bakker, 2014). Only when people are at a high risk of burnout and their workload is increased, then a decline in people their recovery abilities can be observed (Oerlemans & Bakker, 2014). The reason why people with a high level of burnout have decreased recovery ability is that people who are at a high risk of burnout already feel chronically exhausted and disengaged with their work (Demerouti, Mostert & Bakker, 2010).

A possible reason why daily workload does not seem to affect the changes in momentary burnout is that the participants in this study could be at low risk of burnout. When looking at table 2, the average momentary burnout of all the participants in this study has a score of (M = 3.28, SD = 1.06). According to Delgadillo et al (2018), this is classified as a low OLBI burnout score. Furthermore, because the study only took place during one workday it is not possible to determine whether the workload of the participants is temporary high or if this is something that occurs over a prolonged period. This is important to know because temporary increasing/decreasing the workload for people who are at low risk of burnout does not result in higher/lower momentary burnout levels and it could explain the results from the analyses.

Breaks as a moderator on the relationship between workload and momentary burnout

The results from the moderator analyses of breaks on the relationship between workload and momentary burnout show that there was only partial support for hypothesis 5. Initially, it was expected that cognitive, emotional and physical breaks would help employees to detach themselves

from work and by not engaging in any work-related activities during the break, recovery could happen, resulting in a lower perceived workload and leading to a lower momentary burnout at the end of the workday. The reason for this is because during a break people are can stop draining any resources from their cognitive, emotional or physical systems. Cognitive systems affect reasoning and decision making, emotional systems affect emotions and physical systems affect the human body. During work people use their cognitive, emotional and physical systems all the time, however, every person only has a limited amount of resources available during a workday. When people do not strain their cognitive, emotional or physical systems during a break, people can recover some of their diminished personal resources (Trougakos & Hideg, 2009; Hunter & Wu, 2016). When more breaks happen during the day, more personal resources would become available for the remainder of the workday. It is then expected that employees could handle the remaining job demands (workload) a lot better and have a lower momentary burnout at the end of the workday compared to when people only take a few breaks (Demerouti et al., 2001ab).

However, the results from the moderator analyses show the opposite for both cognitive and physical breaks. They do moderate the relationship between daily workload and momentary burnout. However, this is not a decrease as initially expected but it is an increase. This means the more cognitive and physical breaks a person takes, the higher the change in momentary burnout. Meaning that people who take a lot of cognitive or physical breaks have a higher momentary burnout level at the end of the day compared to people who take only a few cognitive or physical breaks.

A possible explanation for this could be because the break conditions are insufficient for cognitive and physical breaks to recover any diminished resources (Trougakos et al., 2008; Kim, Park & Headrick, 2018; Trougakos & Hideg, 2009). What is likely to happen in such a situation is that both cognitive and physical breaks instead add more workload for people. The reason is that when no personal resources are recovered during the breaks, the job resources of employees stay the same before and after the break. However, job demands increase instead because there is now less time for employees to do their work. Meaning that if no recovery takes place during the breaks, the job demand of employees increases when more breaks are taken. Higher job demand while job resources stay the same will result in higher momentary burnout at the end of the workday and it could explain why cognitive and physical breaks result in higher levels of momentary burnout at the end of the workday. (Demerouti et al., 2001ab).

Smartphone usage

The results from the analyses show that there was no support for hypothesis 3. Smartphone usage does not affect changes in momentary burnout. At first, it was expected that people preferred to use their smartphones during breaks and help them to detach themselves from work by relaxing, socializing or entertaining themselves on their phone (Lowry, Gasking & Moody, 2015). By doing so, the more people used their smartphones the more resource-recovery would take place and this would lower the changes in momentary burnout for later moments on the day compared to people who barely used their smartphones. However, from the results, we cannot conclude that participants who used their smartphones more intensively have a lower change in momentary burnout than participants who used their phones barely.

A possible reason why smartphone usage appears unrelated to changes in momentary burnout is that how often people use their phones is not a good measurement for smartphone usage. In this study smartphone usage is measured with one item from the study by Derks and Bakker (2014), this item measures the frequency of smartphone usage during a workday. However, there are many latent factors of smartphone usage that are involved as well when using your phone more often. For

example, how smartphone usage affects work, how smartphone usage affects sleep/tiredness or how smartphone usage affects your state of mind and all these factors change depending on how often someone uses their smartphone.

Moreover, smartphone usage does not only have positive sides such as being more relaxed and entertaining oneself but there are also negative sides(Lowry, Gasking & Moody, 2015). For example, when management/work ask employees to use their smartphones for work, frequent smartphone usage takes away the freedom of the employees and even results in less time for employees to do things for themselves on their smartphones. Furthermore, it will be more difficult to separate work and private time and also makes detaching themselves from work more difficult (Jarvenpaa & Lang, 2005). All those different aspects of smartphone usage are currently not taking into account in this study, however, they do influence the results of the study. A more elaborate way of measuring smartphone usage is looking at the Smartphone Addiction Scale(SAS). Smartphone addiction is a much broader concept than only how frequent a smartphone is used throughout a workday. This concept also relates to how smartphone usage affects someone's personal life, how it impacts their work, the degree of relaxation and enjoyment and other social aspects (Kwom et al., 2013). To conclude, the reason why no relationship has been found between smartphone usage and changes in momentary burnout is that latent factors are involved with how often people use their phones, and it is important to include more aspects of smartphone usage to get a better understanding of how smartphone usage influences changes in momentary burnout.

Smartphone usage as a moderator

The results from the moderator analyses of smartphone usage on the relationship between breaks and momentary burnout show that there is only partial support for hypothesis 4. Expected was that when people use their smartphones more often during the break, more resource-recovery would take place during the break. This would then lead to lower levels of momentary burnout compared to people who barely use their smartphones during breaks. According to Wang et al.(2015), people who use their smartphones, do so to entertain themselves and relieve stress. It is expected that within-workday breaks allow people to use their smartphone without restriction and people who use their phone more often during breaks could recover more personal resources (Trougakos et al., 2008; Kim, Park & Headrick, 2018; Trougakos & Hideg, 2009).

However, the results showed that smartphone usage only moderated the relationship between physical breaks and changes in momentary burnout. Furthermore, this moderating effect was not negative as previously expected but instead, it was slightly positive. Meaning that people who used their smartphones more often during physical breaks had a higher level of momentary burnout at the end of the workday compared to people who barely used their smartphones during physical breaks.

A possible reason for why smartphone usage did not lower the level of momentary burnout at the end of the workday is most likely because the purpose of using their smartphones during a break was not always relaxation or stress relieving. This is because In this study only the smartphone usage of participants was measured and not what the participants used their smartphones for. This means that instead of relaxing or relieving stress, people could have used their smartphones for work-related activities such as communicating with colleagues, the boss or clients or even to solve issues with family/home (Derks & Bakker, 2014). Furthermore, Intensive smartphone usage has shown to be related to high levels of Work-Home-Interference (WHI), which in turn increases exhaustion and cynicism symptoms (Derks & Bakker, 2014).

To conclude, more smartphone usage during breaks most likely did not result in more relaxation and instead, then it is expected that employees used their smartphones on work-related activities or

perhaps to communicate with home. In both cases, when employees use their smartphones more for these activities then this will lead to an increase in exhaustion. This increase in exhaustion could be the reason why people who use their smartphones more often during breaks have a higher momentary burnout level at the end of the day compared to people who barely use their smartphones during breaks.

Exploratory Discussion

Predictors of average momentary burnout

First of all, the results from the exploratory analyses, show that both cognitive and physical breaks are related to average momentary burnout. People who took a lot of cognitive or physical breaks throughout their workday had a higher average momentary burnout than people who took only a few cognitive or physical breaks. As prior explained one would expect that more breaks would lead to more resource recovery and lower levels of momentary burnout(Hunter & Wu, 2016).

However, a possible reason for why both cognitive and physical breaks are positively related to average momentary burnout could be because the measurements also include the presence of the participant's level of momentary burnout. People who have a high level of momentary burnout, feel more exhausted and disengaged and they require more breaks during a workday to recover than people who have a low level of momentary burnout(Demerouti, Mostert & Bakker, 2010). Moreover, people who have a low level of momentary burnout do not suffer from exhaustion symptoms that often and therefore do not need to take additional breaks to recover (Trougakos & Hideg, 2009). This could explain why people who took more cognitive and physical breaks during a workday have a higher average momentary burnout than people who only took few cognitive and physical breaks during a workday.

Secondly, the results from the exploratory analyses show that daily workload is related to average momentary burnout. Participants who reported a high level of daily workload also reported high levels of average momentary burnout. This is consistent with what is found in other studies about workload, where high levels of workload are associated with more burnout complaints (Hu et al., 2016; Greenglass et al., 2001).

Thirdly, the results from the exploratory analyses show that smartphone usage is related to average momentary burnout. People who used their smartphones more often during the workday had lower levels of average momentary burnout compared to people who barely used their smartphones. However, this finding should be carefully examined as the relationship found in this study is only marginally significant and more research would be needed to test the relationship between smartphone usage and average momentary burnout.

Moderators of average momentary burnout

The results from the exploratory analyses show that emotional breaks moderated the relationship between daily workload and average momentary burnout. For people with the same level of daily workload, the more emotional breaks one took, the higher the average momentary burnout would be. Again this is contrary to what you would expect because people who struggle with emotional issues take a break or respite to recover and continue working afterwards. However, research shows that only people who experience positive emotions during these breaks, can utilize this as a resource and help them to recover (Trougakos & Hideg, 2009).

A possible reason for why this positive moderator effect between daily workload and average momentary burnout exist could be because emotional breaks are often because of negative reasons. People who take an emotional break during work are most likely not doing this to celebrate but

instead, they do this because something bad happened recently in their life and negative feelings will be present. Recovery during a respite or break seems to be more difficult as negative feelings are present and these negative emotions have to be regulated and controlled for this person to continue doing their job (Trougakos et al., 2008; Trougakos & Hideg, 2009). This results in no resource recovery during the emotional breaks and instead, resource-depletion will take place. To conclude, when people have similar levels of daily workload, taking emotional breaks will not help them to recover more personal resources but instead, it will cause resource depletion. Resulting in even higher levels of average momentary burnout.

Differences students and employees

Another finding that is interesting to look at is the differences between students and employees. Currently, all findings are generalized across all work sectors and include a wide range of occupational sectors such as healthcare, industrial sector, financial sector and also students. For a complete overview of the distribution of all work sectors see table 3. The reason why this is interesting to mention is that there are significant differences between students and employees in terms of momentary burnout. The “student work sector”, represents about 36% of the participants in the dataset, compared to 12% for employees in the business services sector as the second-highest work sector. This high percentage of students amongst the participants could make generalizing the results a bit more biased towards students.

The differences between students and employees are not an issue in this dataset. As every person and job is different and has different job demands and job resources. This is especially true for students and employees. However, there are also differences between employees in different work sectors. a comparison of exhaustion amongst university students with that of other high-exhaustion sectors showed that students score significantly higher than most other occupations and are comparable with the public accounting sector during a busy season (Law, 2007). A possible reason why students are more exhausted and disengaged with their work(study) than the average employee in this study is because of the different job demands. Students are continually subject to assignments, deadlines, long hours during the day and even all-nighters to study for exams (Law, 2007).

Limitations

This study aimed to have a focused scope on how on-job recovery (cognitive, emotional and physical breaks) and changes in momentary burnout affect each other. By focusing mainly on momentary burnout and on-job recovery, this particular study design also has some limitations. The first limitation in this study is that only a portion of the relationship between the amount of within-workday breaks and momentary burnout can be addressed. In the current study setup, there is no information on when the within-workday breaks took place during the day and therefore it is impossible to see if the momentary burnout increased or decreased due to having a break or if latent factors played a role in the decrease/increase of momentary burnout. Moreover, by not including the time of the within-workday breaks a second limitation also emerged: Not being able to test the mediating effects of within-workday breaks and not being able to figure out what the break conditions would decrease momentary burnout the most.

Bennet et al.(2018) argue that besides the moderating effects of recovery experiences, they also have a mediating effect between work characteristics and well-being outcomes. However, it is not known when these within-workday breaks took place during the study so testing for the mediating effects of within-workday breaks on the relationship between workload and momentary burnout does not make any sense. Furthermore, if the time of the were to be included in this study, then it is

expected that the existing data would become richer as well. With this data, it would have been possible to see the participant's momentary burnout level before and after having a break. And Information about when the best time to have a break would be possible to find out. Moreover, it would become relevant to look at days of the week (Monday…Friday) as certain jobs have a high workload at the start of the week, while others have a high workload at the end of the week or during certain seasons. By combining the day of the week and the time of the break with the different work sectors it would be possible to figure out the best break conditions for a wide range of occupations.

A third limitation In this study is that smartphone usage is only measured by one item from the study by Derks and Bakker (2014), and it is measured as the frequency of using your smartphone during work. However, this measurement of smartphone usage include many latent factors and only the frequency of using your smartphone is not enough to differentiate between different purposes of using your smartphones, such as work-related, personal use or relaxation. Currently, the frequency of using your smartphone showed to be unrelated to momentary burnout. However, if the concept of smartphone usage could be measured with more and different items, like has been done in the smartphone addiction scale (Kwon et al., 2013), it could be possible that some items of smartphone usage(addiction) would be related to momentary burnout. By measuring smartphone usage on different aspects besides the frequency of using it, such as enjoyment/relaxation, impact on work, impact on the personal life and social aspects this study would be able to discover whether the relaxation/enjoyment aspect of smartphone usage is related to changes in momentary burnout and if they affect within-workday breaks as well. The inclusion of a broader measurement of smartphone usage would be interesting as it could help to figure out what aspects of smartphone usage (relaxation, work, personal) during within-workday breaks can help people to detach themselves from their work.

Future Research

For future research, it will be interesting to look more in-depth at how within-workday breaks affect the change in momentary burnout levels. The way to do this is by keeping track of when participants took breaks during their workday and by having participants fill in their momentary burnout questionnaires immediately before and shortly after they took a break. This will help future research to explore the time(moment) of the day at which taking a break has the largest decrease or the lowest increase in momentary burnout. The study by Hunter and Wu (2016), claims that breaks taken early on the day were associated with more resources after the break. Thus expected is that taking a break early on the day would enable people to recover the most resources and reduce the increase in momentary burnout more compared to taking breaks at later moments during the day. However, there might be differences between cognitive, emotional and physical breaks but future research would need to explore this.

Moreover, a future study can include more details about the within-workday break itself as well, such as the preferred activities of people during their break and compare this to what people do during their break. A good way to do this is to observe the participants during their breaks and see whom they interact with and what activities they did. This way the observers can check afterwards by using a questionnaire to check if the participants engaged in behaviour they preferred and verify if the participants were able to detach themselves from work. Doing this will result in a better understanding of what type of activities are commonly preferred by people (E.g. talking with colleagues, playing games on your smartphone, listening to music, etcetera…) and what activities were done during the break (E.g. eating lunch, drinking coffee, talking about work, etcetera…). By

understanding what activities are preferred and what is done during those within-workday breaks, the conditions of when recovery during within-workday breaks takes place or not can be explored.

Moreover, it would be interesting to recreate a similar study but include more aspects of smartphone usage. There are two main ways for future studies to include smartphone usage in more detail. The first one would be by tracking the smartphone usage of employee's to see what apps they use when they use them and for how long. This should not be an issue as there are already various existing apps that can track the screen time, monitor the apps being used and even receive notifications about unusual activities, an example of such a phone app would be FamiSafe. However, during a study tracking smartphone usage could infringe the privacy of participants. If future research plans to track the smartphone usage of participants by using an app there will be a lot of things to look into before actually implementing it in the study.

Instead, future research could use the more conventional way by using an in-depth questionnaire about smartphone usage. A good example of such a questionnaire is the Smartphone addiction scale (SAS) developed by Kwon et al. (2013). The use of such a broad questionnaire is to include more aspects of smartphone usage to get a better understanding of why employees use their smartphones and how these different purposes relate to momentary burnout. A couple of examples of different smartphone usages is personal use(WhatsApp or Facebook), work (calling/texting client or looking up information) and relaxation (playing games or social activities). The current study setup only measures the frequency of using your smartphone, but smartphone usage itself has many aspects and by including more aspects of smartphone usage it will be possible to get a better understanding of which aspects of smartphone usage are (un)related to momentary burnout.

Practical implications

As a general implication, the findings discussed in this study contribute to the already existing literature about on-job recovery (De Jonge, 2020). In specific this study contributes by exploring the effects of smartphone usage, daily workload and cognitive, emotional and physical within-workday breaks and how they affect the changes in momentary burnout levels throughout the day. Furthermore, the findings in this study can be generalized across a wide range of occupations and this makes the practical implications relevant for companies in many work sectors.

One of the practical implications for companies is that breaks are an important facilitator in recovering from momentary burnout. Recovery during breaks can take place in many different forms such as vacations(Fritz & Sonnentag, 2006) and after-work breaks (Sonnentag 2001; Bakker & Oerlemans, 2014). However, not a lot is known about the recovery effects of within-workday breaks (Trougakos & Hideg, 2009; De Jonge, 2020). For companies, it would thus be very useful to know when breaks should be held and what a company can do to recover from momentary burnout throughout the workday. Hunter and Wu (2016) suggest that having long breaks or frequent short breaks, while engaging in preferred activities were associated with the most resources recovered. However, the findings in this study show that irrespective of the daily workload, when people have more cognitive or physical breaks they also have a higher level of momentary burnout compared to people who barely have any cognitive or physical break. For a company, it is therefore important to have breaks in which employees can engage in their preferred activity as well as to make sure people do not take too many cognitive or physical breaks. Even though it is necessary to know how often employees take breaks during the day if the company wants to actively identify people who might be at a high risk of momentary burnout, it is not a good option for companies to monitor their employee's breaks. First of all, some employees might consider the monitoring to be invasive and troublesome leading to symptoms causing mental distress or even physical illness (Stanton & Weiss,

2000) And secondly, regulating the breaks by implementing explicit organizational policies about breaks might work to reduce the number of breaks, but because the breaks are becoming regulatory it makes it nearly impossible for employees to recover any diminished resources during their breaks (Trougakos et al., 2008; Kim, Park & Headrick, 2018; Trougakos & Hideg, 2009). Instead, it would be better for companies to talk with their employees if someone takes an unusual amount of breaks all of a sudden.

Secondly, smartphones and social media are becoming more present on the work floor and smartphones can be used as a handy tool to answer messages from your boss, call clients or use it as a tool for your work (Davis, 2002). Smartphone usage is very relevant for all companies because people have 24-hours per day access to social media by using their computer and smartphones, the negative effects that could arise from overusing smartphones could result in absenteeism, work interruptions and even result in higher perceived stress and increased workload (Duke & Montag, 2017). For companies, it is therefore very important to know how to properly deal with smartphones on the work floor and reduce the chances that it negatively impacts work and the employee's wellbeing. Smartphones can both have a positive effect (relieve stress) and negative effect (cause exhaustion) on the well-being of an employee, (Duke & Montag, 2017). Furthermore, high job demand may motivate employees to "escape" on their smartphones and take a moment away from their work (Wang et al., 2015; Duke & Montag, 2017).

In this study, it is found that during physical breaks, more smartphone usage results in higher levels of momentary burnout at the end of the workday. For companies, it is important to ensure that smartphone usage does not negatively affect employees their health and limit smartphone usage during physical breaks. However, for a company, it would not be very beneficial to restrict smartphone usage at all because there are also positive benefits such as more efficient communication (Jarvenpaa & Lang, 2005), relaxation and relieving stress (Lowry, Gasking & Moody, 2015). Moreover, the effect of smartphone usage found on the relationship between physical breaks and change in momentary burnout are not very big so there is a possibility that the positive benefits outweigh the negative benefits. Therefore, it would be better for the company to only try to talk with employees once they think employees have an extreme/unhealthy level of smartphone usage and start to overuse their smartphones.

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Appendix A: Multi-level Analysis

To give a better visualisation of the results presented in the results section, interaction that are insignificant will be shown in the appendix as for exploratory purposes.

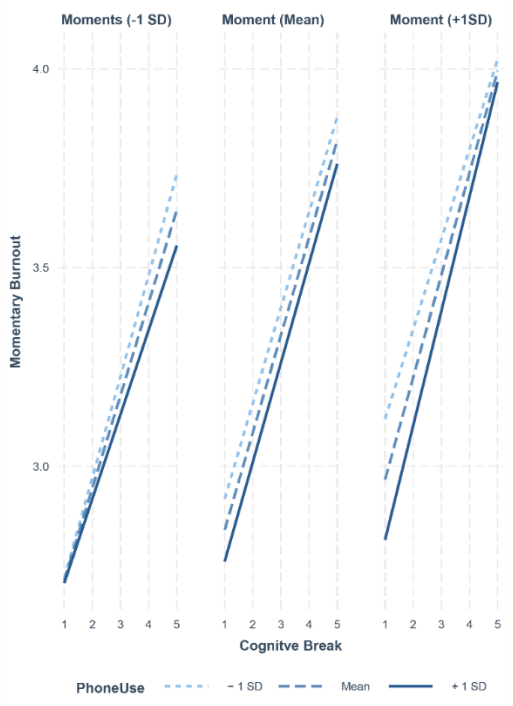

Figure 8: Exploratory three-way interaction of the moderator smartphone usage on the relationship between cognitive breaks and changes in momentary burnout.

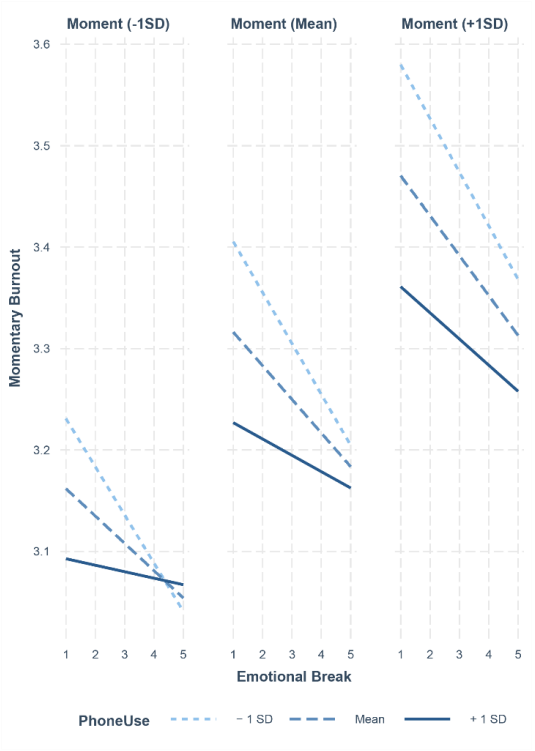

Figure 9: Exploratory three-way interaction of the moderator Smartphone usage on the relationship between emotional breaks and changes in momentary burnout.

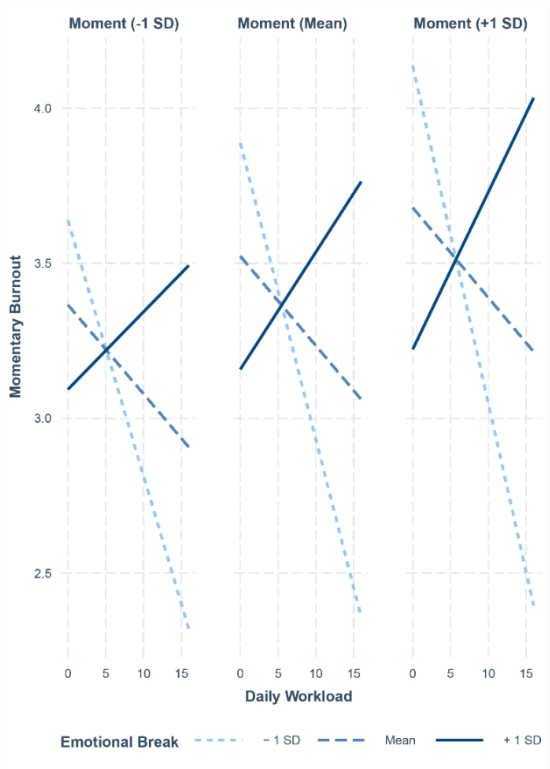

Figure 10: Exploratory three-way interaction of the moderator emotional breaks on the relationship between daily workload and changes in momentary burnout

Appendix B: Exploratory Analysis

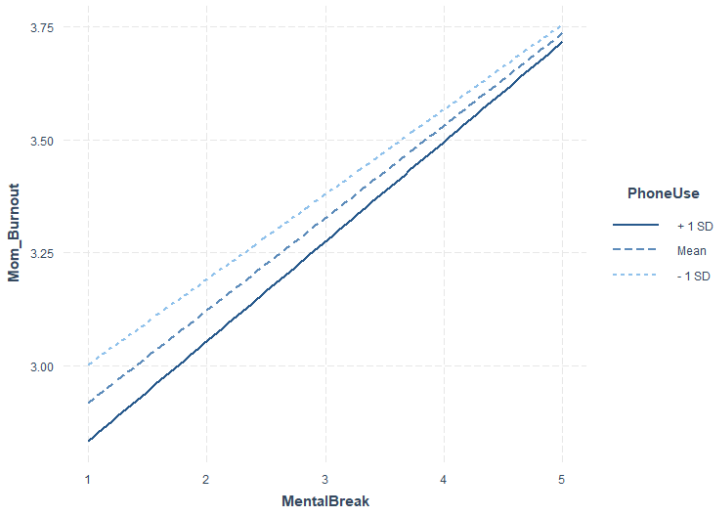

Figure 11: Moderating effect of Smartphone Usage on the relationship between Cognitive Breaks and average momentary burnout.

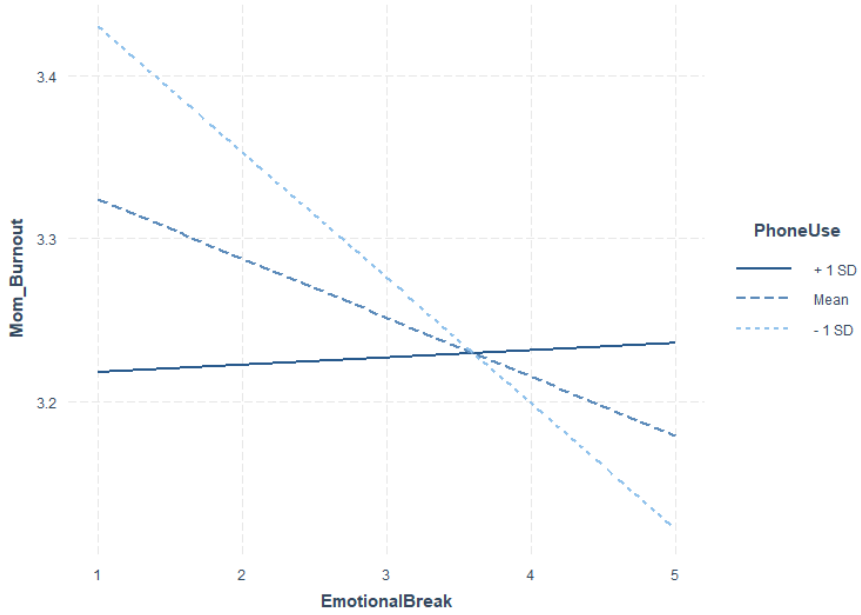

Figure 12: Moderating effect of Smartphone Usage on the relationship between Emotional Breaks and average momentary burnout.

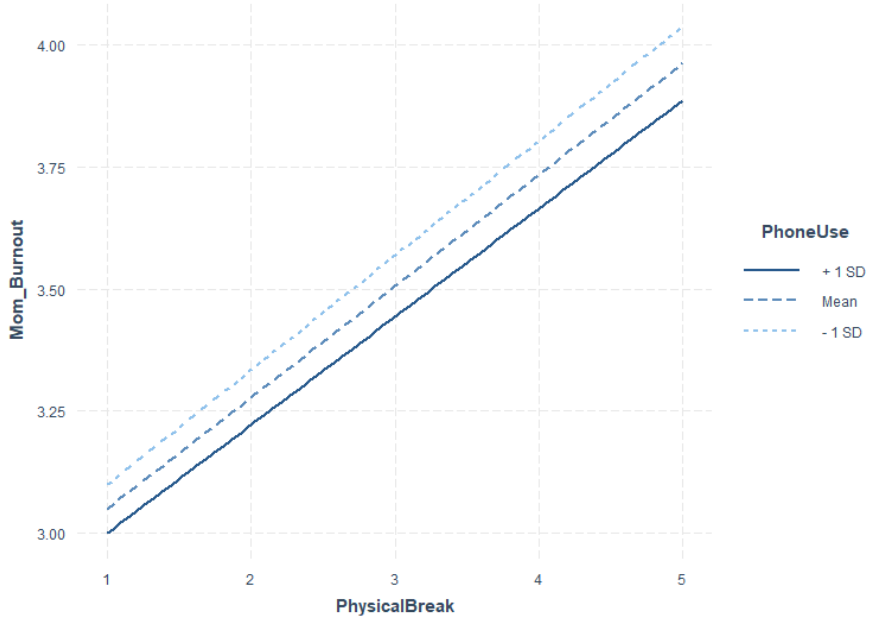

Figure 13: Moderating effect of Smartphone Usage on the relationship between Physical Breaks and average momentary burnout.

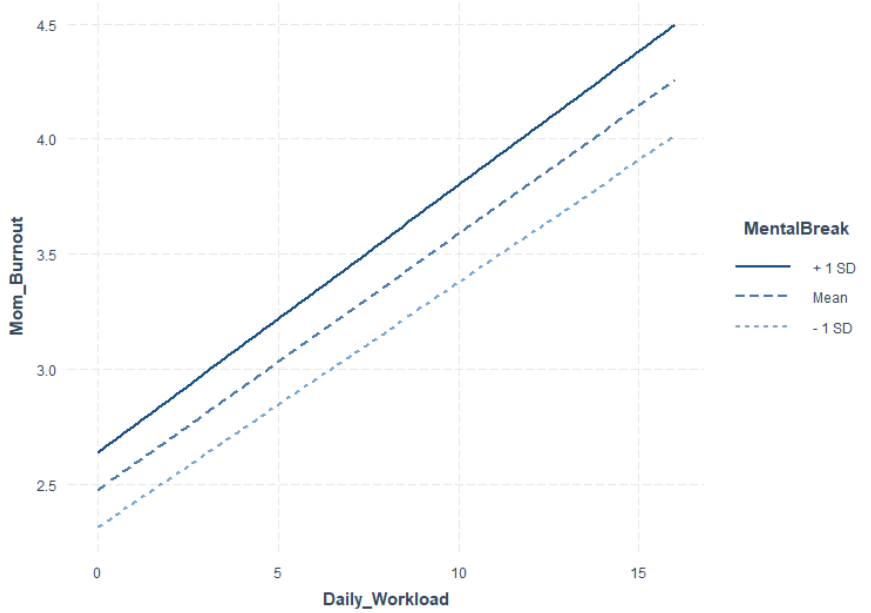

Figure 14: Moderating effect of Cognitive Breaks on the relationship between Daily Workload and average momentary burnout.

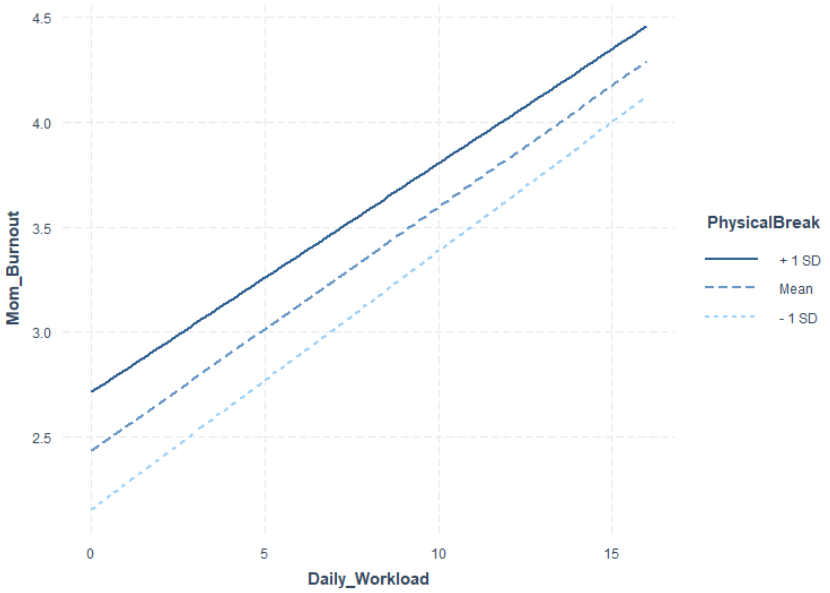

Figure 15: Moderating effect of Physical Breaks on the relationship between Daily Workload and average momentary burnout.