Author(s): Jiang, Heming; Siponen, Mikko; Tsohou, Aggeliki

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REVIEW

Personal use of technology at work: a literature review and a theoretical model for understanding how it affects employee job performance

Hemin Jiang[a], Mikko Siponen[b] and Aggeliki Tsohou[c]

[a]International Institute of Finance, School of Management, University of Science and Technology of China, Hefei, Anhui, People's Republic of China; [b]Faculty of Information Technology, University of Jyvaskyla, Finland; [c]Department of Informatics, Ionian University, Corfu, Greece

ABSTRACT

Employee personal use of technology at work (PUTW) – defined as employees' activities using organisational or personal IT resources for non-work-related purposes while at work – is increasingly common. Our review of existing PUTW studies (n = 137) suggests that previous studies widely discussed PUTW outcomes, antecedents, and policies. The literature review also indicates that previous studies proposed opposing viewpoints regarding the effect of PUTW on employee job performance, but few studies offered empirical evidence. Consequently, the conditions under which PUTW can increase or decrease employee job performance have not been discussed. We develop a theoretical model for increasing the understanding of this issue. Our model suggests that executive attention is an important underlying mechanism through which PUTW affects employee job performance. We further suggest the effect of PUTW on executive attention (and job performance) depends on PUTW behavioural characteristics in terms of four dimensions: PUTW cognitive load, PUTW arousal level, PUTW timing, and PUTW frequency/duration. The model can advance researchers' understanding of the possible conditions under which PUTW may increase or decrease employee job performance. The model also offers new insights into existing studies on PUTW antecedents and policies. As a result, our proposed model provides new theoretical guidance for future studies on PUTW.

1. Introduction

Information technology (IT) devices that are connected to the internet, such as computers, tablets, and smartphones, are ubiquitous at work. These IT devices have greatly facilitated employees' job task performance. At the same time, employees increasingly use these technologies for non-work-related purposes while at work, referred to as employee personal use of technology at work (PUTW) (Burleson & Greenbaum, 2019; Kim, 2018). Examples of PUTW include, but are not limited to, checking and sending non-work-related emails, surfing news sites, visiting social networking sites, performing e-banking, as well as online shopping, chatting, and gaming.[1]

Compared with other traditional non-work-related activities at work, such as long lunch breaks and socialising with co-workers, PUTW does not require employees to be physically absent from their desk or work computer, and thus, it is more convenient, and often less visible to others (Khansa et al., 2017; Wagner et al., 2012). The convenience and invisibility may explain why PUTW is reported to be the main form of non-work-related behaviour at work (Ivarsson & Larsson, 2011). For example, recent studies have suggested that, on average, employees spend one to two hours every workday on PUTW (Kim, 2018), accounting for 10% to 30% of their work time (Agarwal, 2019; Askew et al., 2019).

Due to the prevalence of PUTW, there has been a swell of academic research on this topic in recent years. To understand the status quo of PUTW research, we conduct a systematic review of PUTW literature (consisting of 137 publications). Our review suggests that previous researchers have widely discussed PUTW outcomes, antecedents, and policies. Our review also suggests that previous studies have proposed two opposing viewpoints regarding the effect of PUTW on employee job performance. In some studies, researchers considered PUTW as stealing work time and thus, decreasing employee job performance (Blanchard & Henle, 2008; O'Neill et al., 2014; VKG. Lim, 2002). By contrast, other scholars saw PUTW as providing a convenient mental break or as facilitating work–life balance for employees, which may ultimately increase employee job performance (BL. Coker, 2011; BLS. Coker, 2013). Although both viewpoints can be partially correct, the possible conditions under which a certain PUTW behaviour may increase or decrease employee job performance have not been discussed or examined. For example, previous studies have not explained why the

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same PUTW behaviour – say, non-work-related Facebook use – may increase the job performance of one employee but decrease the job performance of another; or why the same PUTW behaviour decreases the job performance of one employee in some situations but increases the same employee's job performance in other situations.

The opposing viewpoints above have further led scholars to discuss PUTW antecedents (i.e., what factors may result in PUTW) and PUTW policies (i.e., what policies should be adopted to regulate PUTW) from two opposing perspectives. Specifically, the studies that argue for the negative PUTW outcomes have often framed PUTW as a deviant behaviour (e.g., Liberman et al., 2011; VKG. Lim, 2002). These studies have discussed PUTW antecedents from the perspective of why employees engage in deviant behaviours, and suggested deterrence-based policies (e.g., monitoring or sanctions) to prohibit PUTW (Henle et al., 2009; Zoghbi-Manrique-de-Lara & Olivares-Mesa, 2010). By contrast, the studies that argue for the positive PUTW outcomes have discussed PUTW antecedents from the perspective of what utilities employees can gain from PUTW (Garrett & Danziger, 2008; Pindek et al., 2018). These studies suggest that organisations should not adopt the deterrence-based policies to regulate PUTW. The two opposing perspectives may confuse researchers and managers.

Accordingly, the primary objective of this paper is to open up a discourse of the possible conditions under which a PUTW behaviour can increase or decrease employee job performance. Specifically, we first propose one important underlying mechanism[2] (i.e., executive attention) through which PUTW affects employee job performance, which has not been discussed in previous PUTW studies. Discussing executive attention as a potential mechanism inspires us to discuss four PUTW behavioural dimensions, including (1) PUTW cognitive load, (2) PUTW arousal level, (3) PUTW timing, and (4) PUTW frequency/duration. Discussing these dimensions can advance our understanding of the possible conditions under which PUTW may increase or decrease employee job performance.

As a result of the discussions, we develop a theoretical model for understanding the effect of PUTW on employee job performance, which includes three propositions. The proposed model offers a new understanding of extant PUTW literature and provides new theoretical guidance for future studies on PUTW. In the remainder of the paper, we first systematically review PUTW literature and present the opposing viewpoints or perspectives of previous PUTW studies. We then develop the model for PUTW and explain how the proposed model can contribute to PUTW literature. We also discuss the research methods for testing the proposed model. We

conclude by discussing the implications and limitations of this paper.

2. Literature review

2.1. What is PUTW?

In addition to the term PUTW, previous studies have used terms such as *cyberloafing, non-work-related computing (NWRC), personal internet usage (PIU), personal web usage (PWU), internet abuse*, and *workplace internet deviance* to describe PUTW or similar phenomena. Some scholars have used these terms interchangeably (Garrett & Danziger, 2008; Ugrin & Pearson, 2013; Vitak et al., 2011). Traditionally, PUTW literature often describes PUTW as employees' use of *organisational* IT resources for personal or non-work-related purposes either at 1) the *workplace* or 2) during *office time* or *business hours* (Agarwal, 2019; B Cheng et al., 2020; Khansa et al., 2017; VKG. Lim, 2002). With the advancement of technologies (e.g., personal smartphones) and the changing nature of work (e.g., more flexible work hours and work locations), the definition of PUTW has evolved (Burleson & Greenbaum, 2019; Kim, 2018) to reflect the various forms of work conditions. Therefore, in the present study, we follow Burleson and Greenbaum (2019) and define PUTW as employees' activities of using (either organisational or personal) information technology (IT) for non-work-related purposes while at work.

The evolution of the PUTW definition may not fundamentally change what has been (and still is) perhaps the key interest in PUTW: (1) employees' behaviour of using (organisational or personal) IT resources (2) for non-work-related purposes (3) while at work.[3] Therefore, the findings of previous studies are still important for understanding the phenomenon of PUTW. In the following subsections, we review the previous PUTW literature.

2.2. Review of the PUTW literature

We conducted a systematic literature review and identified 137 studies on PUTW (see the details of the literature review process and the reviewed publications in the appendix). In reviewing previous studies, we observed three important research topics: (1) PUTW outcomes, (2) PUTW antecedents, and (3) PUTW policies. We also observed that scholars had opposite opinions on the effect of PUTW on employee job performance (i.e., negative effect vs. positive effect). The opposing viewpoints further led these scholars to discuss PUTW antecedents and policies from two opposing perspectives. To facilitate the discussion, we use the term "negative PUTW studies" to refer to studies that either empirically identified or argued (or assumed) the negative effect of PUTW on

employee job performance. In this category, we also include studies that examined PUTW antecedents and policies based on the assumption that PUTW decreases job performance. By contrast, we use the term "positive PUTW studies" to refer to studies that either empirically identified or argued (or assumed) that PUTW can improve job performance or studies that examined PUTW antecedents and policies based on the assumption that PUTW can improve job performance. Next, we review previous studies on PUTW.

2.2.1. PUTW outcomes: negative or positive

The first research topic we observed in the literature is PUTW outcomes. Only a few studies have empirically investigated PUTW outcomes, all of these studies used a survey method with between 71 and 338 participants. The results of these studies suggested that PUTW can have negative and positive outcomes. For the negative outcomes, previous studies found that PUTW may lead to time loss (Bock & Ho, 2009), procrastination and negative emotion (Lavoie & Pychyl, 2001), client dissatisfaction (Zoghbi-Manrique-de-Lara, 2012), and decreased job performance (Ramayah, 2010).

By contrast, other studies have discussed the positive outcomes of PUTW. Specifically, based on argumentation without empirical evidence, some studies have suggested that the constructive use of PUTW may facilitate employees' mental recovery (Ivarsson & Larsson, 2011) and learning (Belanger & Van Slyke, 2002), which may eventually make employees more productive (Oravec, 2002). These viewpoints were partially supported by some of the subsequent empirical studies. For example, based on social contract theory, Anandarajan and Simmers (2005) have found that PUTW could lead to positive outcomes, such as productivity gain, work–life balance, increased skills and knowledge, and reduced stress. Similarly, from the role integration perspective, Gözü et al. (2015) have found that PUTW may buffer the negative outcomes of the work–family conflict. Drawing on self-determination theory, BL. Coker (2011) has found that allowing employees to engage in PUTW can foster employees' sense of autonomy, and may eventually have a positive effect on work productivity, provided the PUTW does not exceed more than about 12% of work time. BLS. Coker (2013) has further shown that PUTW can replenish individuals' attentional resources and improve employees' perceived productivity.

In other studies, scholars have discussed negative and positive outcomes of PUTW. Specifically, drawing on the job demands-resources model, Kim and Christensen (2017) have discussed in a conceptual model (without empirical evidence) the potential positive outcomes of PUTW (e.g., mental break and work–life balance) and the negative outcomes (e.g., mental distraction and information overload). Similarly, VKG Lim and Chen (2012) have found that PUTW emailing activities may result in negative emotions, whereas PUTW browsing activities may result in positive emotions; this is because emailing activities often consume more cognitive resources than browsing activities do (VKG Lim & Chen, 2012).

In summary, previous studies have provided evidence that PUTW produces various outcomes. Some PUTW outcomes (such as mental recovery, work–life balance, and increased positive emotion) can increase employee job performance, whereas other PUTW outcomes (such as reduced work time, mental distraction, and increased negative emotion) can decrease employee job performance. Although these findings are important, the conditions under which a certain PUTW behaviour is likely to increase or decrease employee job performance have not been discussed or empirically examined in the literature. As a result, previous studies did not explain, for example, why the same PUTW behaviour – say, non-work-related Facebook use – has a positive effect on the job performance of one employee but has a negative effect on the job performance of another; or why the same PUTW behaviour decreases the job performance of one employee in some situations but increases the same employee's job performance in other situations. The lack of answers to this question may also confuse organisations seeking to take advantage of the positive effect of PUTW on job performance while avoiding the negative effect.

2.2.2. PUTW antecedents: work stressors or PUTW utility

The second research topic we observed in the PUTW literature is PUTW antecedents, which relate to the reasons that lead employees to engage in PUTW. Generally speaking, the opposing viewpoints on PUTW outcomes have led scholars to discuss PUTW antecedents from two opposite perspectives.

Specifically, in negative PUTW studies, scholars have taken PUTW as a deviant behaviour and thus, examined PUTW antecedents from the perspective of why employees engage in deviant behaviours. Based on this perspective, several scholars have found that employees are likely to engage in PUTW as an escape of the normative conflict produced by perceived injustice (Blau et al., 2006; V. Lim, 2005; Restubog et al., 2011; VKG. Lim, 2002; Zoghbi-Manrique-de-Lara, 2007, 2009). Employees' perceptions of work role ambiguity and role conflict have also been found to be positively associated with PUTW (Blanchard & Henle, 2008; Runing et al., 2012). Role ambiguity and role conflict, which refer to unspecified or incompatible demands regarding employees' job duties (Rizzo et al., 1970), may create employees' perceived

uncertainty and frustration. PUTW has been considered an ideal way for employees to escape or distance themselves from negative encounters (Blanchard & Henle, 2008; Griffiths, 2010).

In other words, PUTW has been considered in negative PUTW studies as a means of dealing with negative perceptions generated by work stressors, such as perceived injustice, role ambiguity, or role conflict. A similar rationale could explain some other PUTW antecedents that have been identified in previous negative PUTW studies, such as work dissatisfaction (O'Neill et al., 2014), perceived powerlessness (Blanchard & Henle, 2008; Blau et al., 2006; Chen et al., 2011), low job involvement, low intrinsic work motivation (Liberman et al., 2011), burnout (Aghaz & Sheikh, 2016), and workplace ostracism (Koay, 2018).

In contrast to negative PUTW studies, in positive PUTW studies scholars have explored what drives employees to perform PUTW from the perspective of the expected PUTW utility. These scholars have argued that the physical boundaries between work life and private life are increasingly blurred due to the pervasiveness of the internet (Ivarsson & Larsson, 2011). The blurred boundaries facilitate employees working remotely (Kossek et al., 2006), and allow them to perform private tasks at work (Ivarsson & Larsson, 2011). The flexibility of time and space is important to allow an employee's work and family roles to enrich each other (Greenhaus & Powell, 2006). Accordingly, by viewing PUTW as a convenient means of managing work and personal tasks, in positive PUTW studies scholars have identified perceived benefits of engaging in PUTW (e.g., time-saving, convenience, and interesting work life, maintaining personal relationships), recovery experience, perceived internet utility, and coping with boredom at work as PUTW antecedents (Garrett & Danziger, 2008; König & De La Guardia, 2014; Pindek et al., 2018; Reinecke, 2009).

To summarise, previous studies on PUTW antecedents have suggested that negative perceptions of work stressors and expectations for positive PUTW utility can be important reasons employees engage in PUTW. However, it is unknown from previous studies in what situations the negative or positive perspective should be adopted to study PUTW antecedents. Given that the opposite perspectives of previous studies on PUTW antecedents originate from the opposing viewpoints regarding the effect of PUTW on employee job performance, we suggest that understanding the conditions under which PUTW can increase or decrease employee job performance can help understand the previous studies on PUTW antecedents.

2.2.3. PUTW policies: deterrence or non-deterrence

The third research topic that we observed in the PUTW literature is PUTW policies: what policies should be adopted by organisations to regulate PUTW. In negative PUTW studies, scholars have primarily discussed deterrence-based policies for curbing PUTW, such as internet monitoring and sanctions. Although some of the findings are mixed (Chen et al., 2008; Rahimnia & Mazidi, 2015; Zoghbi-Manrique-de-Lara, 2006), these studies have generally found that monitoring and sanctions are useful for mitigating PUTW (Glassman et al., 2015; Henle et al., 2009; Shepherd et al., 2014; Ugrin & Pearson, 2013, 2008; Urbaczewski & Jessup, 2002; Wang et al., 2013), especially when internet monitoring and sanctions are combined together (Zoghbi-Manrique-de-Lara & Olivares-Mesa, 2010). Deterrence-based policies can curb PUTW because monitoring and sanctions can increase employees' perceived risk of engaging in PUTW.

In contrast to the deterrence-based policies above, in positive PUTW studies scholars have suggested that PUTW should be allowed in some situations (Ivarsson & Larsson, 2011), and PUTW should not be addressed uniformly with deterrence policies. On the one hand, deterrence-related factors are less salient in explaining PUTW than other factors, such as the perceived benefits of PUTW and personal norms against PUTW (Li
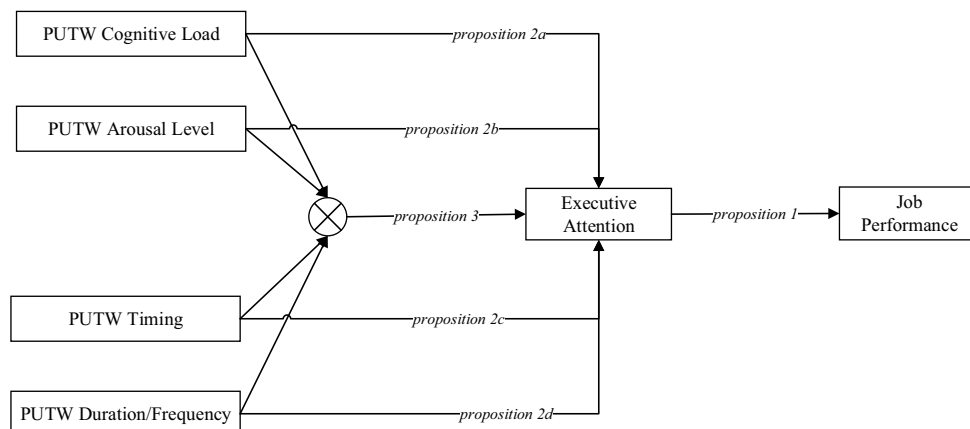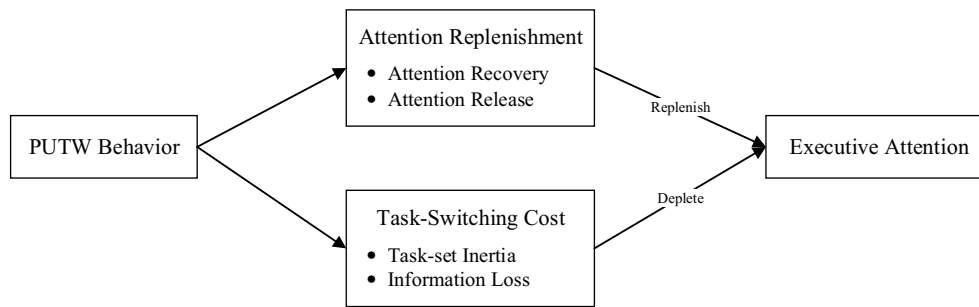

Figure 1. A theoretical model for understanding the effect of PUTW on job performance.

Figure 2. The positive and negative impacts of PUTW on executive attention.

et al., 2010; Moody & Siponen, 2013). On the other hand, deterrence policies may elicit employees' resistance, such as increased PUTW behaviour (Wang et al., 2013; Zoghbi-Manrique-de-Lara et al., 2006) and decreased job satisfaction (Jiang et al., 2020; Shepherd & Klein, 2012; Urbaczewski & Jessup, 2002). Accordingly, these studies have discussed PUTW policies that are less coercive (Ivarsson & Larsson, 2011).

In summary, scholars have discussed PUTW policies from two opposing perspectives. Despite the important implications, previous studies did not discuss in what situations a deterrence- or non-deterrence-based policy should be adopted for addressing PUTW. As a result, the implications of these studies for organisations to develop appropriate PUTW policies could benefit from examining such situations. Similar to PUTW antecedents, the opposing perspectives of previous studies on PUTW policies also originate largely from scholars' opposing viewpoints on the effect of PUTW on job performance. Therefore, discussing the conditions under which PUTW can increase or decrease employee job performance can help understand previous studies on PUTW policies.

3. Towards a theoretical model for understanding the effect of PUTW on employee job performance

3.1. How PUTW affects employee job performance: the role of executive attention

Our literature review suggests that a fundamental issue of PUTW, which requires further theoretical discussions and empirical investigations, is to understand the possible conditions under which a certain PUTW behaviour may increase or decrease employee job performance. We next develop a theoretical model (Figure 1) for increasing our understanding of such conditions.

Job performance refers to how well (in terms of quality and quantity) an employee performs the tasks specified in his or her job responsibilities. Generally

speaking, negative PUTW studies have argued that PUTW decreases employee job performance because PUTW steals work time, or because PUTW can be a distraction, which reduces employees' productive work time (Kim & Christensen, 2017). By contrast, positive PUTW studies have suggested engaging in PUTW may produce some "benefits" (e.g., mental recovery, work–life balance) which can eventually compensate for the "costs" of PUTW. As a result, the overall effect of the PUTW behaviour on job performance can be positive. We suggest that an important avenue for increasing our understanding of the effect of PUTW on employee job performance is to further investigate the underlying mechanisms through which PUTW affects job performance, because discussing the underlying mechanisms can help explain how the "benefits" can compensate for the "costs" of PUTW, and thus, integrate the two opposing viewpoints. In this paper, we suggest one important mechanism (among others): executive attention.

Attention refers to the selected response to the external environment. Two types of attention have been discussed in cognitive psychology literature: involuntary attention and executive attention (Pashler et al., 2001). Involuntary attention is a spontaneous reaction and requires little effort, such as the attention attracted by a student's shouting in a classroom while a lecture is being delivered. By contrast, executive attention requires individuals' cognitive efforts. Executive attention is characterised by the ability to effectively block external distractions while focusing on a single object or task (Diamond, 2013). An example of using executive attention is an employee focuses on job tasks and ignores irrelevant stimuli or distractions. The terms "attention" and "attentional resources" in the remainder of the paper refer to executive attention.

Executive attention can be an important mechanism through which PUTW affects employee job performance for the following reasons. First, many PUTW outcomes that have been discussed by previous scholars are related to executive attention. For example, previous studies suggested that PUTW can alleviate employees'

mental fatigue (BL. Coker, 2011; BLS. Coker, 2013; VKG Lim & Chen, 2012), or PUTW can be a mental distraction (Khansa et al., 2017). Mental fatigue and mental distraction, which are important predictors of job performance, are closely associated with executive attention. Second, increased executive attention can be beneficial for job performance, because more executive attention can facilitate individuals to select information and skills that are the most relevant to the task and inhibit stimuli or distractions that are not relevant to the focal task (Kaplan & Berman, 2010). Third, executive attention has been suggested as a source of other functions that are important for task performance, such as working memory, reasoning, planning, and problem-solving (Diamond, 2013; Kaplan & Berman, 2010). Therefore, job performance is likely to be improved when more executive attention is focused on job tasks, and job performance is likely to suffer when executive attention is depleted or focused elsewhere (Hirst & Kalmar, 1987; Speier et al., 1999). Accordingly, we propose the following:

Proposition 1: *Executive attention is an important mechanism through which PUTW affects employee job performance; the positive (negative) effect of PUTW on employee executive attention is likely to result in positive (negative) effect of PUTW on job performance.*[4]

Next, we discuss why PUTW may replenish or consume employees' executive attention (Figure 2). We also discuss the contingent factors that may strengthen or attenuate the positive and negative effects of PUTW on employee executive attention (and eventually, on job performance). The discussion can advance our understanding of the conditions under which a particular PUTW

behaviour can increase or decrease employee job performance.

3.2. Positive impact of PUTW on executive attention: attention replenishment

According to attention restoration theory (Kaplan, 1995), individuals' attentional resources are limited at a given time, and they can be depleted by various demands. For example, attentional resources can be depleted by performing cognition-intensive job tasks for a certain period. In this case, time away from cognition-intensive tasks, such as engaging in PUTW activities that require a low cognitive load (e.g., web browsing or online social networking), can help restore individuals' attentional resources (Berto, 2005). Previous studies have also suggested that negative perceptions of various stressors may deplete employees' executive attention, because employees may need to devote attentional resources to regulate (e.g., suppress, reappraise) the negative perceptions (Beal et al., 2005; Gross, 1998). In this sense, time away (e.g., a temporary escape) from the stressors via PUTW, which frees employees from effortful regulation of the negative perceptions, can also be a sort of temporary recovery and replenish employees' attentional resources.[5]

Another demand that may deplete individuals' attentional resources is the perceived conflict between private tasks and job tasks. For example, an employee may need to buy a birthday gift for a child, but at the same time, the employee needs to stay at his or her workplace or perform work tasks. Such a conflict can create negative feelings (e.g., anxiety), which may consume some of the employee's attentional resources (Beal et al., 2005), leaving limited attentional resources available for job tasks. In this case, if a PUTW behaviour can eliminate the conflict (e.g., solving the work–family conflict via PUTW to buy the gift), the
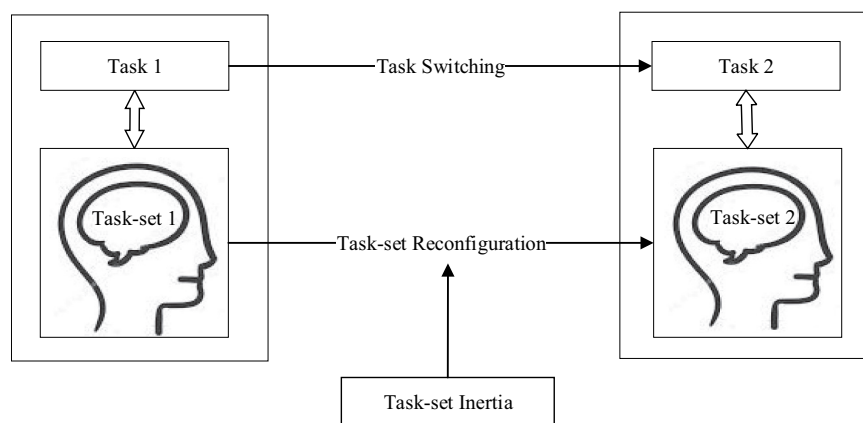

Figure 3. The process of task-set reconfiguration.

behaviour can help release attentional resources that were previously occupied by the conflict, and thus, increase attentional resources for job tasks.

In other words, PUTW can act as a form of mental recovery or a temporary time away from stressors, or can help employees deal with some personal tasks, and eventually, help replenish employees' executive attention. However, some PUTW activities (e.g., online shopping, writing a personal email) may require a high cognitive load, which may consume attentional resources and finally, attenuate the attention replenishment effect (VKG Lim & Chen, 2012). Therefore, we suggest that the attention replenishment effect of PUTW can be particularly real if the PUTW activity requires a low cognitive load. Consider the hypothetical scenario above in which an employee needs to buy a birthday gift for his or her child while at work. In this scenario, if the employee can either choose to buy the gift in person (i.e., online shopping as PUTW) or choose to ask his or her partner to buy the gift via a quick online message (i.e., online chatting as PUTW), we argue that the online chatting (as PUTW) can be a better option for attention replenishment. The reason is the cognitive load of online chatting in this example is relatively lower than online shopping because online shopping may involve product comparison and purchase decision making (Kuem & Siponen, 2014; VKG Lim & Chen, 2012). Based on the discussions above, we propose the following:

Proposition 2a: *PUTW activities can be used to replenish employees' executive attention; the lower the cognitive load required by a PUTW activity, the better the attention replenishment effect of the PUTW activity.*

3.3. Negative impact of PUTW on executive attention: task-switching cost

Although PUTW can replenish employees' executive attention, the attention replenishment effect can be attenuated by the task-switching cost when employees switch their attention from PUTW to job tasks. Switching attention from one task or activity (e.g., PUTW) to another (e.g., a job task) tends to be difficult, and the subsequent task performance can easily suffer because of the switching cost (Leroy, 2009). We suggest that the task-switching cost between PUTW and job tasks can be understood from two complementary perspectives: task-set inertia and information loss. Task-set inertia explains the switching cost from the perspective of PUTW, and information loss explains the switching cost from the perspective of job tasks.

In terms of task-set inertia (Figure 3), individuals always have a task set in mind when performing a certain task, referring to the coordination of cognitive processes and mental representations that enable the person to act in accordance with the task requirements (Kiesel et al., 2010; Rogers & Monsell, 1995). Because individuals' cognitive resources are limited at a certain time (Eriksen & James, 1986; Wickens, 1976), the individuals are barely able to focus simultaneously on multiple tasks (Beal et al., 2005); therefore, task-set reconfiguration is needed when switching between tasks (Rogers & Monsell, 1995). However, task-set reconfiguration is sometimes not easy because of task-set inertia (Alport et al., 1994; Leroy, 2009), which can result in a task-switching cost in the form of extra time and attentional resources that individuals need to complete the switched task (Hsieh & Liu, 2005; Wylie & Allport, 2000). The task-switching cost can be substantial, even if the tasks are simple (Kiesel et al., 2010).

Generally speaking, high task-set inertia may result in a high task-switching cost (Wylie & Allport, 2000). According to previous studies, an important factor that determines the task-set inertia of a certain task is the arousal level of the task (Schimmack & Derryberry, 2005). Arousal is defined as the degree of energisation or excitement with physiological, subjective, and behavioural expressions (Matthews & Amelang, 1993). If a task has a high arousal level, then the associated task-set is highly active, and the task-set reconfiguration after the task is performed will be relatively difficult. Therefore, task-set inertia is relatively high when attention is switched from a task which has a high arousal level (Demanet et al., 2011).

In the PUTW context, we suggest different PUTW activities can be associated with different arousal levels. For example, compared with surfing general news online, the arousal level of online gaming or gambling may be higher, because online gaming or gambling involves increased real-time interactions (or competitions) with the computer or other users. Therefore, it is generally more difficult for employees to switch their attention from online gaming or gambling back to job tasks than to switch their attention from surfing news websites to performing job tasks (Reinecke, 2009). In other words, the task switching cost is high when attention is switched from a PUTW activity that has a high arousal level, because employees may need to devote extra attentional resources to overcome the high task-set inertia. Accordingly, we propose:

Proposition 2b: *The higher the arousal level of a PUTW activity, the higher the task-switching cost in terms of the executive attention of the PUTW activity.*

In addition to task-set inertia, another source of the task-switching cost is information loss, which happens when PUTW interrupts employees' job tasks. Task-set inertia explains the switching cost from the perspective of PUTW, and interruptions can explain the

switching cost from the perspective of job tasks. Specifically, if a PUTW activity interrupts employees' ongoing tasks (e.g., a non-work-related instant message coming during a work task), employees need to first restore the information about the focal work task before turning to PUTW. After they finish the PUTW behaviour, employees may need to recall the information of the interrupted work task before actually starting it again (Salvucci et al., 2009). The "restoration and recalling" process may take time and lead to information loss. Reprocessing the lost information requires extra time and attentional resources, which results in a switching cost, and negatively affects the interrupted work task performance (Altmann & Trafton, 2004).[6]

Based on the literature on interruptions, three factors can be important for determining the strength of the negative effect of interruptions: interruption timing, interruption frequency, and interruption duration. In terms of interruption timing, the negative effect of interruptions on the focal task performance is high if employees in a high concentration state (on the focal task) are interrupted (Borst et al., 2015; Jenkins et al., 2016). The reason is that employees need to restore and recall more information if they are interrupted when they are in a high concentration state, which can result in more information loss. In the PUTW context, employees often perform multiple tasks every day (Leroy, 2009). As a result, employees may engage in PUTW during their performance of a particular task (i.e., within-task PUTW, such as chatting online about a weekend party while writing a report). They may also engage in PUTW at a point between performing different tasks (i.e., between-task PUTW, such as chatting online about a weekend party after finishing the report and before writing another report).

Generally speaking, employees often need to devote a higher level of concentration when they are performing the tasks than when they are not performing the tasks. Therefore, the negative effect of within-task PUTW on executive attention (and thus on task performance) can be higher than that of between-task PUTW. Thus, we propose:

Proposition 2c: *A within-task PUTW behaviour is often likely to result in a higher task-switching cost in terms of executive attention than a between-task PUTW behaviour.*

In terms of interruption frequency and duration, a higher interruption frequency (e.g., PUTW frequency) may result in a higher task-switching cost, because a higher frequency of interruptions naturally results in more "restoration and recalling" processes, and results in more information loss. Moreover, increased frequency of interruptions can produce accumulated negative emotions or affect for employees (e.g., irritation or anxiety), which can be an extra depletion of employees' attentional resources (Baethge et al., 2015; Beal et al., 2005). Therefore, dealing with interruptions can become more complex and cognitively demanding as more interruptions happen (Baethge et al., 2015; Tams et al., 2015). Similarly, the longer the interruption duration, the higher the task-switching cost, because more information about the interrupted tasks is lost as the duration of the interruption increases (Altmann & Trafton, 2004). Moreover, as the PUTW duration increases, the task-set inertia of PUTW can be reinforced and become increasingly active. Thus, it may become increasingly difficult for employees to switch their attention back to job tasks after the PUTW behaviour. Therefore, we propose:

Proposition 2d: *The higher the frequency or the longer the duration of a PUTW behaviour, the higher the task-switching cost in terms of the executive attention of the PUTW behaviour.*[7]

3.4. Integrating the positive and negative effect of PUTW on employee executive attention

Taking the discussions above together, PUTW can replenish employees' executive attention, which can increase employee job performance. However, at the same time, employees may need to devote executive attentional resources to compensate for the task-switching cost due to task-set inertia and information

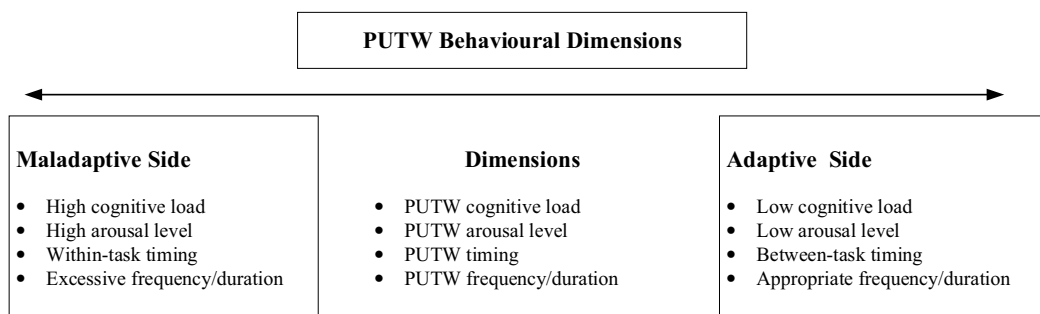| PUTW Behavioural Dimensions		
Maladaptive Side	**Dimensions**	**Adaptive Side**
• High cognitive load • High arousal level • Within-task timing • Excessive frequency/duration	• PUTW cognitive load • PUTW arousal level • PUTW timing • PUTW frequency/duration	• Low cognitive load • Low arousal level • Between-task timing • Appropriate frequency/duration

Figure 4. The behavioural dimensions of PUTW.

loss, which can attenuate or even overrule the potential positive effect of PUTW on executive attention (and thus, on job performance). The discussions above further suggest that the attention replenishment effect of PUTW is influenced by the PUTW cognitive load (i.e., proposition 2a). The task-set inertia of PUTW can be influenced by the PUTW arousal level (i.e., proposition 2b), and the negative effect of interruptions of PUTW can be related to the PUTW timing and PUTW frequency/duration (i.e., proposition 2c and proposition 2d).

Following these discussions, it seems that the effect of a particular PUTW behaviour on executive attention may depend on the specific characteristics of the PUTW behavioural dimensions in terms of the PUTW cognitive load, PUTW arousal level, PUTW timing, and PUTW frequency/duration. For each dimension of the PUTW behaviour, there can be an adaptive side and a maladaptive side (see Figure 4). We suggest that a PUTW behaviour can most positively affect (or least negatively affect) executive attention if the PUTW behaviour is simultaneously characterised as requiring a low cognitive load, with a low arousal level, occurring at between-task timing, and with an appropriate frequency and duration. By contrast, a PUTW behaviour can most negatively affect (or least positively affect) executive attention if the PUTW behaviour is simultaneously characterised as requiring a high cognitive load, with a high arousal level, occurring at within-task timing, and with excessive frequency or duration.

In between the two extreme cases above, the different dimensions of PUTW may interact with each other and exert a joint effect on executive attention. We suggest that the adaptive side of a dimension (e.g., PUTW at between-task timing) can strengthen the positive effect of the adaptive side of another dimension (e.g., PUTW with low cognitive load) on executive attention, or can weaken the negative effect of the maladaptive side of another dimension (e.g., PUTW with high arousal level). For example, a between-task PUTW behaviour (with appropriate duration and frequency) as a mental break can positively affect employee executive attention in terms of attention replenishment, and the positive effect can be stronger if the PUTW behaviour requires a low (as opposed to high) cognitive load, such as surfing general news. However, if the between-task PUTW used as a mental break is online gambling, which has a high arousal level, the positive effect can be weakened, because it may take more time and effort for employees to switch their attention from online gambling back to work tasks than from surfing news to work tasks. To give another example, a within-task PUTW activity, such as receiving a pushed notification from a personal smartphone, can negatively affect executive attention because the notification can be an interruption. However, such a negative effect can be weakened if the notification does not interrupt the employee frequently, or checking the notification does not take a long time. Hence, we propose:

Proposition 3: *The four dimensions of PUTW behaviour may interact to influence employee executive attention. The adaptive side of a dimension can strengthen the positive effect of the adaptive side of another dimension (or can weaken the negative effect of the maladaptive side of another dimension) on executive attention.*

As a summary of the propositions above, we develop a theoretical model for PUTW (Figure 1). Our model suggests that executive attention can be an important path through which PUTW affects employee job performance (i.e., *proposition 1*); the effect of PUTW on employee executive attention and job performance is dependent on the joint effects of the four PUTW behavioural dimensions, including (1) PUTW cognitive load, (2) PUTW arousal level, (3) PUTW timing, and (4) PUTW frequency/duration (i.e., *proposition 2 and proposition 3*). Discussing PUTW behavioural dimensions and their interactions can advance our understanding of the conditions in which PUTW may increase or decrease employee job performance.

The proposed model can also have important implications for understanding previous studies on PUTW antecedents and policies. Specifically, previous studies have examined PUTW antecedents and policies from two opposing perspectives, without clarifying in what situations a positive or negative perspective should be adopted. Based on our theorising, whether a PUTW behaviour decreases or increases job performance may depend on the PUTW behavioural characteristics in terms of the four dimensions. Therefore, for the PUTW behaviour that is primarily characterised by the maladaptive sides of the four PUTW behavioural dimensions, it may be appropriate to examine the antecedents from the negative perspective. However, for the PUWT behaviour that is primarily characterised by the adaptive sides of the four PUTW behavioural dimensions, it may be appropriate to examine the antecedents from the positive perspective.

Similarly, whether deterrence-based policies should be adopted may also partially depend on PUTW behavioural characteristics of the four dimensions. For example, the deterrence-based policies (e.g., monitoring, sanctions) can be used by organisations to regulate the PUTW that is primarily characterised by the maladaptive sides of

the four behavioural dimensions. By contrast, organisations may consider to allow employees to engage in the PUTW that is primarily characterised by the adaptive sides of the four behavioural dimensions. In doing so, organisations may take advantage of the benefits of PUTW while avoiding its potential harms.

4. Discussion

4.1. Method issues for future studies to test the proposed model

Testing our proposed model, which requires several empirical studies, can open up a number of avenues for future research. Below, we suggest different methods for this purpose.

To begin, laboratory experiments can be useful for testing the proposed mechanism (i.e., executive attention) through which PUTW affects employee job performance. For example, based on laboratory experiments, future researchers can examine the mental recovery effect of different PUTW behaviours, including (but not limited to) different PUTW activities (i.e., surfing online news vs. playing online games vs. online shopping), different PUTW timing (e.g., between-task mental break vs. within-task mental break), and different PUTW frequency or duration, on participants' executive attention and task performance. It would also be interesting to compare the recovery effect of PUTW relative to other traditional means of mental breaks (e.g., walking outside the office for a while).

We suggest that neurophysiological tools can be particularly useful for measuring participants' executive attention in laboratory experiments (Dimoka et al., 2012; Vom Brocke et al., 2020). For example, previous studies have suggested that pupil diameter is positively related to individuals' attentional state, such that a larger pupil diameter indicates higher concentration (Hopstaken et al., 2015; Unsworth & Robison, 2016). Therefore, participants' attentional state (e.g., concentration) could be measured by their pupil diameter which can be captured with an eye-tracker. Previous studies also suggested that different frequency bands of electroencephalogram (EEG) signals can be an indicator of individuals' attentional state (Okogbaa et al., 1994). In addition, functional magnetic resonance imaging (fMRI) has been used in previous studies to examine individuals' executive attention (Kozasa et al., 2012).

Although laboratory experiments have high internal validity, external validity can be limited due to the gap between laboratory settings (e.g., experiment task) and real work settings (e.g., real job tasks; Antonakis et al., 2010). In a real work setting, the effect of PUTW on job performance can be manifested in the between-

and within-person levels. For example, the effect of PUTW on job performance can be more positive (or negative) for some employees compared with other employees (i.e., between-person difference). However, even for the same employee, the effect of PUTW on job performance can be positive in some situations but negative in other situations (i.e., within-person difference). Therefore, we suggest that the experience sampling method (ESM) could be used in field studies on PUTW outcomes and antecedents. The ESM is widely used in the fields of management and psychology for understanding individuals' momentary or situational perceptions or behaviours (Beal & Weiss, 2003; Debus et al., 2014; Trougakos et al., 2014; Uy et al., 2010). Using the ESM, researchers may investigate employees' PUTW behavioural characteristics and (episodic) job performance multiple times, and capture the within- and between-person level variance (Beal et al., 2005; Butts et al., 2015) in terms of the relationships among PUTW behavioural characteristics and employee job performance.

4.2. Theoretical contributions

First, this paper advances the understanding of the possible conditions under which a certain PUTW behaviour is likely to increase or decrease employee job performance, which has not been discussed in previous PUTW studies. By contextualising the literature related to executive attention to the PUTW field, we propose that the effect of PUTW on employee job performance may depend on the PUTW behavioural characteristics in terms of PUTW cognitive load, PUTW arousal level, PUTW timing, and PUTW frequency/duration. In doing so, we also provide new theoretical guidance for future studies to empirically examine the impact of PUTW on employee job performance, which is rare in extant literature. Our paper also provides new insights into previous studies on PUTW antecedents and policies by clarifying some possible situations in which a positive or negative perspective should be adopted to study PUTW antecedents and policies.

Second, our discussion of the task-switching cost in the PUTW context can contribute to the literature of employee momentary recovery behaviour while working. Specifically, most previous studies on employee recovery have focused on employee recovery during after-work hours (e.g., in the evening) or during vacations (Sonnentag, 2003; Sonnentag et al., 2008, 2012). There are relatively few studies on employee recovery during the workday (Trougakos et al., 2014), although micro-breaks during the workday play an important role in sustaining employees' productivity (Lee et al., 2018). The few studies primarily discussed how different types of breaks (e.g., indoor breaks vs. outdoor breaks) affect employees' psychological well-being or

somatic symptoms after the breaks, such as perceived fatigue, vitality, or lower back pain (Hunter & Wu, 2016; Zacher et al., 2014). However, the issue of task-switching costs after micro-breaks has rarely been considered. Although the increased psychological and physical well-being can be beneficial to job performance, the benefits can be attenuated or even overruled by the task-switching cost in the context of PUTW. Task-switching costs can be substantial in the context of micro-breaks, given that employees may engage in such micro-breaks (e.g., PUTW) many times in a workday. We suggest that considering the task-switching cost can provide a more comprehensive understanding of the mental recovery effect of different means of mental breaks during the workday.

4.3. Practical implications

The practical implications of this paper are twofold. First, based on the proposed mechanism through which PUTW affects job performance and the four behavioural dimensions of PUTW, this paper can be useful for employees to self-assess how their PUTW behaviour affects their job performance. As a result, employees should be better able to leverage IT to facilitate their work and personal lives to reach a better balance between their work and personal lives; this is particularly important for employees who perform non-routine-based tasks and have high work autonomy.

Second, this paper has implications for organisations to develop appropriate PUTW-regulating policies. The discussions suggest that deterrence-based policies, such as sanctions or monitoring, can be used to regulate employees' maladaptive PUTW behaviours that are likely to decrease job performance. Deterrence-based policies can be inappropriate for regulating employees' adaptive PUTW behaviours that are likely to affect job performance positively. Furthermore, our proposed model suggests that the effect of PUTW on employee job performance may be contingent on specific characteristics in terms of PUTW behavioural dimensions, such as cognitive load, arousal level, timing, and frequency/duration. Therefore, instead of adopting policies with a "one size fits all" approach, such as internet monitoring or sanctions, organisations could arrange training to foster employees' awareness of the situations in which PUTW can negatively or positively affect their job performance. Such training can guide employees to exert better self-control in regulating their PUTW behaviour or transforming their maladaptive PUTW behaviours into adaptive PUTW behaviours.

4.4. Limitations and future research directions

First, although we proposed that executive attention is a potentially important underlying mechanism through which PUTW affects employee job performance, it does not mean, of course, executive attention is the only mechanism through which PUTW affects employee job performance. Executive attention can be relevant for professionals whose job tasks are relatively cognition intensive (e.g., software programmers and researchers), but it may be less relevant for employees whose job tasks are primarily routine-based and require fewer cognitive resources. Future studies could discuss other potential mechanisms through which PUTW affects the job performance of different types of employees.

Second, employee job performance is only one dimension of PUTW outcomes. Future research should investigate other outcomes of PUTW. For example, previous studies have preliminarily found that employees' PUTW behaviour related to their creative performance (Kuem & Siponen, 2014) and organisational citizenship behaviours (Rajah & Lim, 2011). However, it may not be the case that all PUTW behaviours increase creativity or organisational citizenship behaviours. Therefore, future research should thoroughly investigate the contingent factors based on which PUTW may increase or decrease employees' creative performance and organisational citizenship behaviours.

5. Conclusions

We reviewed the findings of existing PUTW research in terms of PUTW outcomes, antecedents, and policies. We found that previous studies proposed opposite viewpoints regarding the effect of PUTW on employee job performance, without discussing the conditions under which PUTW may increase or decrease employee job performance. The opposite viewpoints further led scholars to discuss PUTW antecedents and policies from opposing perspectives. We proposed a theoretical model of PUTW, which can increase our understanding of extant PUTW literature, and has important implications for future studies on PUTW. This paper also has important implications for literature related to employees' momentary recovery behaviour during the workday. The discussions can have practical implications for employees and organisations to take advantage of the positive effect of PUTW on job performance, and at the same time, avoid its negative side. Therefore, this paper can offer new insights for future theory development and empirical research on PUTW.

Notes

1. In this study, we use the terms *PUTW behaviour* and *PUTW activities*. For instance, visiting news websites and shopping online are considered to be two different *PUTW activities*, but both constitute *PUTW behaviour*.
2. The word "mechanism" in this paper refers to the intervening variable.
3. Following Burleson and Greenbaum (2019), the phrase "at work" in our definition means any time or context in which work tasks are present and supposed to be performed.
4. All the propositions in the paper are based on the assumption that "other conditions are held constant".
5. However, the attention replenishment effect of PUTW as an escape from stressors may not be easily perceived by employees. Specifically, escaping from stressors may not actually eliminate stressors but can provide with a temporary relief. Pursuing the temporary relief may often result in employees' PUTW behaviour with an excessive duration or frequency, and employees may feel guilty or anxious after excessive PUTW. The feeling of guilt or anxiety may, in turn, consume attentional resources, and ultimately, may attenuate or overrule the attention replenishment effect of PUTW (as an escape from reality).
6. The "restoration and recalling" process applies not only to PUTW behaviour associated with external interruptions (e.g., a non-work-related instant message comes while performing a job task) but also to employees' PUTW behaviour associated with self-interruptions (e.g., engaging in PUTW as a mental break while performing a job task).
7. This proposition does not necessarily suggest a negative linear relationship between PUTW frequency/duration and executive attentional resources. Although proposition 2d suggests that the task-switching cost may increase as the PUTW frequency/duration increases, the attention replenishment effect may also increase as the PUTW frequency/duration increases to an appropriate threshold (BL. Coker, 2011). Therefore, we conjecture that the actual relationship between PUTW frequency/duration and executive attention is an inverted U-shape (Wu et al., 2021).

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