The impact of cyberloafing and physical exercise on performance: A quasi-experimental study on the consonant and dissonant effects of breaks at work[1].

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Abstract

This study aims to examine the consonant and dissonant effects that cyberloafing and physical exercise may have on individuals' performance as activities of occupying rest breaks at work. Built upon an innovative perspective, a laboratory quasi-experimental study was developed where a total of 124 participants performed two different tasks - a cognitive task measuring errors and omissions and a motor task. Their performance was evaluated after a cyberloafing or physical exercise break. Aligned with the cognitive dissonance theory, results revealed that physical exercise breaks had a positive effect on motor performance. Conscientiousness and engagement also presented a medium effect size, suggesting a trend to moderate the impact of cyberloafing breaks on cognitive performance. Theoretical and practical implications, as well as limitations of the study and areas for future research were also explored.

Key words: Cyberloafing; Physical Exercise; Breaks; Motor Performance; Cognitive Performance.

Introduction

In recent decades, employee's mental and physical health has merited increased attention and concern from employers (Rongen, Robroek, Lenthe, & Burdorf, 2013). From an organizational management perspective, wellbeing is a major factor in quality performance and consequently, business effectiveness and profit (Coulson, McKenna, & Field, 2008; Hogan, Mata, & Carstensen, 2013; White et al., 2016). Thus, determining the most effective organizational practices and resources (e.g., type of breaks) that foster wellbeing in employees and have a positive impact on the quality of their performance is crucial. According to Motowildo and colleagues (1997), performance may be defined as the outcome of individuals' tasks and thereby the added value to the overall organization. One key aspect that should be considered in implementing these organizational practices and using specific resources is the type of performance that job tasks require employees to execute.

Resources such as the Internet, along with other technological advancements in the workplace, have changed businesses and created new opportunities for managers to implement these organizational practices, even though these may lead to activities managers may consider deviant (Jandaghi, Alvani, Matin, & Kozekanan, 2015). For instance, cyberloafing, which consists of employees using their company Internet for personal and non-work-related purposes during work hours (Lim, 2002), may be considered one of these deviant activities. Previous research has mainly focused on the potential antecedents and predictors of cyberloafing (Lim & Chen, 2012; Wagner, Barnes, Lim, & Ferris, 2012), as well as on the risks and costs associated with it and the policies to prevent it (Jandaghi et al., 2015; Young & Case, 2004). Other research suggests that by allowing employees to take an Internet break from work, cyberloafing is likely to have a positive impact on work performance (Lim & Chen, 2012). In sum, the impact of cyberloafing in specific work performance is still not consensual among researchers (Jandaghi et al., 2015).

In order to address these inconsistencies in the literature, we first aim to study if there are no differences between individuals who take breaks and those who do not take breaks regarding their cognitive (i.e., the number of errors and omissions in a cognitive task) and motor performance. We postulate that the effects of breaks on performance only occur in situations where the type of break (e.g., Internet or Physical Exercise) is congruent with the tasks performed. Therefore, drawing upon the cognitive dissonance theory (Festinger, 1957), we propose that Internet breaks may only be beneficial when individuals are performing tasks that require the same cognitive demands as the tasks they must execute at work (e.g., concentration, focus and attention to details). On the other hand, we believe that when there is dissonance between what individuals do during cyberloafing (or Internet breaks) and subsequent tasks at work that involve motor tasks, performance may not increase

significantly. Hence, our second aim is to understand whether cyberloafing has a positive impact on cognitive performance.

From the different aspects that revolve around workplace wellbeing, organizations have begun to implement workplace health promotion programs (Rongen et al., 2013), such as physical exercise programs at the office and during working hours. With these actions, managers hope that keeping employees healthy will maintain or increase their work performance (Conn, Hafdahl, Cooper, Brown, & Lusk, 2009). Although most studies have focused on the impact of physical exercise on health in general (Conn et al., 2009), or on cognitive performance of older adults and adolescents (Phillips, Edwards, Andel, & Kilpatrick, 2016), the impact of physical exercise on performance, productivity and other outcomes of interest in business is a subject that has been less studied by researchers (White et al., 2016), but that has been gaining importance in the work context. In view of this and according to cognitive dissonance theory (Festinger, 1957), we expect that physical exercise breaks may only be beneficial when individuals perform tasks at work that require the same motor and cognitive demands as the tasks they execute while doing exercise, such as coordination, speed and musculoskeletal articulation. With this in mind, our third aim is to understand whether having a physical exercise break can have a positive impact on motor performance.

Additionally, this study proposed to understand the moderating role of conscientiousness and engagement since they have been identified as some of the most consistent predictors of job performance (Barrick & Mount, 1991; Rich, Lepine, & Crawford, 2010). Conscientiousness has been considered one of the five personality dimensions that best predicts job performance (Barrick & Mount, 1991; Hurtz & Donovan, 2000; Salgado, 1997), whereas engaged employees have a sense of energetic and effective connection with their

work activities (Schaufeli, Salanova, González-Romá, & Bakker, 2002), are persistent and driven by a solid belief of future success (Sweetman & Luthans, 2010).

The role of rest breaks in performance

After working for prolonged periods of time, the ability to successfully implement a task is diminished under the condition of fatigue (Li et al., 2016). Industrial environments, where individuals perform monotonous or repetitive tasks during long periods of time (Tang, Li, & Huang, 2016), were found to be associated with physical fatigue, being muscle fatigue identified as an important precursor of work-related musculoskeletal disorders, as well as decreased performance (Santos, Baptista, Monteiro, Miguel, Santos, & Vaz, 2016). Thus, introducing breaks is a key intervention to provide recovery after fatiguing physical work (Mathiassen, Hallman, Lyskov, & Hygge, 2014).

Over the past decades, work has changed to a large extent from demanding physical effort, to demanding mental effort (Boksem & Tops, 2008). Moreover, besides physical fatigue, mental fatigue has been a prevalent problem that office workers have to face daily because of intense and stressful tasks (Li et al., 2016). Mental fatigue refers to the feeling that people may experience after or during prolonged periods of cognitive activity, especially in a boring and repetitive task (Boksem & Tops, 2008) and has been associated with impaired cognitive and behavioral performance (Boksem, Lorist, & Meijman, 2005). Individuals under mental fatigue exhibit slower response speed and increased propensity to commit errors (Cak, Say, & Misirlisoy, 2019; Li et al., 2016).

The impact of cyberloafing on performance

According to Lim (2002), cyberloafing is a specific form of loafing behavior in which employees spend work hours and company Internet access to check personal e-mails or visit websites not related to their work, therefore, representing a form of production deviance.

Several factors have been verified to contribute to cyberloafing behavior often referred to as cyberloafing antecedents (Varghese & Barber, 2017).

When employees surf the web, they are likely to feel energized and experience positive affect (Lim & Chen, 2012) and according to Stanton (2002), employees feel that surfing the net while at work is generally a pleasurable activity that makes work more interesting (Lim & Chen, 2012). This may be because surfing the web allows employees to take their mind off work temporarily and serve as a palliative coping strategy against negative workplace experiences (Stanton, 2002). On the other hand, scholars have generally conceptualized cyberloafing as a form of workplace production deviance (Lim, 2002) that can be characterized as abusive and bad behavior, especially when employees use organization resources to engage in their personal businesses during work time (Vardi & Wiener, 1996). The time spent on the Internet for non-work purposes directly distracts workers from their tasks (Corgnet, Gonzalez, & Mateo, 2015) and according to D'Abate and Eddy (2007), when people are distracted by personal interests and demands, their performance may be affected. According to Hemp (2004), the problem of workers being on the job but not fully functioning, can lower productivity on the job by one-third or more (e.g., lower quantity of output, working more slowly, repeated tasks, lower quality of work and mistakes on the job).

Thus, it becomes a concern for organizations if people have the urge to check social media and post updates frequently (Hartanto & Yang, 2016), especially with the recent popularity of smartphones, which have brought changes in how people work and take breaks (Rhee & Kim, 2016). Furthermore, research on cyberloafing behavior, such as emailing, has suggested that it negatively affects employees' work and emotions (Macklem, 2006). This is because personal resources such as energy and attention are required to respond to emails. The results of Lim and Chen's study (2012) were consistent with these findings and showed that emailing activities were positively related to negative affect. Furthermore, those who

engaged in these activities were more likely to report negative affect than those who engaged in browsing activities. If employees spend substantial amounts of time engaged in cyberloafing during work periods, their productivity may decrease (Johnson & Rawlins, 2008) and the costs of this behavior can have a significant impact on organizations (Wagner et al., 2012).

On a different note, findings from a study developed by Lim and Chen (2012) revealed that cyberloafing was generally prevalent in the workplace and that employees felt that it was acceptable to use their workplace Internet access for personal purposes during working hours, spending on average 51 min per workday on cyberloafing. By allowing employees to take a break from work, cyberloafing is likely to have a positive impact on work performance (Lim & Chen, 2012). A study from Greengard (2000) revealed that 56% of employees, who used the Internet for personal purposes, said it helped them perform their jobs better, or simply made them happier or less stressed. In sum, although employees may argue that surfing the web may help them feel happier, energized and less stress, cyberloafing behavior is time-consuming and a distraction from work, leading to a decrease in performance and in organizations' overall productivity.

In order to overcome certain inconsistencies in the literature, we incorporated Festinger's theory of cognitive dissonance (1957) that explains why individuals become psychologically more comfortable when they experience internal consistency with their previous experiences. Therefore, we assume that the positive or negative impact of cyberloafing breaks on performance may depend on the characteristics of the tasks. When individuals need to switch from a break to a completely different task, they tend to experience a "goal shifting" where individuals need to pursue other motivations and activities. Moreover, there is a new rule activation where individuals have to turn off previous rules and turn on (again) the rules required for the task after the break (Rubinstein, Meyer, & Evans, 2001).

According to the dissonance cognitive theory, individuals develop stress when they need to add new parts in contradictory actions causing psychological dissonance, thus, affecting performance.

The impact of physical exercise on performance

The basic underlying principle in ergonomics and management science for introducing rest breaks in occupational work is to maintain good productivity and a sustainable health and wellbeing of the individual worker by providing opportunities to recover from tasks that might otherwise lead to a loss in performance (Wells, Mathiassen, Mebdo, & Winkel, 2007). Some occupational studies have investigated alternative non-rest break activities, including productive tasks. Most of these studies have been devoted to physical exercise (PE) breaks, based on the notion that more activity will be a more effective source of variation than simple rest (Mathiassen et al., 2014).

Coulson et al.'s (2008) findings highlighted that, compared to days when no exercise was undertaken during the working day, exercising in the workplace improved mood and performance, leading to better concentration, work-based relationships and heightened resilience to stress. Another study showed that PE had a positive influence on coping skills for work behavior and for tolerating minor irritations, without becoming stressed (Steptoe, Kimbel, & Basford, 1998). Toker and Biron (2012) revealed that PE attenuated the increase of job burnout and depression. That is, the increase in job burnout and depression was strongest among employees who did not engage in PE and weakest to the point of non-significance among those engaging in high PE. Even though studies regarding the impact of PE in cognitive performance were predominantly developed with children/adolescents and old adults, Hogan and colleagues (2013) found that exercise may hold important benefits for both affective experiences and cognitive performance regardless of age. Higher cardiorespiratory fitness levels in cognitively normal adults were also associated with better performance on a

spatial memory task and greater volume of the hippocampus (Erickson et al., 2009). According to Hunter and colleagues (2016), increasing PE in the workplace could provide employees with physical and mental health benefits, and employers with economic benefits through reduced absenteeism and increased productivity. These findings document that some workplace PE interventions can improve both health and important worksite outcomes.

The moderating role of conscientiousness on performance

The relationship between personality and job performance has been studied at length in the last decades (Corgnet et al., 2015). The literature has focused on five fundamental personality traits, which are commonly referred to as The Big Five personality traits: extraversion, agreeableness, conscientiousness, emotional stability and openness (Barrick & Mount, 1991). For the purpose of this study, we will focus our moderation analyses only on conscientiousness, since several meta-analyses have shown that, among the Big Five personality dimensions, conscientiousness is the best personality predictor of job performance (Barrick & Mount, 1991; Hurtz & Donovan, 2000; Salgado, 1997).

Conscientiousness has been defined by Digman (1990) as the extent to which a person is able to self-regulate and be purposeful, achievement oriented, responsible, and persistent. It is indicated by facets such as self-discipline, deliberation, competence, order, dutifulness and achievement striving (Costa & McCrae, 1992). Barrick and Mount (1991) identified the dimensions of conscientiousness as being careful, thorough, responsible, organized, hardworking, achievement-oriented, and persevering, whereas Ansari (2003) added individual's degree of organization, persistence and motivation in goal-directed behavior as conscientiousness dimensions as well.

Studies on the relationship between conscientiousness and job performance have been developed in the last decades (Corgnet et al., 2015) with conscientiousness being identified as one of the most consistent predictors of job performance across a variety of tasks, occupations

and cultures (Barrick & Mount, 1991). The reason for this is that highly conscientious individuals are described as organized, reliable and ambitious (Costa & McRea, 1992) and have been known to set more difficult goals (Judge & Ilies, 2002), to be less likely to procrastinate when pursuing goals (Steel, 2007) and to be more likely to employ time management and other effort regulation techniques (Bidjerano & Dai, 2007; Varghese & Barber, 2017) - all of which are believed to promote job performance.

The moderating role of engagement on performance

Engagement is a concept that has been consistently linked to job performance (Rich et al., 2010). Originally introduced by Kahn (1990), the term employee engagement was defined as the harnessing of an employee's full self in terms of physical, cognitive, and emotional energies to work role performances. More recently, job engagement has been defined by Schaufeli and colleagues (2002) as a positive, fulfilling, work-related state of mind that is characterized by vigor (i.e., high levels of energy while working, willingness to invest effort in work, and persistence in the face of difficulties), dedication (i.e., sense of enthusiasm, inspiration, pride, and challenge) and absorption (i.e., being happily engrossed in one's work, whereby time passes quickly and one has difficulties detaching).

A significant relationship between work engagement and job performance has been repeatedly confirmed (Schaufeli, Alessandri, Borgoni, Caprara, & Consiglio, 2015), with more engaged employees reporting higher levels of job performance (Rich et al., 2010). This may be due to the fact that engaged employees have a sense of energetic and effective connection with their work activities and they see themselves as being able to deal completely with the demands of their job (Schaufeli et al., 2002). According to Kahn (1990), engaged employees focus their physical effort on the pursuit of role-related goals, but are also cognitively vigilant and empathically connected to others in the service they are doing. Previous studies have demonstrated that more engaged workers are characterized by tenacity

and persistence and that they are driven by a solid belief in future success (Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2009). On the other hand, disengaged employees withhold their physical, cognitive and emotional energies, are emotionally absent, detached and passive when completing their work (Kahn, 1990).

Hypotheses

As seen before, the literature on time breaks and cyberloafing is somewhat inconsistent. For example, there is a dark side approach to time breaks at work that emphasizes the negative impact of cyberloafing and breaks on reduced performance (e.g., D'Abate & Eddy, 2007; Hemp, 2004; Johnson & Rawlins, 2008; Wagner et al., 2012), distraction (Corgnet et al., 2015; Lim & Chen, 2012), and negative emotions (Lim & Chen, 2012; Macklem, 2006). On the other hand, other studies have shown that taking periodic breaks from work are important as these breaks allow employees to recharge their energy level and are crucial for improving work performance (Sonnentag, 2003). Taking into account these inconsistencies and drawn upon the cognitive dissonance theory (Festinger, 1957), we want to contribute to the literature by showing that in the absence of an alignment between the task content and the type of break (dissonance), there is no effect in terms of increased performance. Therefore, we propose the following hypothesis:

- ***Hypothesis 1a (H1a): Rest breaks and cognitive performance.*** *We expect that when there is no preoccupation to find consonance between the type of break and the task characteristics, that there will be no significant decrease in terms of errors (i.e., of commission and omission) for those who take a break (i.e., Internet or Physical Exercise).*
- ***Hypothesis 1b (H1b): Rest breaks and motor performance.*** *We expect that when there is no preoccupation to find consonance between the type of break*

and the task characteristics, that there will be no significant increased motor performance for those who take a break (i.e., Internet or Physical Exercise).

Framed on the cognitive dissonance theory (Festinger, 1957), individuals are motivated to reduce their cognitive dissonances. Therefore, in breaks where individuals perform a continuum of tasks that possess the same cognitive characteristics of the original task, the energy and positive experience associated to cyberloafing (Sonnentag, 2003) will have a positive impact on performance, allowing individuals to commit less errors and omissions. In view of this, we propose the following hypothesis:

- ***Hypothesis 2 (H2): Cyberloafing and cognitive performance.*** *Cyberloafing may have a positive impact on work performance if individuals perform tasks that have the same cognitive characteristics as the original task (Sonnentag, 2003), therefore reducing cognitive dissonance (Festinger, 1957). Thus, we expect that Internet breaks will have a positive impact on cognitive performance, when compared to physical exercise breaks.*

People seek behavioral consistencies, therefore, they have a propensity to align their actions with their perceptions. Hence, if they perform motor tasks, it is expected that breaks with physical demands may improve their subsequent motor performances. Based on the evidence that physical active breaks have a positive impact on health in general, and on individuals' performance, we propose that PE as consonant behavior, will have a positive effect on motor performance:

- ***Hypothesis 3 (H3): Physical exercise and motor performance.*** *Physical exercise has been found to improve performance in the workplace (Coulson et al., 2008), especially if individuals perform motor tasks because the latter tend to reduce their cognitive dissonances (Festinger, 1975). Therefore, we expect*

that physical exercise breaks will have a positive impact on motor performance when compared to Internet breaks.

Conscientiousness was reported to have a strong relationship with cyberloafing, whereby (self-reported) higher levels of conscientiousness could limit cyberloafing (Blanchard & Henle, 2008). Since highly conscientious individuals tend to be more responsible, hardworking, achievement-oriented (Barrick & Mount, 1991) and have a sense of dutifulness and achievement striving (Costa & McCrae, 1992), we expect that they may exhibit enhanced performance and reveal a greater connection with the tasks that constitute their role. Accordingly, we propose the following hypotheses:

- ***Hypothesis 4a (H4a): Conscientiousness and cognitive performance.*** *Previous research has shown that conscientiousness may be the best personality predictor of job performance (Hurtz & Donovan, 2000). Therefore, we expect that conscientiousness will moderate the relationship between Internet breaks and cognitive performance, such that the positive influence of this type of break on reduced errors and omissions will be higher when individuals have greater conscientiousness.*
- ***Hypothesis 4b (H4b): Conscientiousness and motor performance.*** *As mentioned before, conscientiousness has been found to be one of the best predictors of job performance (Hurtz & Donovan). Thus, we expect that conscientiousness will moderate the relationship between physical exercise breaks and motor performance, such that the positive influence of this type of break on motor performance will be higher when individuals have greater conscientiousness.*

Since engaged individuals tend to be more persistent (Xanthopoulou et al., 2009), work with greater intensity on their tasks, pay more attention to and are more focused on

responsibilities (Rich et al., 2010), and show more efforts in the pursuit of role-related goals (Kahn, 1990), we expect that they may exhibit enhanced performance and a greater emotional connection to the tasks that constitute their role. Hence, we propose the following hypotheses:

- ***Hypothesis 5a (H5a): Engagement and cognitive performance.*** *Evidence has shown that those who are more engaged, perform better at work (Rich et al., 2010). Therefore, we expect that engagement will moderate the relationship between Internet breaks and cognitive performance, such that the positive influence of this type of break on reduced errors and omissions will be higher when individuals reveal greater engagement.*
- ***Hypothesis 5b (H5b): Engagement and motor performance.*** *As mentioned, the literature has shown that engagement predicts job performance positively (Rich et al., 2010). Hence, we expect that engagement will moderate the relationship between physical exercise breaks and motor performance, such that the positive influence of this type of break on motor performance will be higher when individuals reveal greater engagement.*

Method

Sample

The initial sample consisted of 126 university students from a public university with a background in management, from which only 124 students were considered valid for this study (98%). Two participants were excluded because they did not finish all the proposed tasks. From the total sample, 75 participants (60.5%) were female students. The ages of the participants ranged between 18 and 41 years (M = 21.41, SD = 3.18). In terms of education, all students had a background in management, with 85.5% of the participants enrolled in a

bachelor's degree and 14.5% enrolled in a masters' degree program.

Procedure

With the purpose of testing the hypotheses of this study, a laboratory quasi-experimental research design was developed to collect all the necessary data. Initially, an email was sent to all students from different classes asking for voluntary participants. Before data collection, the research was explained to the participants and their participation in the investigation was strictly voluntary.

In order to evaluate the two dimensions of this research (cognitive performance and motor performance), two types of activities were defined, one for each dimension. The cognitive activity was the Toulouse-Piérron Attention Test (Figure 1). This test evaluates concentrated attention, reaction speed and accuracy in executing simple tasks. In this test, and following the Toulouse-Piérron protocol, participants needed to identify two specific graphic symbols among a larger group of very similar symbols during a period of 10 minutes.

----- Insert Figure 1 about here -----

The motor activity intended to resemble a monotonous and repetitive task, consistent with those occurring in many industrial settings, such as in manufacturing. This activity required participants to wrap paper to make rolled-up raffles (i.e., a type of raffle that is rolled up, as opposed to being a ticket in a booklet) as thin as possible. The goal of this activity was to make as many raffles as possible during a period of 10 min. The pieces of paper that were given to the participants to make raffles had the same size (5cm x 5cm) and thickness (see Figure 2a and Figure 2b).

----- Insert Figure 2a about here -----

----- Insert Figure 2b about here -----

Before the beginning of the data collection, both activities were explained to the participants and they were asked to complete a pre-experimental questionnaire with their

general information such as age, gender, university degree, university, handiness, vision problems, articulation problems and previous experience in both activities.

To ensure that the participants were able to perform as best as they possibly could, a prize for the best performing participant in each task was announced. The prize was a voucher card to spend in one of 1100 retail stores. We also informed participants before the beginning of the data collection (as an incentive to participate in the study) that they would all be receiving chocolates.

Since the goal of the study was to determine whether cyberloafing and physical exercise have an influence on individuals' performance, the participants were recruited from different classes and, according to their availability, students were integrated into small groups (ranging between 4-10 individuals) and these groups were randomly assigned to one of three conditions (Table 1). In order to avoid undesirable order effects, within each condition we counterbalanced the order of the cognitive activity and motor activity conditions (i.e., within each condition some small groups started with cognitive activity whereas others with motor activity first).

Our study constitutes a 2×3 design with two moments for T1 and T3 (with-subjects) and 3 conditions (between-subjects) considering the no break group, Internet break and Physical exercise break. For each condition, participants performed two activities (cognitive and motor) that were divided into three parts of 10 minutes each (T1, T2 and T3). T1 and T3 corresponded to the activities that were the same for all groups, whereas T2 corresponded to the different conditions (i.e. different types of breaks, and no break condition):

a) No break group (control group) – This group did not have a break on T2 and spent 30 minutes doing the same activity;
b) Internet break group - This group spent T2 browsing the WEB, simulating cyberloafing behavior. Specific types of websites that were allowed included those

offering news, social networking, online gaming, entertainment, and hobby-related activities.

c) Physical exercise break group - This group spent T2 doing simple physical exercise movements, such as stretching and moving specific muscles and articulations, such as arms, hands, neck, shoulders and legs. Some of the exercises practiced by this group are showcased in Figure 3.

----- Insert Figure 3 and Table 1 about here -----

After completing the experiment conditions, the participants were asked to complete a post-experimental questionnaire that measured their levels of psychological engagement and conscientiousness.

Measures

Cognitive Performance. Cognitive performance was evaluated by the Toulouse-Piéron test during periods T1 and T3 (T2 only for the control group) and corresponds to the number of graphic symbols correctly identified in that period. Toulouse Piéron was developed in 1904 and validated by Amaral (1976), suggesting good psychometric evidence in measuring selective attention, memory and concentration. The measure consists of 40 lines with 40 figures in each line. The print is black, on white paper, and each figure is distinguished from the others by the orientation of the outer trace (see Figure 1). In each square, the trace is oriented towards one of the 8 directions of the Rose of the Winds (i.e., a total of 8 types of squares). The test involves marking with the pencil all the squares that match either of the two target squares at the top of the sheet (i.e., squares with a horizontal trace to the left, or a trace down and to the right). The correctly marked squares (A), omissions (O) and errors (E) are counted for each minute. Considering that the literature refers to the association between breaks and the number of errors (Lim, 2002), in the current study we measured cognitive performance considering the concentration or dispersion index (ID) that has to do with

distractions, which consists of the total number of omissions + errors.

Motor Performance. Motor performance was evaluated in the raffles' activity during T1 and T3 (T2 only for the control group) and corresponds to the number of raffles done in that period.

Engagement. Engagement was evaluated according to the shortened version of Utrecht Work *Engagement Scale (UWES Scale-9).* The UWES-9 was created and tested by Schaufeli, Bakker, and Salanova (2006), which evaluates the three constituting dimensions of work engagement: vigor, dedication, and absorption. This scale was adapted for the required tasks and is composed of nine items scored on a seven-point frequency scale (0 = never to 6 = always) and included items such as "I am proud of the task that I do" and "By doing this task, I feel strong and vigorous."

Conscientiousness. Conscientiousness was evaluated with the Big Five Inventory (John, Donahue, & Kentie, 1991), designed to measure the Big Five personality traits. In this study, we followed the same procedure of other recent studies (e.g., Lippke, Pomp, & Fleig, 2018) and included only the items related with the conscientiousness trait of the Big Five Inventory. Examples of items are: "Makes plans and follows through with them" and "Tends to be disorganized". The scale is composed of eight items scored on a five-point Likert scale (1 = totally disagree to 5 = totally agree).

Results

In order to verify if there is supported evidence to draw conclusions from our main hypotheses, a repeated measure analysis of variance (ANOVA) and moderation analyses were performed. All of the extracted results, including tables and figures presented below, were analyzed using IBM SPSS Statistics – Version 23. The results of this study are presented according to the order of the hypotheses. In the first part, different 3 ×2 repeated measures

ANOVAs are presented to validate the hypotheses related to the effect of the different breaks on performance. In the second part, the results of the moderation analyses are displayed.

Two 3 ×2 repeated measures ANOVAs were conducted to compare the effects of different breaks on performance for time 1 and time 3 (before and after the breaks). Kolmogorov-Smirnov statistic scores suggested a normal distribution for motor performance ($p > .05$) and, as expected, a non-normal distribution for the errors and omission variable ($p < .05$). The absence of normal distribution for errors and omissions was expected since a normal curve would represent the probability distribution of errors and omissions occurring. However, it is unlikely that committing errors and omissions may be a normally distributed phenomenon, as other phenomena which are not the norm (Bauman, Cross, & Walker, 2013). Thus, we would expect this variable to not have a normal distribution due to its nature. Moreover, the sample size could affect it. Field (2013) suggests no alternative non-parametric option for this repeated measure factorial ANOVA, therefore, we opted to pursue with this statistical procedure. Moreover, an ANOVA is not very sensitive to moderate deviations from normality. Some of the literature (e.g., simulation studies which used an assortment of non-normal distributions) has shown that the false positive rate is not affected very much by this violation of the assumption (Glass et al., 1972; Harwell et al., 1992; Lix et al., 1996).

H1a: Rest breaks and cognitive performance

We predicted that if the type of break is not specified (i.e., Internet or Physical Exercise), then there will be no influence in random individual outcomes such as cognitive performance in terms of commission and omission of errors. Before proceeding with the analyses for H1a and H1b, we aggregated the groups that took a break (i.e., Internet or Physical Exercise) into a single group ($N = 77$) and compared with the group that had no break ($N = 44$). Thus, regarding cognitive performance (i.e., number of errors and omissions), as expected in H1a, the mean differences (Table 2) were non-significant, $F_{(1,119)} =$

000, $p = 0.99$, $\eta^2 = 0.00$, which means that breaks did not significantly influenced the number of errors and omissions.

----- Insert Table 2 about here -----

H1b: Rest breaks and motor performance

We had also predicted that individuals who did not take a break would reveal no difference in terms of motor performance than those who took a non-specific break (i.e., Internet or Physical Exercise). Participants in the break group ($N = 76$; $M_1 = 30.28$; $SD_1 = 14.24$; $M_3 = 36.80$; $SD_3 = 16.48$) did not significantly increase their motor performance on T3 $F_{(1,118)} = 3.55$, $p = 0.06$, $\eta^2 = 0.03$ when compared to the group that experienced no breaks (control group) ($M_1 = 28.50$; $SD_1 = 10.34$; $M_3 = 37.82$; $SD_3 = 12.77$). Hence, hypothesis H1b was accepted.

H2: Cyberloafing and cognitive performance

In H2, we predicted that Internet breaks would have a positive impact on cognitive performance, when compared to physical exercise breaks. We found that in the contrast between the Physical Exercise break and the Internet break, that the group with the Internet break did not decrease their errors and omissions significantly ($p = .08$). Hence, we reject H2.

H3: Physical exercise and motor performance

H3 proposed that physical exercise breaks would have a positive impact on motor performance when compared to Internet breaks. The differences on motor performance (i.e., raffles) were not significant, $F_{(2,114)} = 2.75$, $p = 0.07$, $\eta^2 = 0.05$ and therefore, we can conclude that for both moments (T1 and T3) the type of break did not significantly influence motor performance. However, the physical exercise break group revealed higher motor performance ($M_1 = 33.18$; $SD_1 = 14.77$; $M_3 = 40.85$; $SD_3 = 17.14$), followed by the control group ($M_1 = 28.50$; $SD_1 = 10.34$; $M_3 = 37.82$; $SD_3 = 12.77$), and the Internet break group ($M_1 = 27.22$; SD_1

= 13.18; M_3 = 32.54; SD_3 = 14.80). Pairwise comparisons considering measures on T1 and T3 (i.e., before and after the break) allowed us to find a significant statistical effect with an improvement in the physical exercise break over the Internet break (p = .02). Therefore, we accept hypothesis 3, suggesting that in accordance with the cognitive dissonance theory, physical exercise had a positive impact on motor performance.

Interaction Effects

To test the interaction effects, we included median split variables of conscientiousness and engagement as an interaction term in the previous repeated measures ANOVA. Figures 4 to 7 show the plots of the moderation effects of conscientiousness and engagement on cognitive performance for each type of break.

----- Insert Figures 4 to 7 about here -----

H4a: Conscientiousness and cognitive performance. We expected that conscientiousness would moderate the relationship between Internet breaks and cognitive performance, such that the positive influence of this type of break on reduced errors and omissions would be higher when individuals had greater conscientiousness. The moderation analysis revealed that, from time 1 to time 3, conscientiousness ($F_{(2,115)}$ = 2.74, p = 0.07, η^2_p = 0.04) had a positive, but non-significant effect on the effects between the types of breaks and the number of errors and omission. The literature suggests that omega squared values of .01, .06 and .12 represent small, medium and large effect sizes, respectively (Field, 2013), therefore, we can report a medium effect size for this result. However, these results show an effect size that is closer to a medium (.06) effect size than a small effect size (.01) (Field, 2013). After the Internet break, the number of errors and omissions was lower for individuals with high levels of conscientiousness (when compared with the effect of physical exercise). Taking into account the positive trend (marginally significant for $p < .10$) and the close to medium effect size, these findings partially support H4a.

H4b: Conscientiousness and motor performance. We also expected that conscientiousness would moderate the relationship between physical exercise breaks and motor performance, such that the positive influence of this type of break on motor performance would be higher when individuals had greater conscientiousness. No significant results were found for the moderation effects when motor performance (raffles) was included as dependent variable, therefore we rejected H4b.

H5a: Engagement and cognitive performance. Additionally, we expected that engagement would moderate the relationship between Internet breaks and cognitive performance, such that the positive influence of this type of break on reduced errors and omissions would be higher when individuals revealed greater engagement. The moderation analysis revealed that, from time 1 to time 3, engagement ($F_{(2,115)} = 2.39$, $p < 0.10$, $\eta^2_p = 0.04$), had a non-significant positive effect on the effects between the types of breaks and the number of errors and omission. Nonetheless, these results revealed again an effect size that is closer to a medium (.06) effect size than a small effect size (.01) (Field, 2013). After the Internet break, the number of errors and omissions was lower for individuals with high levels of engagement (when compared with the effect of physical exercise). Taking into account the positive trend (marginally significant for $p < .10$) and the close to medium effect size, these results partially support H5a.

H5b: Engagement and motor performance. Lastly, we expected that engagement would moderate the relationship between physical exercise breaks and motor performance, such that the positive influence of this type of break on motor performance would be higher when individuals revealed greater engagement. No significant results were found for the moderation effects when motor performance (raffles) was included as dependent variable, therefore we rejected H5b.

Discussion

Built upon an innovative perspective and framed by the dissonance cognitive theory (Festinger, 1957), this study aimed to contribute to the literature by using a quasi-experimental study design that could quantify the effect of cyberloafing and physical exercise on both motor and cognitive performance. This research also sought to understand if these relationships were moderated by two of the most consistent predictors of job performance: engagement and conscientiousness.

In general, the results found in this study revealed that individuals perform better after breaks that are not dissonant with their initial and subsequent tasks. These results find support in the cognitive dissonance theory (Festinger, 1957) that states that the dissonance is caused by the existential inconsistency between two contradictions. If the breaks demand contradictory cognitive neuronal activities, the number of errors will increase and general performance will decrease (Rubinstein et al., 2001). Individuals experience mental discomfort when they change from one break to a task that requires completely different cognitive and motor attributes. These findings extend previous studies by reinforcing the role of dissonance and how conflicts between knowledge affect performance at work (Vanderhaegen & Carsten, 2017).

The current study showed that introducing physical exercise breaks had a positive effect on motor performance, as opposed to cognitive performance, because both physical exercise breaks and motor performance require the same neuronal inputs. This evidence is consistent with studies previously published that revealed that exercising in the workplace improved mood, concentration and performance (Coulson et al., 2008) and decreased job burnout and depression (Toker & Biron, 2012).

The cognitive performance (i.e., number of errors and omissions) of individuals with high levels of conscientiousness and engagement was higher when introducing Internet breaks, however despite the medium effect size, the effect was not significant for $p < .05$. This trend in terms of results might be congruent with the fact that more conscientious and engaged individuals tend to have higher self-control techniques and are not so easily distracted. Therefore, the results suggest a possible trend and that individuals while engaged and conscientious, most likely did not shift their focus from the cognitive task while taking their breaks (McCrae & Löckenhoff, 2010). Regarding motor performance, the results did not reveal any significant moderation effects. This result may be due to the fact that when performing the same repetitive task for a period of time, our performance may increase due to the simple fact that we start to excel in the task or automatize it, and therefore, the effects of characteristics such as conscientiousness and engagement may be attenuated. Moreover, the literature also suggests that engagement and especially conscientiousness, are more associated with productivity in tasks that require more cognitive demands (Barrick & Mount, 1991).

Theoretical Implications

The present study provided important contributions for the literature on cyberloafing behavior in the workplace, since the impact of cyberloafing on work performance has not been consensual among researchers (Varghese & Barber, 2017). Some argue that cyberloafing at work is generally a pleasure activity (Stanton, 2002) that leaves employees happy and less stressed (Greengard, 2000), which may imply a positive impact on work performance (Lim & Chen, 2012). Others argue cyberloafing have negative outcomes, since it distracts employees from work during work hours (Lim, 2002), leading to lower performance and productivity (Hemp, 2004; Johnson & Rawlins, 2008). Moreover, most of these authors claim that

cyberloafing results in lower task performance (the loss of work time may be translated into lost productivity).

Our results extend the cognitive dissonance theory (Festinger, 1957) to the field of computers and work literature and simultaneously shed some light on the literature about the positive or negative impact associated with breaks at work. According to our findings, engagement and conscientiousness revealed a medium effect size in explaining the impact of cyberloafing breaks on cognitive performance and that exercise breaks are important only if the characteristics of the break match the characteristic of the task that is being performed. Otherwise, participants will lose time when they must switch from one task to another, developing brief mental blocks that impact productivity (Rubinstein et al., 2001).

This research also contributed to the literature on behavior in the workplace in terms of management, since it introduced two differentiated dimensions to measure performance: cognitive and motor performance. This differentiation intended to incorporate two different types of activities. For example, motor activities are more predominant in industrial environments where individuals perform monotonous and repetitive tasks during long periods of time (Tang et al., 2016). Alternatively, cognitive activities are more prevalent nowadays since workplaces demand more mental effort, especially after the industrialization era (Boksem & Tops, 2008).

Regarding PE, our findings extend previous theoretical contributions that have mainly focused on the impact of PE on health in general (Conn et al., 2009) and in which target samples were predominantly of children/adolescents whose competencies are still in development (Kim & SO, 2015), or older adults, whose abilities are declining (Phillips et al., 2016). Since a significant positive correlation was found between PE and motor performance, this study provides evidence that may extend the occupational health literature and have important implications for work and organizational studies.

Practical Implications

Cyberloafing is generally prevalent in the workplace (Lim & Chen, 2012) and, according to our results, despite the non-significant differences, a medium effect size confirms that participants revealed a lower increase in terms of number of errors and omissions after performing Internet breaks (when compared with the control group). The literature suggests the need for mental workload optimization (Van Acker, Parmentier, Vlerick, & Saldien, 2018), therefore the work time spent on this type of breaks can be translated into increased productivity. This becomes a critical issue in the corporate world. In other tasks that do not require related cognitive processes (e.g., motor tasks), there is a need to contain cyberloafing. Hence, organizations should find mechanisms and policies to manage cyberloafing behavior and understand when it is prejudicial and when it is beneficial.

There is evidence in the literature that employee surveillance decreases the intention to use the Internet in the workplace (Lijiao, Wenli, Qingguo, & Smyth, 2014) and that company sanctions toward cyberloafing (Blanchard & Henle, 2008) and organizations' Internet policy (Zoghbi-Manrique-de-Lara & Olivares-Mesa, 2010) are also among other antecedents that are moderately associated with cyberloafing. Therefore, in situations where employees develop motor tasks, organizations can use Internet surveillance programs, put explicit policies in place and tailor sanctions to control Internet usage in the workplace (Bequai, 1998).

In sectors where tasks require more physical activity managers may also benefit if they hire employees that are less prone to engage in cyberloafing behaviors since several human behavioral traits have been identified to contribute to cyberloafing behavior. Moreover, because employees perceive the time they spend on non-related activities at work as being lower than the actual time (AUTHORS, 2016), organizations should create awareness among employees about the time they spend on cyberloafing activities and the costs associated with this behavior.

Substantial potential benefits of the promotion of physical exercise should become well established for companies where employees spend more time doing monotonous and repetitive motor tasks, especially after the positive relationship found in this study between PE and performance. Given that, PE in the workplace can provide physical and mental health benefits and employer economic benefits through reduced absenteeism and increased productivity (Hunter et al., 2016). The workplace is therefore a possible setting where employers should encourage workplace health promotion programs that include PE. Comparisons of programs with and without worksite fitness should be made by organizations to determine whether the cost of providing onsite fitness programs is justified with improvements in employee health and productivity (Conn et al., 2009).

Furthermore, this study also revealed that conscientiousness and engagement may be moderators of the relationship between the type of break and cognitive performance, with less errors and omissions after Internet breaks. With this in mind, organizations could provide their employees with specific time slots for Internet breaks in allocated areas of the company where this type of activity is formally recognized, as opposed to being a deviant activity. Moreover, the positive impact of Internet breaks on cognitive performance by high conscientious and engaged individuals deserves more attention in terms of selection processes. Candidates with these profiles are less prone to committing errors and omissions while performing cognitive tasks in between the inevitable cyberloafing breaks of modern times.

Limitations and Future Research

Although the present study aimed to give important contributions to the existing literature about cyberloafing and physical exercise, some limitations also emerged due to the type of research developed that must be acknowledged.

The first limitation of this study is the sample size. The sample consists only of a total of 124 participants, divided by 3 different groups that lead to groups with less than 45 participants each, which means relatively small samples and therefore, some difficulty in finding statistically significant results, as well as large effect sizes. A bigger sample size would increase the robustness of the results found. Moreover, given that the sample size of each group was small, confidence intervals of 90% could be used to provide slightly different interpretations of the results, which means that *p*-values smaller than 0.1 could potentially be cautiously considered statistically significant. Specifically, an alternative explanation could be considering the results as significant since the literature has indicated that the level of significance should be chosen based on the entire context, including the study's aims, area of research, limitations, etc. (Fisher, 1950; Neyman & Pearson, 1933). We opted to present our findings as previous studies (e.g., Haas, Nugent, & Rule, 2004) because we believe they constitute an important steppingstone for future research to investigate further.

Secondly, the group of participants consisted solely of university students and data collection was completed in the university. The literature has shown that i) different types of cyberloafing had different prevalence rates, ii) students and employees differed with regard to cyberloafing and that iii) males and females demonstrated different cyberloafing patterns (Akbulut, Dönmez, & Dursun, 2017). Thus, future studies might consider studying different types of cyberloafing behavior, taking into account gender differences and that data collected in a real workplace could provide more ecological validity.

Moreover, it is relevant to point out that the length of the activities was relatively short. The activities that were performed before the break only lasted 10 minutes, which might have not led to a good representation of the possible fatigue that could arise from more extended activity duration, as in real work conditions (Boksem & Tops, 2008; Li et al., 2016). Data collection did not consider performance per minute. Therefore, future studies might consider

looking at performance over time during T1 and T3. For example, more detailed analyses may consider whether the break raised people back to their initial performance levels, or just raised performance above the level seen at the end of T1. Moreover, to make strong casual inferences about the relationships among variables, it would be interesting to collect data continuously, over a longer period of time (3, 6, or 12 months), given that the benefits of physical exercise practice, for example, are clearer after extended periods of time. Another potential limitation of this study could be the possible bias created by the prizes delivered to the candidates to perform the test which may impact the moderator factors.

Since there are organizations that already use Internet surveillance programs and tailored controlled Internet systems (Bequai, 1998), and that company sanctions and Internet policies were shown to have moderate correlations with cyberloafing (Blanchard & Henle, 2008; Zoghbi-Manrique-de-Lara & Olivares-Mesa, 2010), it would be interesting to compare the performance of employees between these companies and the companies that deploy Internet freely to employees. It would also be interesting to compare performance of employees from organizations that provide onsite work fitness programs with performance of employees that work in organizations that do not provide these programs.

Conclusion

Findings revealed possible trends indicating that cyberloafing may have a positive effect on cognitive performance, whereas physical exercises breaks had a positive impact on motor performance. These findings provide insights in line with the cognitive dissonance theory, for organizations to find mechanisms and policies to stimulate the appropriate breaks by considering the characteristics of the work tasks. On the other hand, physical exercise was found to have a positive effect on motor performance, giving organizations evidence of potential benefits of physical exercise in the workplace. Conscientiousness and engagement

were also found to be potential moderators of these relationships with regard to cognitive performance, showing a positive effect along with Internet breaks.

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Table 1.

Resume of the cognitive and motor activities.

Group	***Cognitive Activity (30 min) Toulouse-PiéronTest***			***Motor Activity (30 min) Raffles***		
	T1 -10 min	*T2 -10 min (Break)*	*T3 - 10 min*	*T1 -10 min*	*T2 -10 min (Break)*	*T3 - 10 min*
No Break (Control Group)	Toulouse-Piéron	Toulouse-Piéron	Toulouse-Piéron	Raffles	Raffles	Raffles
Physical Exercise Break	Toulouse-Piéron	Physical Exercises	Toulouse-Piéron	Raffles	Physical Exercises	Raffles
Internet Break	Toulouse-Piéron	Internet Activities	Toulouse-Piéron	Raffles	Internet Activities	Raffles

Table 2.

Descriptive analysis of ANOVA test results for performance during periods T1 and T3.

Group	***Cognitive Performance (errors and omissions)***					***Motor Performance***				
	M1	*SD1*	*M3*	*SD3*	*N*	*M1*	*SD1*	*M3*	*SD3*	*N*
No Break (Control Group)	21.57	16.00	34.50	23.83	44	28.50	10.34	37.82	12.77	44
Breaks (Physical exercise and Internet breaks)	23.82	21.32	36.74	26.48	77	30.28	14.24	36.80	16.48	76
Physical Exercise Break	23.43	28.45	42.65	25.11	40	33.18	14.77	40.85	17.14	39
Internet Break	24.18	11.78	30.35	26.77	37	27.22	13.18	32.54	14.81	37
Total	23.00	19.52	35.93	25.47	121	29.62	12.93	37.18	15.18	120

Notes: M1 = mean at time 1, M3 = mean at time 3; SD1 = standard deviation at Time 1; SD3 = standard deviation at Time 3, N = sample size.

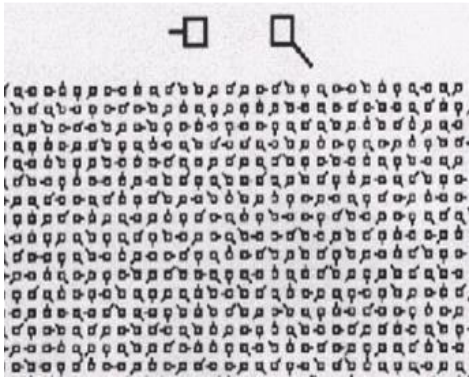

Figure 1. Toulouse-Piérron attention test (excert) where participants must mark the two target figures which are seen at the top, in the rows of smaller figures.

Figure 2a. The pieces of paper that were used to make the raffles.

Figure 2b. Pieces of paper rolled up into raffles.

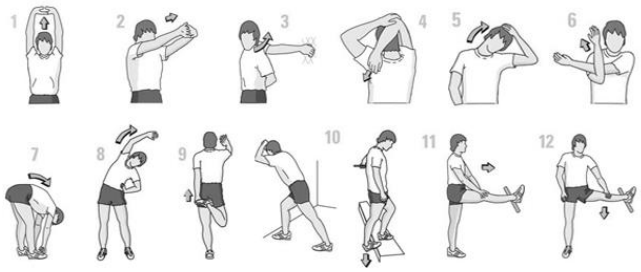

Figure 3. Exercises practiced by the physical exercise break group.

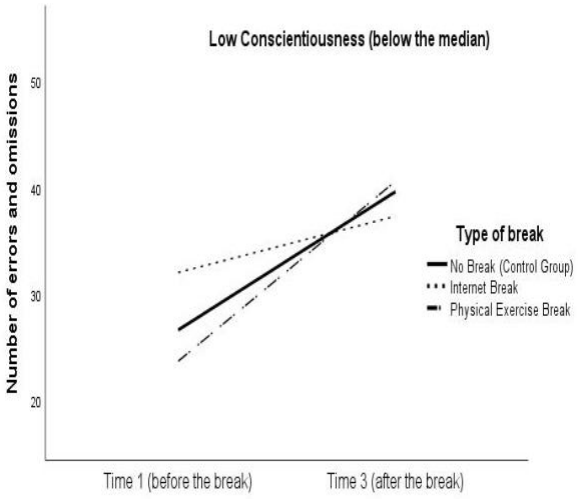

Figure 4. The moderation effect of low conscientiousness on cognitive performance.

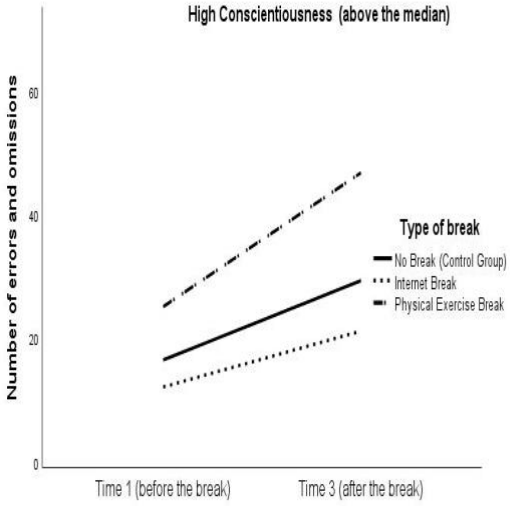

Figure 5. The moderation effect of high conscientiousness on cognitive performance.

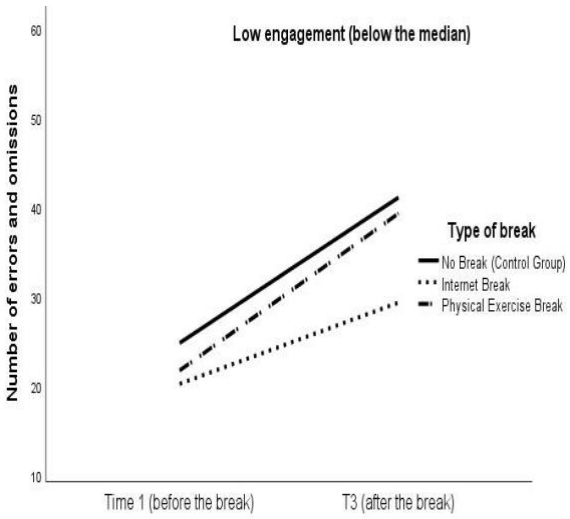

Figure 6. The moderation effect of low engagement on cognitive performance.

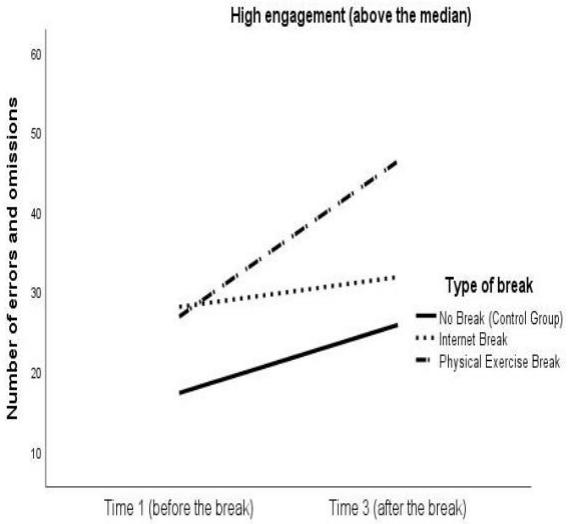

Figure 7. The moderation effect of high engagement on cognitive performance.