Journal of Strategic Information Systems 29 (2020) 101595

Contents lists available at ScienceDirect

Journal of Strategic Information Systems

journal homepage: www.elsevier.com/locate/jsis

Worker stress in the age of mobile technology: The combined effects of perceived interruption overload and worker control

Stefan Tams[a,*], Manju Ahuja[b], Jason Thatcher[c], Varun Grover[d]

[a] HEC Montréal, Canada
[b] University of Louisvilleo, United States
[c] University of Alabama, United States
[d] University of Arkansas, United States

ARTICLE INFO

Keywords:
Interruptions
Work-life conflict
Technostress
Mobile technologies
IT use
Adoption

ABSTRACT

Mobile technologies have dramatically increased the number of work-related interruptions, especially after regular work hours. At the same time, many employees have limited freedom to decide how and when they accomplish their work, a condition that renders the explosion of interruptions especially problematic. This study proposes that perceived interruption overload negatively impacts work-related technology-usage via workers' experiences of work-life conflict, a key source of stress, and that this indirect effect is stronger for lower levels of worker control (moderated mediation). Data were collected from 601 knowledge workers and analyzed through Conditional process analysis, which integrates moderation and mediation analyses. The results supported our model. This study takes an important step toward elucidating the role of mobile technology in work-life conflict and technostress, and it illustrates the roles of perceived interruption overload as well as conflict and technostress in IT use.

Introduction

Organizations increasingly rely upon mobile information technologies to increase their employees' work performance. For example, one study reports that 269 billion emails per day were exchanged in 2017, up from 2015's figure of 205 billion emails, and this figure is expected to grow to almost 320 billion daily by 2021 (The Radicati Group, Inc., 2017). Moreover, Woollaston (2013) reports information collected by the Android app Locket which showed that their 150,000 users checked their phones around 110 times per day on average. This proliferation of email and related forms of communication has transformed the work environment so that 24/7 availability and associated interruptions have become an integral part of organizational life (Wilkes et al., 2018).

In this regard, mobile technologies are particularly problematic, exposing employees to an endless stream of email notifications, instant messages, task reminders, message reminders, and other interruptions, all mediated via smartphones and tablets that constantly beep, buzz, and blink. Estimates suggest that these instant messages and related technology-mediated (T-M) interruptions have grown to consume about two hours of employees' work days (Wilkes et al., 2018). This trend is disturbing because of its potentially negative effects on focus and productivity.

Interruptions frequently come during non-work hours. Woollaston (2013) reports data compiled by the lockscreen app Locket which found that over 75 percent of people unlock their phones and actively use them during the peak evening time between 5 pm and 8 pm. The data further indicated that during this time the average person checked their mobile device around nine times an hour.

* Corresponding author.
E-mail addresses: stefan.tams@hec.ca (S. Tams), manju.ahuja@louisville.edu (M. Ahuja), vgrover@walton.uark.edu (V. Grover).

https://doi.org/10.1016/j.jsis.2020.101595
Received 9 August 2017; Received in revised form 4 November 2019; Accepted 5 December 2019
Available online 07 February 2020

The peak evening time is also the peak family time so that the active use of a mobile device for work during this time is bound to create a strain on family life, entailing work-life conflict (WLC). WLC is the conflict arising from the work role intruding into the personal role (Sarker et al., 2018). As such, WLC has been described as a key source of stress (Ahuja et al., 2007).

Overall, today's work context is characterized by constant interruptions from mobile technologies, an expectation a worker will be accessible at all times, assumed short response times, and an expectation that a worker's actions will be coordinated with those of other employees (O'Leary et al., 2011). Taken together, these factors may create WLC with downstream negative consequences for organizations.

Attending to interruptions can shift attention away from a task, thereby impeding task performance and the ability to resume the original task at hand (Iqbal and Horvitz, 2010). Thus, we argue that T-M interruptions are likely to create a chain of responses in employees, leading to job-related and behavioral outcomes. Specifically, we suspect that WLC caused by interruption overload may eventually lead employees to withdraw from using mobile technologies. Research has found that employees experiencing WLC may limit their interactions with coworkers or customers (Flaherty et al., 1999). Similarly stress due to interruption overload may result in workers limiting their interactions and a decline in the work-related usage of mobile technologies. The present study holds that characteristics of a technology that are experienced negatively, such as frequent interruptions, can reduce the extent to which people are willing to use the technology.

Overall, our goal is to examine the potential negative impacts of overload caused by interruptions after regular work hours in the context of mobile technologies. We focus on the work-related usage of mobile technologies as an outcome variable. Burton-Jones and Straub (2006) have argued that it is crucial for IS research to examine work-related technology usage as an outcome variable. In line with this argument, IS research has examined issues of IT use at all levels of analysis, including the individual, the group, and the organization (Sidorova et al., 2008). This attention devoted to IT usage is also consistent with Benbasat and Zmud's (2003) claim that IS research should focus directly on the use of the IT artifact since technology has to be used if individuals and organizations are to reap its benefits. Therefore, examining the impact of key sources of technostress such as WLC on technology usage is important, and it is a logical continuation of research into technostress. Consistent with this idea, recent technostress research (Riedl, 2013; Tarafdar et al., 2010) has called for theorizing usage-related, behavioral outcome variables in technostress research (in addition to the psychological outcomes that have been the focus of much prior technostress research). Only a few IS studies have followed this call. An exception is Maier et al. (2015) who looked at the effects of technostress on hedonic technology use; they theorized that techno-exhaustion can reduce the amount of time that users spend on Facebook. Research needs to build on this pioneering work by examining the effects of technostress on use in a work context. The use of mobile technologies for work has had spillover effects making it easier for work to intrude into peoples' personal lives resulting in WLC. We examine the effects of perceived interruption overload on the work-related usage of mobile technologies via WLC.

A potentially pertinent amplifier of this problem is that–while knowledge workers are expected to be accessible at all times–many of them have limited freedom to decide whether, how, and when they accomplish their work (Noonan and Glass, 2012). This work condition renders the explosion of T-M interruptions particularly problematic. Decision-making freedom allows workers to fit the task of responding to T-M interruptions in their other responsibilities (Karasek, 1979; Ahuja and Thatcher, 2005); lack of it, however, indicates that employees have limited control over their work and cannot adapt their work schedules and methods to respond to the additional demands from interruption overload, creating stress. This stress likely leads them to shy away from desirable work behaviors like using work IT. For example, Chang et al. (2009) showed that stress can reduce organizational citizenship behavior. It seems reasonable to assume that stress may also reduce the extent to which employees use work IT.

Yet, despite the practical significance of perceived interruption overload, research focusing on its effect on technology usage and the dependence of this effect on worker decision-making freedom (i.e., the extent of control that employees have over their work) is nascent.

Therefore, our second goal is to examine–when employees are required to be accessible outside of work hours–does it matter whether they are given a certain level of control over how and when they use their mobile technologies? More specifically, we examine one lever that may be useful to managers in enabling their employees to better manage perceived interruption overload; we examine how the extent of control that workers have over their work may moderate WLC and associated technostress and, in turn, technology usage. We suspect that control will allow employees to better manage their work and to better fit interruptions into their lives, mitigating WLC and its subsequent impacts on work-related technology usage. That is, we propose that T-M interruptions will be less damaging when workers have higher levels of control. In summary, the present study examines whether perceived interruption overload impacts work-related technology usage via increased perceptions of WLC – and whether this mediated impact of perceived interruption overload on technology usage depends on the extent of control that employees have over their work.

We contribute to research on WLC, technostress, and IS use in several important ways. Perhaps most importantly, in the context of mobile technology and the associated spillover effects of work into peoples' personal lives, we look at usage as a dependent variable in a mediation model, with control as a moderator. Thus, we refine understanding of how WLC and its associated stress is created by mobile technologies and how it can be managed more effectively. We seek to integrate relevant concepts that have been studied in isolation before. More specifically, while prior research has examined interruptions and work-related technology usage in isolation, we create a more complete picture of their relationships, suggesting that T-M interruptions are detrimental to technology usage and that the level of impact depends on the amount of control extended to workers (Cooper et al., 2001; Jett and George, 2003; McGrath, 1976; Riedl et al., 2012, 2013; Tarafdar et al., 2007, 2011). Our study helps IS research progress from simply investigating the general association between technological stressors, WLC, and stress to providing more detailed and specific explanations of the conditions under which technology creates these problems.

Background and hypotheses

We build on prior research by elaborating on the concepts of interruptions, WLC as a source of stress, as well as work-related technology usage. A few studies have looked at the intersection of two such areas (e.g., Ayyagari et al., 2011, described the potential power of T-M interruptions in generating stress), some studies have touched on elements of these areas (e.g., Tams et al., 2018, examine the interplay of interruptions, stress, and technology use in an experiment), yet no study to date has explicitly examined the intersection of all three areas in the context of mobile technology and the workplace. A more direct focus on this intersection using actual workers holds strong potential to explain how the usage-related impacts of T-M interruptions unfold. This is because recently-advanced conceptual ideas indicate that T-M interruptions are pertinent to both stress and technology use and that stress is a major inhibitor of various work-related behaviors including IS use (Cooper et al., 2001; Jett and George, 2003; McGrath, 1976; Riedl et al., 2012, 2013; Tarafdar et al., 2007, 2011).

Perceived interruption overload

T-M interruptions are prevalent in today's work environments as they occur in various forms, for example, as instant messages, email notifications, task reminders, and message reminders. Despite the prevalence of these interruptions and their generally negative consequences for various work-related behaviors, research into the effects of T-M interruptions is nascent (Afifi et al., 2018).

Two pioneering studies by Speier et al. (1999, 2003) examined the impact of T-M interruptions on decision performance, finding that interruptions generally have a negative impact on the performance of decision makers because they induce conflict about the allocation of various resources, such as time. These studies highlighted the importance of exploring the negative impacts of T-M interruptions in more depth. Two later review papers by Riemer and Frößler (2007) and by Stephens (2008) supported this notion, indicating that T-M interruptions cause substantial productivity losses by leading workers to feel stressed and, as a result, to withdraw from various desirable behaviors (such as IS use). Overall, while little research has empirically examined the negative impacts of T-M interruptions on stress and downstream withdrawal behaviors, it has consistently viewed these interruptions as problematic, affecting stress and work behaviors.[1]

Consistent with Speier et al. (2003), we examine T-M interruptions as stressors that are externally generated and randomly occurring and that break continuity of cognitive focus on another task or obligation. Further, T-M interruptions generally require immediate attention and insist on action so that an individual who is being interrupted generally needs to turn his or her attention toward the interruption (Speier et al., 2003). Hence, individuals receiving more T-M interruptions than they can effectively process generally consider these interruptions demanding, leading them to perceive that they have too much to do (Chen and Karahanna, 2018). In line with this notion, in this study we focus on the negative consequences of interruptions, especially in terms of perceived interruption overload that refers to perceived overload caused by interruptions. Building on Chen and Karahanna (2018), we define perceived interruption overload as the extent to which users receive more interruptions after regular work hours than they can effectively process and handle. Consistent with this definition, we sample a population of users who confirm that they use mobile devices for work during non-work hours (please see the method section for more details).

In contrast to work overload, which is an indicator of the magnitude and difficulty of the work itself, perceived interruption overload has its source in the cognitive resources needed when the subject is switching focus among tasks. The notion of perceived interruption overload is grounded in the cognitive (or mental) workload literature. It addresses the ability of people to attain a certain level of performance, given the limited available mental resources. This is consistent with the classic work of Kahneman's (1973), who has defined workload as the proportion of the capacity an operator spends on task performance. When task focus is interrupted by an external stimulus, the subject of interruptions will knowingly or unknowingly shift attention from the task. At this point, a decision must be made to focus on the new task, divide the attention among tasks, or ignore the interruption (O'Leary et al., 2011). Even if a decision is made to not attend to the interrupting stimulus, this decision itself is a decision point of whether or not the stimulus is worthy of attention, which can add to the cognitive burden of the task itself. In fact, it has been shown that this can result in lower task performance and the inability to resume the original task at hand (Iqbal and Horvitz, 2010). The more people's work focus is interrupted, the more time they must devote to "meta work" or "overhead" – i.e., the time required to organize and co-ordinate multiple tasks and spheres (González and Mark, 2004; Salvucci and Taatgen, 2010).

WLC as a pertinent problem in the context of perceived interruption overload

Given the pervasive, omnipresent nature of such contemporary mobile technologies as smartphones and of the interruptions they mediate, their impacts often span work and non-work settings so that individuals' work roles intrude into and interrupt their other roles, creating conflict among the various different role requirements (Riedl, 2013; Tarafdar et al., 2007). For this reason and consistent with prior technostress research (e.g., Tarafdar et al., 2007), we conceptualize stress in response to T-M interruptions that occur outside of working hours as WLC. WLC is experienced under conditions of contradictory, incompatible, or incongruent role

[1] We do not expect a direct linkage between perceived interruption overload and technology usage since – consistent with the demand-control model advanced by Karasek (1979) – demands are merely a stressor and, thus, generally have no direct impacts on employee behaviors. Instead, it is an employee's experience of stress that generally carries the effect of a stressor on to employee behavior performance (Cooper et al., 2001). Thus, we included stress in our study.

requirements that occur when a person is asked to fulfill the requirements from multiple roles at the same time (Riedl, 2013; Tarafdar et al., 2007). WLC most frequently manifests as conflicting demands of work and family (McGrath, 1976; Riedl, 2013; Tarafdar et al., 2007), implying a conflict about the allocation of time and attention to both environments (McGrath, 1976). For example, it has become common practice for employees to continue to be available after leaving work and even at home (Ciolfi and Lockley, 2018). This trend started when employees became able to check their voicemails on the road and from home, and it grew even more pervasive when employees were able to access their emails and other messages when away from the workplace (Spira and Feintuch, 2005). The pervasiveness of work-related T-M interruptions leaves people saddled with WLC: having to choose between responding to the plethora of work-related queries, questions, and comments and fulfilling their personal responsibilities (Sarker et al., 2018; Riedl et al., 2012).

Technology usage

IS use has been a longstanding phenomenon of interest to IS research (Barki et al., 2007; Davis et al., 1989). Burton-Jones et al. (2017) identify four major themes of research on IS use:

(1) The application, refinement, and integration of various psychological explanations of IT adoption,
(2) The development of theories to account for the dynamics of use such as the human aspects of use,
(3) The development of new measurement and methodological approaches, and
(4) The continuing expansion of the broader network of constructs of interest in the study of IS use, including an expanding universe of antecedents that influence IS use.

This study relates to themes 2 and 4 given that it investigates the human aspects of IS use and that it identifies perceived interruption overload as well as work-life conflict as inhibitors of IS use. Past research on human aspects of IS use has focused on coping with negative emotions (e.g., Beaudry and Pinsonneault, 2005), unconscious cognition (e.g., Limayem et al., 2007; Ortiz de Guinea and Markus, 2009; Polites and Karahanna, 2013), and culture (e.g., Kappos and Rivard, 2008; Leidner and Kayworth, 2006). Feelings of overload that arise from interruptions have not yet been thoroughly investigated in the context of IS use. Given the relevance of interruptions to behavior (Galluch et al., 2015; Speier et al., 2003), perceived interruption overload warrants further analysis.

Regarding the expanding universe of antecedents that influence IS use, researchers have emphasized the importance of social influence and support (e.g., Sykes et al., 2009; Wang et al., 2013), institutional pressures (e.g., Chatterjee et al., 2002; Liang et al., 2007), and personality (e.g., McElroy et al., 2007). IS researchers have also enriched our understanding of how IS use is embedded in processes in practice (e.g., Serrano and Karahanna, 2016; Venters et al., 2014). However, IS researchers have not yet carefully examined the extent to which perceived interruption overload and related perceptions of work-life conflict can influence IS use. Such an examination would respond to recent calls for probing the impact of stress-related constructs on usage-related behavioral outcomes (Riedl, 2013; Tarafdar et al., 2010). Therefore, the addition of a use-related outcome variable to this study would contribute to the literature on IS use by showing that stress-related constructs can be negative antecedents for use. Taken together, these arguments lead us to investigate IS use as an outcome variable.

Connecting perceived interruption overload and WLC to technology usage

To inform our understanding of how the relationship between perceived interruption overload, WLC, and work-related technology usage is structured and of how this relationship may depend on worker control, we use Karasek's (1979) demand-control model. This model constitutes one of the two most prominent theoretical frameworks used to study organizational stress due to its conceptual significance and empirical success (Siegrist, 1996), and it fits the phenomenon studied in the present paper since it theorizes the interaction between demands and control, such as the dependence of interruption-related effects on worker control that we seek to examine here. More specifically, the demand-control model consists of four basic elements: job demand (i.e., the stressor), stress (e.g., WLC), stress-related negative consequences such as performing a work-related behavior to a lesser extent (e.g., using work IT to a lesser degree), and control (i.e., the extent of control that employees have over their work) (de Lange et al., 2003; Karasek, 1979; Karasek and Theorell, 1990; van der Doef and Maes, 1999). Applied to the present study, the model suggests that we can conceptualize perceived interruption overload as a job demand, WLC in the form of inter-role conflict as stress or strain, work-related technology usage as a consequence of this WLC, and worker control as control, that is, a (negative) moderator of the interruption-stress-usage relationship.

The model holds that the concept of control is key to improve understanding of stressor-stress relationships and their subsequent outcomes (Karasek, 1979; Karazek and Theorell, 1990; Siegrist, 1996). Specifically, the model theorizes that stressor-stress relationships are strongest when work demands are high and control in terms of decision latitude is low (see Fig. 1; Karasek, 1979). A key implication of the model is the need to focus on work process redesign to increase the extent of control that workers have over their work (Karasek, 1979; Karazek and Theorell, 1990). This suggests that in the context of interruption overload workers could be given the freedom to decide about whether, when, and how to respond to a work-related instant message or email after regular work hours.

Overall, the major premise of the model is that stress varies with the job demands placed on an individual and the freedom allowed the individual in deciding how to meet those demands. The interaction between demands and control affects workers'

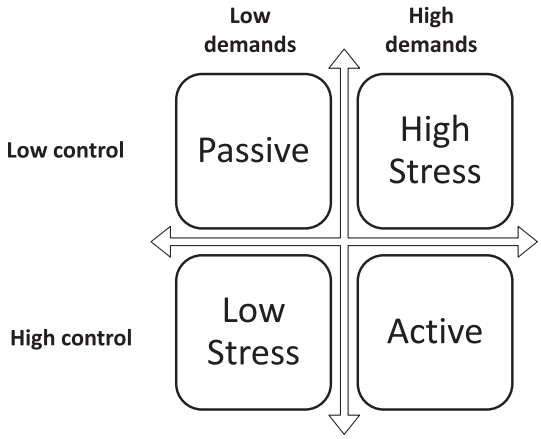


Fig. 1. The Demand-Control Perspective (adapted from Karasek, 1979).

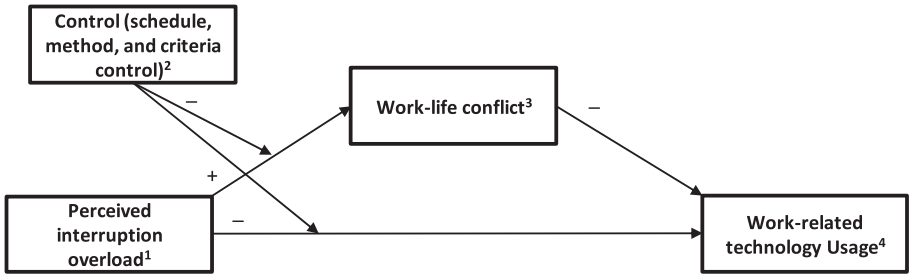
experiences of stress, which, ultimately, impacts various employee behaviors (de Lange et al., 2003; Karasek, 1979; Karazek and Theorell, 1990; van der Doef et al., 2000; van der Doef and Maes, 1999). The model offers two hypotheses: the strain and the buffer hypotheses (de Lange et al., 2003; van der Doef and Maes, 1999). While the strain hypothesis suggests that high demands lead to stress and, ultimately, impact employee behaviors, the buffer hypothesis predicts an interaction effect of job demands and worker control, in which control moderates the effects of job demands on stress and subsequent outcomes (de Lange et al., 2003; van der Doef and Maes, 1999). The two hypotheses are not mutually exclusive; instead, the strain hypothesis is nuanced by the buffer hypothesis (van der Doef and Maes, 1999). The strain hypothesis implies for the present paper that high levels of perceived interruption overload impact work-related technology usage via increases of WLC, while the buffer hypothesis suggests that the strength of this mediated relationship may vary with worker control. Concerning the former hypothesis, research has shown that interruptions can reduce desirable work behaviors like task performance (Cooper et al., 2001; Speier et al., 1999, 2003). Since IT use behaviors are desirable work behaviors, it is reasonable to assume that perceived interruption overload can lead employees to shy away from using the technologies that create these interruptions.

IS researchers have suggested, albeit not explicitly modeled or empirically examined, that interruptions can lead to stress in individuals by breaking peoples' concentration on another obligation (Ren et al., 2008; Riedl, 2013; Tarafdar et al., 2007). More generally, in today's fast-paced environment the omnipresence of work-related T-M interruptions even at home leaves employees saddled with conflict between responding to the plethora of work-related queries, questions, and comments and fulfilling their primary personal responsibilities, entailing WLC (Riedl, 2013; Tarafdar et al., 2007). In fact, mobile technologies frequently even accompany holidays, and one often feels that one has to respond to e-mail from home, even if this behavior entails WLC (Ciolfi and Lockley, 2018; Tarafdar et al., 2007). WLC due to T-M interruptions is a common but understudied phenomenon (Riedl, 2013; Tarafdar et al., 2007).

WLC in the form of inter-role conflict has downstream negative consequences for job-related employee behaviors (McGrath, 1976). People in high conflict roles tend to show less trust, liking, and respect for the object they deem responsible for the conflict they experience (McGrath, 1976). As a result, they withdraw from these object, or they restrict their interactions with them (McGrath, 1976). Hence, the WLC resulting from the T-M interruptions that are mediated by mobile technologies may lead people to withdraw from these technologies, or it may lead people to restrict their interactions with them. In either case, the work-related usage of mobile technologies is expected to decline due to the WLC experienced on the basis of perceived interruption overload. Hence:

H1. WLC mediates the negative effect of perceived interruption overload on the work-related usage of mobile technology, that is, there is a negative, indirect effect of perceived interruption overload via WLC on the work-related usage of mobile technology.

Adding to H1, we predict that the indirect effect of perceived interruption overload via WLC on work-related technology usage should be weaker when workers have more control over when and how to accomplish their work and over what kinds of work to accomplish: the demand-control model's buffer hypothesis (Karasek, 1979; Karazek and Theorell, 1990). Accordingly, schedule control, method control, and criteria control that address the when, how, and what, respectively, are pertinent moderators of the indirect effect (Ahuja and Thatcher, 2005; Breaugh, 1999; Hackman and Oldham, 1975). Control of scheduling, methods, and criteria affords employees the freedom and flexibility to manage the timing and content of their responses to T-M interruptions so that interruption overload presents less of a struggle, reducing inter-role conflict and, thus, WLC in the face of these interruptions. Hence, we hypothesize moderated mediation, proposing that there is an indirect effect of perceived interruption overload on Work-related technology usage through WLC (the simple form of indirect effect) and that this indirect effect depends on the level of control workers



Legend:
[1]*Representative of the concept of **Demand** (the **Stressor**) in the demand-control model*
[2]*Representative of the concept of **Control** in the demand-control model*
[3]*Representative of the concept of **Stress / Strain** in the demand-control model*
[4]*Representative of the **Outcomes** of stress / strain*

The model denotes our mediation hypotheses: simple mediation in the case of H1 and 1st stage moderated mediation of interruption-related impacts via work-life conflict in the cases of H2a, H2b, and H2c, with schedule, method, and criteria autonomy as 1st stage moderators, respectively. In other words, the *a* path is moderated by worker control.

Fig. 2. A moderated mediation model of perceived interruption overload, work-life conflict, and control in the prediction of IS Use.

Table 1
Construct definitions.

Construct	Definition	Reference
Perceived Interruption Overload	The extent to which users receive more interruptions after regular work hours than they can effectively process and handle	Chen and Karahanna (2018)
Work-life Conflict	The inter-role conflict that occurs as job demands interfere with the performance of personal duties	Adams et al. (1996), Ahuja et al. (2007), and Netemeyer et al. (1996, 2004)
Work-related Technology Usage	The extent (in terms of intensity and scope) to which individuals utilize a mobile technology	Burton-Jones and Straub (2006) and Karahanna et al. (2006)
Schedule Control	The degree to which a job provides freedom, independence, and discretion to an employee in terms of scheduling his or her work	Ahuja and Thatcher (2005), Breaugh (1999), and Hackman and Oldham (1975)
Method Control	The degree to which a job provides freedom, independence, and discretion to an employee in terms of determining the procedures (i.e., methods) to be used in carrying his or her work out	Ahuja and Thatcher (2005), Breaugh (1999), and Hackman and Oldham (1975)
Criteria Control	The degree to which a job provides freedom, independence, and discretion to an employee in terms of determining what is to be done (i.e., the objectives of his or her work)	Ahuja and Thatcher (2005), Breaugh (1999), and Hackman and Oldham (1975)

believe they have over their work. To address the question of whether mediation exists for different conditional values of control we examine the conditional indirect effect. Fig. 2 shows the proposed model. The construct definitions are provided in Table 1. We hypothesise:

H2a. The strength of the mediated relationship between perceived interruption overload and work-related usage (via WLC) depends on the level of schedule control extended to a user; the negative, indirect effect of perceived interruption overload via WLC on work-related usage is weaker when schedule control is higher.

H2b. The strength of the mediated relationship between perceived interruption overload and work-related usage (via WLC) depends on the level of method control extended to a user; the negative, indirect effect of perceived interruption overload via WLC on work-related usage is weaker when method control is higher.

H2c. The strength of the mediated relationship between perceived interruption overload and work-related usage (via WLC) depends on the level of criteria control extended to a user; the negative, indirect effect of perceived interruption overload via WLC on work-related usage is weaker when criteria control is higher.

Method

Data were collected from 601 knowledge workers who used mobile technologies for their work after regular work hours. A market research company was used for data collection. Market research companies aim to provide researchers with samples representative of

Table 2
Quality criteria and descriptives of construct measures.

Construct	Number of Items	AVE	AVE Non-Associated Items	Alpha	Mean	SD	Range
Perceived Interruption Overload	4	0.77	0.00	0.95	3.52	1.66	6.00
Work-life Conflict	5	0.76	0.00	0.95	3.53	1.65	6.00
Work-related Technology Usage	4	0.57	0.00	0.83	3.37	1.14	5.00
Schedule Control	3	0.75	0.00	0.91	5.03	1.57	6.00
Method Control	3	0.81	0.00	0.96	5.26	1.52	6.00
Criteria Control	3	0.59	0.00	0.87	4.53	1.46	6.00
Tenure	1	n/a	n/a	n/a	9.52	10.70	45.00
Compatibility	3	0.86	0.00	0.95	4.45	1.81	6.00
Telepresence	3	0.67	0.00	0.86	5.20	1.63	6.00
Family time	1	n/a	n/a	n/a	3.27	1.32	5.00

AVE = Average Variance Extracted, n/a = not applicable to single-item control variables.

the general population (Ayyagari et al., 2011). They help prevent sampling and statistical conclusion errors by ensuring that researchers have access to a well-defined sample frame and can acquire an adequate sample size (Carter and Grover, 2015). In this study, we used the market research division of SurveyMonkey. SurveyMonkey's market research division was a particularly appropriate market research company for the purposes of our study since the use of mobile technologies and of the internet belonged to its most popular targeting criteria, implying that SurveyMonkey was specialized in providing survey responses to studies like ours.

To satisfy sample frame requirements, three screening questions were developed: (1) as part of your current job, do you need to use mobile technologies in order to get your work done?, (2) as part of your current job, are you required to use mobile technologies during working hours?, and (3) as part of your current job, are you required to use mobile technologies during non-working hours? By drawing on a panel of respondents who used mobile devices for work and confirming that they used their devices during working hours and non-work hours, we sampled a population of skilled knowledge workers who may experience WLC. About half of the respondents were male (55%), the average age of the respondents was 42 years, and the respondents had an organizational tenure of 9 years on average.

The respondents were queried about (1) the perceived interruption overload they experience after regular work hours, (2) the control over their work extended to them by their employers, (3) their experiences of WLC, and (4) the extent to which they used their mobile technologies for work. All measures were adapted from prior research (e.g., Chen and Karahanna, 2018; Ahuja and Thatcher, 2005; Breaugh, 1999). Consistent with our focus on interruptions, we adapted the original items so that they focused on interruptions rather than generalized work overload. It is a common approach in IS research to adapt measures to new study contexts. For example, the measure of computer self-efficacy proposed by Compeau and Higgins (1995) has been adapted to various contexts including internet technologies (McElroy et al., 2007) and information security (Chen and Zahedi, 2016).

Appendix A details the full scales. For control variables, we measured organizational tenure, compatibility of mobile technology with an individual's preferred work style, perceived telepresence, and time spent with family. These variables have been shown to impact technology usage behaviors, and they have been linked to inter-role conflict as well as related perceptions of a work environment (Ayyagari et al., 2011; Agarwal and Prasad, 1999; Ahuja et al., 2007; Karahanna et al., 2006).

Results

The quality of our survey instrument was assessed by estimating the reliability as well as the convergent and discriminant validity of the measurement items. SPSS version 21 was used to calculate all statistics, which were obtained through a factor analysis with Maximum Likelihood Extraction (MLE) and Promax rotation. The internal consistency reliability of a block of items is represented by Cronbach's coefficient alpha. Satisfactory values for this criterion exceed 0.70 (Nunnally, 1978). All alphas exceeded this threshold (see Table 2), indicating satisfactory internal consistency. Moreover, all AVE values were above 0.50 (see Table 2) and the square root of the AVE for each construct was higher than the correlations between that construct and all other constructs in the model (see Table 3), indicating sufficient convergent and discriminant validity. Additionally, the AVE value for non-associated items, which quantifies the amount of variance a construct measure captures from the items it is not associated with relative to the amount due to measurement error, was lower than 0.01 for each construct (see Table 2). This result further confirmed construct validity (Fornell and Larcker, 1981).

Convergent and discriminant validity are further confirmed when all items load in excess of 0.50 on their associated constructs and when all item loadings within constructs are higher than those across constructs (Chin, 1998). The loadings of items on their associated and other constructs are presented in Table 4. These loadings provided additional evidence that all construct measures had sufficient convergent and discriminant validity; all items loaded above 0.50 on their associated constructs, and all items loaded higher on their associated constructs than on other ones.

Table 3
Inter-construct correlations.

Construct	Interruption overload	Work-life conflict	Work-related Technology Usage	Schedule Control	Method Control	Criteria Control	Tenure	Compatibility	Telepresence	Family time
Perceived Interruption Overload	**0.875**									
Work-life Conflict	0.694	**0.871**								
Work-related Technology Usage	0.295	0.400	**0.755**							
Schedule Control	0.104	0.099	0.288	**0.866**						
Method Control	0.072	0.123	0.281	0.731	**0.900**					
Criteria Control	0.237	0.289	0.456	0.601	0.659	**0.770**				
Tenure	0.087	0.090	0.127	0.121	0.060	0.013	**n/a**			
Compatibility	0.191	0.312	0.628	0.274	0.393	0.521	0.066	**0.927**		
Telepresence	0.063	0.182	0.459	0.207	0.295	0.309	0.092	0.533	**0.816**	
Family time	0.036	0.068	0.076	0.074	0.021	0.100	0.065	0.014	0.017	**n/a**

Diagonal Elements in **Bold** are Square Roots of the Average Variance Extracted; n/a = not applicable to single-item control variables.

Table 4
Item loadings and cross-loadings.

Item	Perceived Interruption Overload (IntLoad)	Work-life Conflict (WLC)	Work-related Technology Usage (Use)	Schedule Control (Schedule)	Method Control (Method)	Criteria Control (Criteria)
IntLoad1	**0.792**	0.160	−0.020	0.024	−0.022	−0.010
IntLoad2	**0.889**	0.067	0.020	−0.008	−0.012	−0.019
IntLoad3	**0.913**	0.004	−0.007	−0.034	0.085	−0.021
IntLoad4	**0.900**	−0.008	−0.011	0.026	−0.040	0.036
WLC1	0.054	**0.841**	−0.001	−0.016	0.083	−0.035
WLC2	0.027	**0.930**	−0.022	−0.020	−0.006	−0.022
WLC3	−0.053	**0.955**	−0.034	0.021	−0.018	0.012
WLC4	0.072	**0.847**	−0.026	−0.004	−0.026	−0.013
WLC5	−0.007	**0.771**	0.090	−0.006	−0.030	0.063
Use1	−0.094	−0.012	**0.536**	0.009	0.186	−0.100
Use2	0.020	−0.025	**0.884**	−0.038	0.003	−0.023
Use3	0.034	−0.046	**0.810**	−0.026	−0.030	0.042
Use4	0.011	0.095	**0.747**	0.073	−0.092	0.055
Schedule1	0.008	−0.054	−0.006	**0.830**	−0.062	0.066
Schedule2	0.027	−0.005	0.007	**0.883**	0.074	−0.051
Schedule3	−0.035	0.043	−0.001	**0.883**	0.080	−0.027
Method1	−0.017	0.025	0.015	0.049	**0.927**	−0.042
Method2	−0.004	−0.025	0.024	0.019	**0.921**	0.029
Method3	0.042	−0.008	0.001	0.059	**0.848**	0.036
Criteria1	−0.014	0.047	0.075	−0.017	0.056	**0.664**
Criteria2	−0.005	−0.039	−0.056	0.003	−0.032	**1.000**
Criteria3	0.013	0.027	−0.011	0.101	0.267	**0.571**

We used both procedural and statistical remedies to control for method bias (Podsakoff et al., 2003). Specifically, we protected respondent anonymity, reduced evaluation apprehension, and evaluated the significance of common method variance in our data by performing Harmon's single factor test through a factor analysis with MLE and Promax Rotation. In this approach, all items are forced to fit on a single factor representing method effects. Common method bias is considered significant if the model fits the data. In our data, a one-factor model showed substantial misfit (χ^2 [209] = 7770.92, $p < 0.001$). We further compared this measurement model to the full model and found that the one-factor model fit the data less well ($\Delta\chi^2$ [95] = 7464.71, $p < 0.001$), indicating that common method bias was not found.

We proceeded with a formal test of our mediation (H1) and moderated mediation hypotheses (H2) using Conditional process analysis (Hayes, 2013; 2015). Conditional process analysis integrates moderation and mediation analysis. It relies on the principles of least squares regression but employs a bootstrapping procedure to estimate indirect effects and moderated indirect effects. Bootstrapping is widely used in statistical mediation analysis, and its performance has been extensively studied and shown to be superior to the Causal Steps Approach (Baron and Kenny, 1986) and the Sobel test (Sobel, 1982) (see Hayes, 2013; 2015). Moreover, the bootstrapping procedure combines high statistical power with good control over the Type I error rate (MacKinnon et al., 2002, 2004),

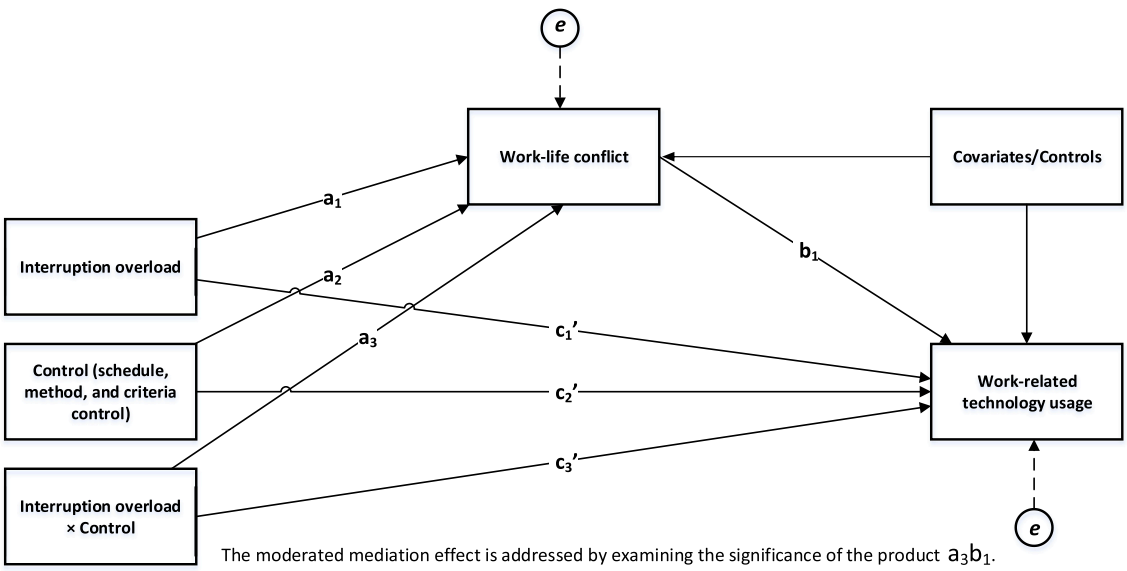


Fig. 3. Statistical model for testing the moderated mediation hypotheses.

Table 5
Results for the indirect effect.

Variable	Coeff	SE	P	LLCI	ULCI
Step 1: Controls only model					
(Constant)		0.151	0.000	n/a	n/a
Tenure	−0.079	0.003	0.010	n/a	n/a
Compatibility	0.492	0.023	0.000	n/a	n/a
Telepresence	0.235	0.025	0.000	n/a	n/a
Familytime	0.093	0.026	0.003	n/a	n/a
Step 2: Controls and main effect					
(Constant)		0.237	0.000	n/a	n/a
Tenure	−0.067	0.003	0.026	n/a	n/a
Compatibility	0.464	0.022	0.000	n/a	n/a
Telepresence	0.230	0.025	0.000	n/a	n/a
Familytime	0.098	0.026	0.001	n/a	n/a
Interruption overload	−0.165	0.083	0.000	n/a	n/a
Step 3: Controls, main effect, and mediated effect					
(Constant)		0.252	n/a	1.861	2.853
Tenure	−0.007	0.003	n/a	−0.013	−0.001
Compatibility	0.280	0.022	n/a	0.237	0.324
Telepresence	0.150	0.024	n/a	0.102	0.198
Familytime	0.091	0.026	n/a	0.041	0.142
Interruption overload	−0.151	0.115	n/a	−0.377	0.076
Indirect effect	−0.300	0.081	n/a	−0.456	−0.147

and it accounts for many of the problematic assumptions in the Sobel test and the Causal Steps Approach (Zhao et al., 2010)[2]. First, the procedure produces a bootstrap confidence interval by generating a bootstrap sample of the data. Next, the coefficients for the statistical model are estimated and the index of moderated mediation is calculated (Hayes, 2015). This index assesses directly whether the moderated mediation effect is significant.

All hypotheses were tested using Hayes' PROCESS procedure (version 2.15) for Conditional process analysis in SPSS (Hayes, 2013, 2015; Hayes and Preacher, 2014; Montoya and Hayes, forthcoming). For Hypothesis 1, we employed PROCESS model number 4 with a 95% confidence interval and 1000 bootstrap resamples in SPSS version 21. Hypotheses 2a, 2b, and 2c were tested using PROCESS model number 8 for assessing 1st stage moderated-mediation. This model estimates the conditional indirect effects at different levels of the moderators. The conditional indirect effect of perceived interruption overload on work-related IT usage can be expressed as (Hayes, 2013, 2015; Preacher et al., 2007)

$$f(\hat{\theta}|W) = \hat{b}1(\hat{a}\ 1 + \hat{a}3W) \tag{1}$$

where W is control (the moderator). The conditional indirect effect depends on control to the extent that the interaction coefficient $\hat{a}_3$ is different from zero. Fig. 3 shows the statistical model.

All tests included the control variables. The results supported our hypotheses. First, a significant, negative indirect effect of perceived interruption overload on work-related technology usage via WLC was found ($b = -0.300$, $SE = 0.081$, $LL = -0.456$, $UL = -0.147$, $p < 0.05$), supporting H1. Further, the results of our moderated-mediation tests revealed a marginally significant, positive index of moderated mediation for H2a, indicating the existence of a positive, indirect interaction effect of perceived interruption overload and schedule control on work-related technology usage via WLC ($b = 0.041$, $SE = 0.029$, $LL = 0.004$, $UL = 0.100$, $p < 0.10$). This finding lent marginal support to H2a. Additionally, the results showed a significant, positive index of moderated mediation for H2b, signifying the existence of a positive, indirect interaction effect of perceived interruption overload and method control via WLC on work-related technology usage ($b = 0.049$, $SE = 0.030$, $LL = 0.004$, $UL = 0.123$, $p < 0.05$). This finding supported H2b. Finally, the results showed a significant, positive index of moderated mediation for H2c, demonstrating the existence of a positive, indirect interaction effect of perceived interruption overload and criteria control via WLC on work-related IT use ($b = 0.060$, $SE = 0.030$, $LL = 0.012$, $UL = 0.141$, $p < 0.05$). This finding supported H2c (see Tables 5 and 6).[3]

[2] Baron and Kenny's test makes two improper assumptions that the bootstrapping procedure corrects (Zhao et al., 2010). First, Baron and Kenny claim that mediation is strongest when there is an indirect effect but no direct effect in Step 3. Yet, the strength of mediation can best be measured by the size of the indirect effect rather than by the lack of a direct effect because mediation is by definition concerned with the indirect effect. For the same reason, a significant "effect to be mediated" in Step 2 is not needed; the only requirement to establish mediation should be that the indirect effect (i.e., the product of the a and b paths) is significant. Most importantly, it is not sufficient to show that the total effect of the independent variable is reduced when the mediator is added to the model as this reduction does not indicate a significant difference between the two models. Similarly, this reduction does not indicate a significant indirect effect in the numerator of Step 4 when evaluated against the standard error of the indirect path in the denominator. Compared to the Sobel test, the bootstrapping test is more powerful since the indirect effect is evaluated as the product of two parameters, implying a non-normal sampling distribution of the indirect effect and a non-normal z-value in the Sobel test. Thus, the confidence interval in the Sobel test often improperly includes zero (Zhao et al., 2010).

[3] We thank an anonymous reviewer for his/her suggestion that Aiken and West's (1991) original technique for moderation analysis can be applied

Table 6
Results for the moderated indirect effects.

Variable	Coeff/index	SE	LLCI	ULCI
Moderator: Schedule Control				
(Constant)	3.114	0.600	2.127	4.103
Tenure	−0.007	0.003	−0.013	−0.002
Compatibility	0.274	0.023	0.237	0.312
Telepresence	0.145	0.025	0.104	0.185
Familytime	0.086	0.026	0.044	0.128
Interruption overload	−0.374	0.278	−0.832	0.083
Indirect effect	−0.296	0.079	−0.427	−0.169
Moderated indirect effect	0.041	0.029	0.004	0.100
Moderator: Method Control				
(Constant)	2.692	0.616	1.483	3.902
Tenure	−0.007	0.003	−0.013	−0.001
Compatibility	0.273	0.023	0.228	0.318
Telepresence	0.147	0.025	0.098	0.195
Familytime	0.090	0.026	0.039	0.141
Interruption overload	−0.206	0.283	−0.761	0.350
Indirect effect	−0.292	0.087	−0.488	−0.134
Moderated indirect effect	0.049	0.030	0.004	0.123
Moderator: Criteria Control				
(Constant)	3.999	0.693	2.638	5.359
Tenure	−0.007	0.003	−0.013	−0.001
Compatibility	0.263	0.024	0.217	0.310
Telepresence	0.143	0.025	0.095	0.191
Familytime	0.074	0.026	0.023	0.126
Interruption overload	−0.705	0.312	−1.318	−0.092
Indirect effect	−0.264	0.080	−0.444	−0.116
Moderated indirect effect	0.060	0.030	0.012	0.141

Table 7
Tests of the significance of the (moderated) indirect effects.

Hypothesis		Support
HI	WLC mediates the negative effect of perceived interruption overload on the work-related usage of mobile technology, that is, there is a negative, indirect effect of perceived interruption overload via WLC on the work related usage of mobile technology	Supported***
H2a	The strength of the mediated relationship between perceived interruption overload and work-related usage (via WLC) depends on the level of schedule control extended to a user; the negative, indirect effect of perceived interruption overload via WLC on work-related usage is weaker when schedule control is higher	Supported*
H2b	The strength of the mediated relationship between perceived interruption overload and work-related usage (via WLC) depends on the level of method control extended to a user; the negative, indirect effect of perceived interruption overload via WLC on work-related usage is weaker when method control is higher	Supported**
H2c	The strength of the mediated relationship between perceived interruption overload and work-related usage (via WLC) depends on the level of criteria control extended to a user; the negative, indirect effect of perceived interruption overload via WLC on work-related usage is weaker when criteria control is higher.	Supported***

***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively; Number of bootstrap resamples: 5.000.

Regarding the conditional indirect effects of perceived interruption overload on work-related technology usage via WLC at different values of worker control, for H2a the indirect effect was −0.314 for low levels of schedule control (one standard deviation below the mean, $p < 0.05$) and −0.278 for high levels of it (one standard deviation above the mean, $p < 0.05$). Concerning H2b, the indirect effect was −0.314 for low levels of method control ($p < 0.05$) and −0.270 for high levels ($p < 0.05$). Finally, regarding H2c the indirect effect was −0.288 for low levels of criteria control ($p < 0.05$) and −0.240 for high levels ($p < 0.05$). These results provided evidence that perceived interruption overload reduces technology usage by creating WLC and that this indirect effect (of perceived interruption overload on technology usage via WLC) depends on the control extended to workers such that it is weaker for higher levels of control (see Table 7).

The model explained 53% of the variance in WLC and 48% of the variance in work-related technology use which, given the few predictor variables in our model, compares favorably to much prior IS use research. Therefore, our model is both parsimonious and powerful, important criteria for contributing to knowledge (Bacharach, 1989).

(*footnote continued*)
in the same way to mediation analysis and to moderated mediation analysis.

Implications for research

By providing a conceptualization and empirical evaluation of the roles of mobile technology and perceived interruption overload in WLC and IS use, the present study extends related research and theory. We build on prior works' conceptualizations of interruptions as stressors to theorize that perceived interruption overload impacts work-related technology usage, a key outcome variable in IS research, through WLC. WLC, in turn, has been described as a key source of stress (Ahuja et al., 2007).

This study also examined how worker control impacts WLC, a key source of technostress, and ultimately technology usage. The study hypothesized and found that the indirect effect of perceived interruption overload on technology usage via WLC was smaller when workers had more control. This finding suggests that worker control acts as an important boundary condition to interruption-based stress; interruptions matter less when workers possess more control. This not only contextualizes the indirect effect found here, but it also extends research on WLC and technostress in an important way. Given the lack of stress research that formally hypothesizes and tests moderation effects using procedures recommended by Aiken and West (1991) or Preacher et al. (2007), our results help technostress research progress from investigating the general association between technological stressors and stress to providing more detailed and specific explanations of the conditions under which technological stressors create stress. This contribution is particularly important since specifying boundary conditions (i.e., relevant moderators) for theoretical models is critical to advancing theory development and testing (Bacharach, 1989; Cohen et al., 2003). Lazarus (1999) pointed out that examining moderating variables is vital in the context of stress research to help ease the effects of stressors on workers' experiences of stress and its negative consequences.

While prior research has examined the impacts of WLC and technostress on a variety of outcome variables such as organizational commitment, continuance commitment, and productivity (Ragu-Nathan et al., 2008; Riedl et al., 2012; Tarafdar et al., 2007), their impact on IT use has seldom been examined. Hence, examining the impact of WLC and associated stress on technology usage is important, and it is a logical continuation of research into technostress. Consistent with this analysis, Tarafdar et al. (2010) called for theorizing usage-related outcome variables in technostress research, as was done here.

Implications for practice

The present study's results are directly applicable in organizations. They underscore that managers can help employees manage WLC and technostress by affording them control over their IT use behaviors (Karazek and Theorell, 1990). As mobile devices become more pervasive, this study becomes particularly relevant for practice. The evidence we found for the strain hypothesis (i.e., H1) suggests that managers should limit the interruption overload placed on workers after regular work hours, while the evidence for the moderating effects of control lead us to recommend that managers should increase worker control over their responses to T-M interruptions. By adjusting the work environment and extending more control to workers, managers can help them cope more effectively with interruption overload.

Our results also provide a strong impetus for mobile application developers and design science researchers to begin exploring innovative design solutions that can mitigate the negative impact of work-related interruptions on WLC and IT use. Design science research can be very helpful in the design of IT solutions for various problems (e.g., Hevner and Chatterjee, 2010). For example, with the help of artificial intelligence, it may be possible to better triage work tasks and automate some of them, thereby reducing the load on employees. Organizations can also develop better monitoring devices which could sense detrimental use patterns and alert employees to prevent the negative impact of heavy technology use. Finally, in line with Lukyanenko and Parsons (2013) the design science community can use the results of our study to develop design principles that can guide the development of future personal and organizational mobile apps capable of detecting and better managing interruption overload and WLC.

Limitations and directions for future research

As with any research, there are some limitations that should be considered when interpreting our results. First, the causal direction between perceived interruption overload and technology usage may seem unusual because the relationship is negative. We wish to clarify that our model satisfies the three conditions for causality, which are covariation, temporal precedence, and control for third variables (alternative explanations). Concerning covariation, we have stablished this condition empirically by finding support for Hypothesis 1 (as well as Hypotheses 2a-2c). As regards temporal precedence, it is unlikely that system usage increases before a corresponding reduction in interruption overload occurs. This is because increased system usage provides the opportunity for experiencing more, not fewer, interruptions. It seems more plausible that perceived interruption overload leads to discontent and stress, thereby reducing usage. This notion is similar in spirit to the IS success model and the Technology acceptance model, as discussed earlier. In both of these theories, it is experience-based perceptions about the system that affect usage. While there clearly is a possibility of reciprocal relationships between factors such as satisfaction, utility, and use (Bhattacherjee and Premkumar, 2004), individual-level IS theories generally seek to explain variation in system use. Since system use is the variable in which variance is to be explained, it constitutes the dependent variable. Moreover, selecting one specific variable like use as the dependent variable is appropriate because reciprocal relationships cannot readily be tested using statistical methods (Bacharach, 1989; Cohen et al., 2003; Tabachnick and Fidell, 2007).

Moreover, IS research suggests causality from information overload to satisfaction and behavior. For example, as Tarafdar et al. (2010) note, "technology overload and ICT-mediated interruptions reduce the satisfaction of users with the ICT they employ for their tasks and their ability to benefit from them. This intuition is echoed in emerging practitioner perspectives …, that suggest excessive

information, frequent upgrades, and blurring of work–home boundaries induced by pervasive connectivity result in inaccurate information processing and poor task-related decision making using ICT and in dissatisfaction with ICT" (Tarafdar et al., 2010, p. 305). This suggests that–often–interruptions and overload lead to dissatisfaction and thereby impact usage behaviors.

As to the third condition for establishing causality, we have included relevant control variables as covariates in the statistical models that were used to test for covariation, thereby accounting for alternative explanations. For example, for H1 we tested the indirect effect of perceived interruption overload through Work-life conflict on usage after controlling for organizational tenure, compatibility of mobile technology with an individual's preferred work style, perceived telepresence, and time spent with family. These variables have been shown to impact technology usage behaviors, and they have been linked to inter-role conflict as well as related perceptions of the work environment. By including these variables as covariates in our analysis, we controlled for their influence on our dependent variable, ruling them out as alternative explanations. In summary, although our study has limitations concerning inferences of causality, it has met all three conditions for causality to much the same extent as previous research.

Second, this study examined only one set of variables that may buffer against the effects of T-M interruptions on WLC and technology usage. While the study examined only contextual variables (i.e., the extent of control workers have over their work) as coping mechanisms, stress research suggests that both contextual (e.g., control) and dispositional variables (e.g., self-efficacy) can help workers cope with stressors (Cooper et al., 2001). Yet, the approach taken here was consistent with the demand-control model (Karasek, 1979), which excludes individual differences from consideration to permit a focus on work conditions and implications for the work environment. Still, future work should also examine whether dispositional variables (e.g., computer self-efficacy) can help workers cope with technological stressors (Cooper et al., 2001), that is, future work could explicitly model and test dispositional variables as moderators of the stressor-stress link.

Third, this study examined a specific form of overload, namely overload due to interruptions. Interruptions contribute to information overload (defined as receiving more information than one can efficiently process and handle), which means that they are an aspect of overload (Tarafdar et al., 2007, 2011). Hence the conceptualization and measurement of the role of T-M interruptions in our model as perceived interruption overload. This way, our concept and measure of interruptions allows us to build on and extend prior work that has begun to view interruptions as a form of overload (e.g., Chen and Karahanna, 2018; Sarker et al., 2018). Yet one important limitation of our study is that we did not directly control for overall work overload. On the one hand, we did use "time spent with family" as a control variable. While this does not capture the concept of overall work overload directly, it does capture some aspects of overall work overload in its converse form – overall time spent at work (someone spending less time with family often spends more time working). Also, our approach is reasonable given that overall work overload includes interruption overload. Thus the inclusion of overall work overload in our model in addition to perceived interruption overload would introduce multicollinearity concerns. On the other hand, it would be useful to learn to what extent other, more general forms of overload impact IT usage. Future work could examine the effects of such other forms of overload as role overload or project overload on usage.

Fourth, future research could disentangle the effects of different types of interruptions on WLC and on the work-related usage of mobile technology. For example, future research could separate the effects of work-related interruptions that occur at work from work-related interruptions that occur at home. Future research could also separate the effects of work-related interruptions that occur at work from nonwork-related interruptions that occur at work or from nonwork-related interruptions that occur at home. All of these different types of interruptions may perhaps influence WLC and the work-related usage of mobile technology in different ways. On the one hand, there is no certainty that these different types of interruptions have dissimilar effects on WLC and on the usage of mobile technologies. On the other hand, one could speculate that work-related interruptions that take place at work may directly reduce work productivity and indirectly affect WLC, whereas work-related interruptions that take place at home may directly and positively affect WLC by taking time away from home responsibilities. Furthermore, nonwork-related interruptions that take place at work may negatively affect WLC by eliminating time from work. Future research should examine these initial ideas.

Moreover, our results may be due to some unobserved variable such as an employer's expectation of around-the-clock responsiveness after work hours. In other words, certain characteristics of our sample, rather than our independent variable, may account for the observed relationships in our model. On the one hand, it is true for most studies that certain characteristics of a particular sample may account for any observed relationships with a DV. That is why we included relevant control variables from the literature in our model, as is common practice. Nevertheless, future research could replicate our results using a laboratory experiment to maximize the control over the study variables. Such a design can help counteract the influence of specific sample characteristics on the results. Moreover, a longitudinal design could be used to ensure that the results hold across several points in time. Future research could also extend our study using data from different organizational and national cultures to determine to what types of organizations and nations they generalize. Given that work-life conflict is often chronic, another promising avenue for future research is to test our model using neurophysiological measures like cortisol.

Future research could also examine the model advanced here in more detail regarding possible differential effects between the three control mechanisms. Specifically, in contrast to the findings for the moderating impacts of criteria and method control that were fully significant, our finding for the moderating impact of schedule control was marginally significant. This contrast in significance may point to a systematic difference in the effectiveness of criteria control, method control, and schedule control as buffers against the negative effects of interruption overload. As an initial response to this idea, one could suggest that schedule control may be less effective as a buffer because it merely affords employees the freedom to respond to interruptions at a later time, whereas criteria and method control more directly address the substance of the interruptions. Future work could examine this initial idea in more detail.

Additionally, more domain-specific work is needed on the impacts of perceived interruption overload and Work-life conflict on technology usage. We surveyed a general pool of knowledge workers, providing a general understanding of how the relationship between perceived interruption overload and technology usage is structured. More work is needed on such trends as agile

development (for software developers) or the New World of Work surface (NWOW, for workers in general). Such work could nuance our findings and provide for a more detailed view of the conditions under which control matters.

Conclusion

Considering the proliferation of interruptions that are mediated by mobile technologies, it is important for IS research to offer practitioners a deeper understanding of the potential "dark sides" of these T-M interruptions, such as diminished worker health and work-related IT use. Although a few prior studies have described the potential drawbacks of T-M interruptions, they have not modeled or measured the negative impacts of these interruptions in terms of spillover effects. Using a pertinent stress theory, the present study found that perceived interruption overload after regular work hours reduces work-related technology usage by inducing WLC. The study, further, found that worker control can buffer against this negative, indirect effect of T-M interruptions on use by affording an employee the freedom and discretion to adjust his or her work life so that it intrudes less into his or her family life. Managers can directly apply our findings by increasing the extent of control they extend to their employees. This study takes an important step toward clarifying the role of perceived interruption overload in WLC and associated technostress and toward illustrating the roles of WLC and technostress in IT usage. The latter contribution is particularly important given that technology usage is considered a key outcome variable in IS research and given that prior technostress research has called for an examination of the impacts of technological stressors on IS usage.

Acknowledgements

This research was supported by the Social Sciences and Humanities Research Council of Canada.

Appendix A. Measurement items

General instructions sent to respondents:

The following questions ask about how you perceive or use mobile technologies i.e., PDA, smartphones etc. When answering these questions, please keep in mind the mobile technology that you use most frequently for work related purposes. For the following questions, if you see the term 'after working hours' you should think about those times when you are **not** officially 'at work'

Most items were on 7-point likert-type scales ranging from 1 (strongly disagree) to 7 (strongly agree)

Perceived interruption overload (Chen and Karahanna, 2018; Yin et al., 2018) (7-point likert-type scale)

- AFTER regular working hours, I feel overloaded because I receive more interruptions from mobile technologies than I can process.
- AFTER regular working hours, I feel rushed due to frequent interruptions from mobile technologies.
- AFTER regular working hours, I feel busier because I must handle interruptions from mobile technologies.
- AFTER regular working hours, I feel pressure due to interruptions from mobile technologies.

WLC (Adams et al., 1996; Ahuja et al., 2007; Netemeyer et al., 1996, 2004) (7-point likert-type scale)

My use of mobile devices for work results in…

- the demands of my work interfering with my home and family life.
- my job taking up more time and making it difficult to fulfill family responsibilities.
- things I want to do at home do not getting done because of the demands my job puts on me.
- my job producing stress that makes it difficult to fulfill family duties.
- my making changes to my plans for family activities so that I can meet work-related demands.

Work-related Technology Usage (Burton-Jones and Straub, 2006; Karahanna et al., 2006)

- How frequently do you access your mobile technology device for work? (Never, a few times a year, monthly, weekly, daily, all the time)
- During a typical day, how many minutes do you spend using your mobile technology device for work? (0, 1–20, 20–60, 60–120, 120–180, > 180)
- Of all the features and functions available on your mobile technology device, what percentage would you estimate that you use on a fairly regular basis? (< 10%, 10–24%, 25–49%, 50–74%, 75–94%, 95%+)
- Approximately, what percentage of all your job functions is managed using your mobile technology device? __%

Schedule Control (Ahuja and Thatcher, 2005; Breaugh, 1999; Hackman and Oldham, 1975) (7-point likert-type scale)

- I have control over the scheduling of my work.
- I have some control over the sequencing of my work activities (when I do what).
- My job is such that I can decide when to do particular work activities.

Method Control (Ahuja and Thatcher, 2005; Breaugh, 1999; Hackman and Oldham, 1975) (7-point likert-type scale)

- I am allowed to decide how to go about getting my job done (the methods to use).
- I am able to choose the way to go about my job (the procedures to utilize).
- I am free to choose the method(s) to use in carrying out my work.

Criteria Control (Ahuja and Thatcher, 2005; Breaugh, 1999; Hackman and Oldham, 1975) (7-point likert-type scale)

- My job allows me to modify the way I am evaluated so that I can emphasize some aspects of my job and play down others.
- I am able to modify my job objectives (what I am supposed to accomplish).
- I have some control over what I am supposed to accomplish (what my supervisor sees as my job objectives).

Control variables
Time spent with family:

- In an average week, what percentage of your total time (out of 100%) do you spend with your family?
  - o < 10%
  - o 10–24%
  - o 25–49%
  - o 50–74%
  - o 75–94%
  - o 95%+

Organizational tenure:
Organizational tenure was measured as the number of years a respondent has worked for an organization.
Compatibility of mobile technology with an individual's preferred work style (7-point likert-type scale)

- Using mobile technology fits my preferred routine for conducting my job.
- Mobile technology enables me to work in the way I prefer.
- Using mobile technology fits my preferred method for doing my job.

Telepresence (7-point likert-type scale):

- My mobile technology device enables others to contact me 24/7.
- The use of my mobile technology device enables others to have access to me.
- My mobile technology device facilitates contact with coworkers 24/7.

References

Adams, G.A., King, L.A., King, D.W., 1996. Relationships of job and family involvement, family social support, and work–family conflict with job and life satisfaction. J. Appl. Psychol. 81 (4), 411–420.

Afifi, T.D., Zamanzadeh, N., Harrison, K., Callejas, M.A., 2018. WIRED: The impact of media and technology use on stress (cortisol) and inflammation (interleukin IL-6) in fast paced families. Comput. Hum. Behav. 81, 265–273.

Agarwal, R., Prasad, J., 1999. Are individual differences germane to the acceptance of new information technologies? Decis. Sci. 30 (2), 361–391.

Ahuja, M.K., Chudoba, K.M., Kacmar, C.J., McKnight, D.H., George, J.F., 2007. IT road warriors: Balancing work-family conflict, job autonomy, and work overload to mitigate turnover intentions. MIS Quart. 31 (1), 1–17.

Ahuja, M.K., Thatcher, J.B., 2005. Moving beyond intentions and toward the theory of trying: Effects of work environment and gender on post-adoption information technology use. MIS Quart. 29 (3), 427–459.

Aiken, L.S., West, S.G., 1991. Multiple Regression: Testing and Interpreting Interactions. Sage Publications Inc, Thousand Oaks, CA.

Ayyagari, R., Grover, V., Purvis, R., 2011. Technostress: Technological antecedents and implications. MIS Quart. 35 (4), 831–858.

Bacharach, S.B., 1989. Organizational theories: Some criteria for evaluation. Acad. Manag. Rev. 14 (4), 496–515.

Barki, H., Titah, R., Boffo, C., 2007. Information system use–related activity: an expanded behavioral conceptualization of individual-level information system use. Inf. Syst. Res. 18 (2), 173–192.

Baron, R.M., Kenny, D.A., 1986. The moderator–mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. J. Pers. Soc. Psychol. 51 (6), 1173–1182.

Beaudry, A., Pinsonneault, A., 2005. Understanding user responses to information technology: a coping model of user adaptation. MIS Quart. 29 (3), 493–524.

Benbasat, I., Zmud, R.W., 2003. The identity crisis within the IS discipline: Defining and communicating the discipline's core properties. MIS Quart. 27 (2), 183–194.

Bhattacherjee, A., Premkumar, G., 2004. Understanding changes in belief and attitude toward information technology usage: A theoretical model and longitudinal test. MIS Quart. 28 (2), 229–254.

Breaugh, J.A., 1999. Further investigation of the work autonomy scales: Two studies. J. Bus. Psychol. 13 (3), 357–373.

Burton-Jones, A., Straub, D.W., 2006. Reconceptualizing system usage: An approach and empirical test. Inf. Syst. Res. 17 (3), 228–246.

Burton-Jones, A., Stein, M., & Mishra, A., 2017. IS Use, in MIS Quart. Research Curations, Ashley Bush and Arun Rai (Eds.), https://www.misqresearchcurations.org/blog/2017/12/1/is-use.

Carter, M., Grover, V., 2015. Me, My Self, and I(T): Conceptualizing information technology identity and its implications. MIS Quart. 39 (4), 931–957.

Chang, C., Rosen, C.C., Levy, P.E., 2009. The relationship between perceptions of organizational politics and employee attitudes, strain, and behavior: A meta-analytic examination. Acad. Manag. J. 52 (4), 779–801.

Chatterjee, D., Grewal, R., Sambamurthy, V., 2002. Shaping up for e-commerce: Institutional enablers of the organizational assimilation of web technologies. MIS

Quart. 26 (2), 65–89.
Chen, A., Karahanna, E., 2018. Life interrupted: The effects of technology-mediated work interruptions on work and nonwork outcomes. MIS Quart. 42 (4), 1023–1042.
Chen, Y., Zahedi, F.M., 2016. Individuals' internet security perceptions and behaviors: polycontextual contrasts between the United States and China. MIS Quart. 40 (1), 205–222.
Chin, W.W., 1998. Issues and opinions on structural equation modeling. MIS Quart. 22 (1), 1–8.
Ciolfi, L., Lockley, E., 2018. From work to life and back again: Examining the digitally-mediated work/life practices of a group of knowledge workers. In: Computer Supported Cooperative Work (CSCW) 27(3–6). pp. 803–809.
Cohen, J., Cohen, P., West, S.G., Aiken, L.S., 2003. Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences, 3rd ed. Lawrence Erlbaum Associates Publishers, Mahwah, NJ.
Compeau, D.R., Higgins, C.A., 1995. Computer self-efficacy: Development of a measure and initial test. MIS Quart. 19 (2), 189–211.
Cooper, C.L., Dewe, P.J., O'Driscoll, M.P., 2001. Organizational Stress: A Review and Critique of Theory, Research, and Applications. Sage Publications Inc, Thousand Oaks, CA.
Davis, F.D., Bagozzi, R.P., Warshaw, P.R., 1989. User acceptance of computer technology: a comparison of two theoretical models. Manage. Sci. 35 (8), 982–1003.
De Lange, A.H., Taris, T.W., Kompier, M.A., Houtman, I.L., Bongers, P.M., 2003. The very best of the millennium“: Longitudinal research and the demand-control-(support) model. J. Occup. Health Psychol. 8 (4), 282–305.
Flaherty, T.B., Dahlstrom, R., Skinner, S.J., 1999. Organizational values and role stress as determinants of customer-oriented selling performance. J. Personal Sell. Sales Manage. 19 (2), 1–18.
Fornell, C., Larcker, D.F., 1981. Structural equation models with unobservable variables and measurement error: Algebra and statistics. J. Market. Res. (JMR) 18 (3), 382–388.
Galluch, P.S., Grover, V., Thatcher, J.B., 2015. Interrupting the workplace: Examining stressors in an information technology context. J. Assoc. Inf. Syst. (JAIS) 16 (1), 1–47.
González, V. M., Mark, G., 2004. Constant, constant, multi-tasking craziness: Managing multiple working spheres. In Proceedings of the ACM CHI 2004 Conference on Human Factors in Computing Systems (CHI '04), 6, pp. 113-120. Vienna, Austria: ACM.
Hackman, J.R., Oldham, G.R., 1975. Development of the job diagnostic survey. J. Appl. Psychol. 60 (2), 159–170.
Hayes, A.F., 2013. Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-based Approach. The Guilford Press, New York, NY.
Hayes, A.F., 2015. An index and test of linear moderated mediation. Multivariate Behav. Res. 50 (1), 1–22.
Hayes, A.F., Preacher, K.J., 2014. Statistical mediation analysis with a multicategorical independent variable. Br. J. Math. Stat. Psychol. 67 (3), 451–470.
Hevner, A., Chatterjee, S., 2010. Design science research in information systems. In: Design Research in Information Systems. Springer, Boston, MA, pp. 9–22.
Iqbal, S. T., Horvitz, E., 2010. Notifications and awareness: A field study of alert usage and preferences. In: Proceedings of the 2010 ACM Conference on Computer Supported Cooperative Work (CSCW '10), pp. 27–30, Savannah, GA: ACM.
Jett, Q.R., George, J.M., 2003. Work interrupted: A closer look at the role of interruptions in organizational life. Acad. Manag. Rev. 28 (3), 494–507.
Kahneman, D., 1973. Attention and Effort. Prentice-Hall, Englewood Cliffs, NJ.
Kappos, A., Rivard, S., 2008. A three-perspective model of culture, information systems, and their development and use. MIS Quart. 32 (3), 601–634.
Karahanna, E., Agarwal, R., Angst, C.M., 2006. Reconceptualizing compatibility beliefs in technology acceptance research. MIS Quart. 30 (4), 781–804.
Karasek, R.A., 1979. Job demands, job decision latitude, and mental strain: Implications for job redesign. Adm. Sci. Q. 24 (2), 285–308.
Karazek, R., Theorell, T., 1990. Healthy Work: Stress, Productivity and the Reconstruction of Working Life. Basic Books, New York, NY.
Lazarus, R.S., 1999. Stress and Emotion: A New Synthesis. Springer Publishing Co, New York, NY.
Leidner, D.E., Kayworth, T., 2006. A review of culture in information systems research: Toward a theory of information technology culture conflict. MIS Quart. 30 (2), 357–399.
Liang, H., Saraf, N., Hu, Q., Xue, Y., 2007. Assimilation of enterprise systems: The effect of institutional pressures and the mediating role of top management. MIS Quart. 31 (1), 59–87.
Limayem, M., Hirt, S.G., Cheung, C.M.K., 2007. How habit limits the predictive power of intention: The case of information systems continuance. MIS Quart. 31 (4), 705–737.
Lukyanenko, R., Parsons, J., 2013. Reconciling theories with design choices in design science research. In: International Conference on Design Science Research in Information Systems. Springer, Berlin, Heidelberg, pp. 165–180.
MacKinnon, D.P., Lockwood, C.M., Hoffman, J.M., West, S.G., Sheets, V., 2002. A comparison of methods to test mediation and other intervening variable effects. Psychol. Methods 7 (1), 83–104.
MacKinnon, D.P., Lockwood, C.M., Williams, J., 2004. Confidence limits for the indirect effect: distribution of the product and resampling methods. Multivariate Behav. Res. 39 (1), 99–128.
Maier, C., Laumer, S., Weinert, C., Weitzel, T., 2015. The effects of technostress and switching stress on discontinued use of social networking services: a study of Facebook use. Inf. Syst. J. 25 (3), 275–308.
McElroy, J.C., Hendrickson, A.R., Townsend, A.M., DeMarie, S.M., 2007. Dispositional factors in internet use: personality versus cognitive style. MIS Quart. 31 (4), 809–820.
McGrath, J.E., 1976. Stress and behavior in organizations. In: Handbook of Industrial and Organizational Psychology, M. D. Dunnette (Ed.), pp. 1351-1395 (Part 31). Chicago, IL: Rand McNally College Pub. Co.
Netemeyer, R.G., Boles, J.S., McMurrian, R., 1996. Development and validation of work–family conflict and family–work conflict scales. J. Appl. Psychol. 81 (4), 400–410.
Netemeyer, R.G., Brashear-Alejandro, T., Boles, J.S., 2004. A cross-national model of job-related outcomes of work role and family role variables: a retail sales context. J. Acad. Mark. Sci. 32 (1), 49–60.
Noonan, M.C., Glass, J.L., 2012. The hard truth about telecommuting. Month. Labor Rev. 135 (6), 38–45.
Nunnally, J.C., 1978. Psychometric Theory. McGraw-Hill, New York, NY.
O'Leary, M.B., Mortensen, M., Woolley, A.W., 2011. Multiple team membership: A theoretical model of its effects on productivity and learning for individuals and teams. Acad. Manag. Rev. 36 (3), 461–478.
Ortiz de Guinea, A., Markus, M.L., 2009. Why break the habit of a lifetime? Rethinking the roles of intention, habit, and emotion in continuing information technology use. MIS Quart. 33 (3), 433–444.
Podsakoff, P.M., MacKenzie, S.B., Lee, J., Podsakoff, N.P., 2003. Common method biases in behavioral research: A critical review of the literature and recommended remedies. J. Appl. Psychol. 88 (5), 879–903.
Polites, G., Karahanna, E., 2013. The embeddedness of information systems habits in organizational and individual level routines: Development and disruption. MIS Quart. 37 (1), 221–246.
Preacher, K.J., Rucker, D.D., Hayes, A.F., 2007. Addressing moderated mediation hypotheses: Theory, methods, and prescriptions. Multivariate Behav. Res. 42 (1), 185–227.
Ragu-Nathan, T.S., Tarafdar, M., Ragu-Nathan, B.S., Tu, Q., 2008. The consequences of technostress for end users in organizations: Conceptual development and empirical validation. Inf. Syst. Res. 19 (4), 417–433.
Ren, Y., Kiesler, S., Fussell, S.R., 2008. Multiple group coordination in complex and dynamic task environments: Interruptions, coping mechanisms, and technology recommendations. J. Manage. Inf. Syst. 25 (1), 105–130.
Riedl, R., 2013. On the biology of technostress: Literature review and research agenda. DATA BASE for Adv. Inf. Syst. 44 (1), 18–55.
Riedl, R., Kindermann, H., Auinger, A., Javor, A., 2012. Technostress from a neurobiological perspective—system breakdown increases the stress hormone cortisol in computer users. Bus. Inf. Syst. Eng. 4 (2), 61–69.

Riedl, R., Kindermann, H., Auinger, A., Javor, A., 2013. Computer breakdown as a stress factor during task completion under time pressure: Identifying gender differences based on skin conductance. Adv. Hum.-Comput. Interact Article no. 7 (ID 420169).
Riemer, K., Frößler, F., 2007. Introducing real-time collaboration systems: Development of a conceptual scheme and research directions. Commun. Assoc. Inf. Syst. (CAIS) 20, 204–225.
Salvucci, D.D., Taatgen, N.A., 2010. The Multitasking Mind. Oxford University Press, New York, NY.
Sarker, S., Ahuja, M., Sarker, S., 2018. Work–life conflict of globally distributed software development personnel: An empirical investigation using border theory. Inf. Syst. Res. 29 (1), 103–126.
Serrano, C., Karahanna, E., 2016. The compensatory interaction between user capabilities and technology capabilities in influencing task performance: An empirical assessment in telemedicine consultations. MIS Quart. 40 (3), 597–621.
Sidorova, A., Evangelopoulos, N., Valacich, J.S., Ramakrishnan, T., 2008. Uncovering the intellectual core of the information systems discipline. MIS Quart. 32 (3), 467–482.
Siegrist, J., 1996. Adverse health effects of high-effort/low-reward conditions. J. Occup. Health Psychol. 1 (1), 27–41.
Sobel, M.E., 1982. Asymptotic confidence intervals for indirect effects in structural equation models. Sociol. Methodol. 13, 290–312.
Speier, C., Valacich, J.S., Vessey, I., 1999. The influence of task interruption on individual decision making: An information overload perspective. Decis. Sci. 30 (2), 337–360.
Speier, C., Vessey, I., Valacich, J.S., 2003. The effects of interruptions, task complexity, and information presentation on computer-supported decision-making performance. Decis. Sci. 34 (4), 771–797.
Spira, J.B., Feintuch, J.B., 2005. The cost of not paying attention: How interruptions impact knowledge worker productivity. Inf. Overload Res. Group (IORG) – Basex Research paper.
Stephens, K.K., 2008. Optimizing costs in workplace instant messaging use. IEEE Trans. Prof. Commun. 51 (4), 369–380.
Sykes, T.A., Venkatesh, V., Gosain, S., 2009. Model of acceptance with peer support: a social network perspective to understand employees' system use. MIS Quart. 33 (2), 371–393.
Tabachnick, B.G., Fidell, L.S., 2007. Using Multivariate Statistics, 5th ed. Allyn & Bacon Inc., Needham Heights, MA.
Tams, S., Thatcher, J.B., Grover, V., 2018. Concentration, competence, confidence, and capture: An experimental study of age, interruption-based technostress, and task performance. J. Assoc. Inf. Syst. 19 (9), 857–908.
Tarafdar, M., Tu, Q., Ragu-Nathan, T.S., Ragu-Nathan, B.S., 2011. Crossing to the dark side: Examining creators, outcomes, and inhibitors of technostress. Commun. ACM 54 (9), 113–120.
Tarafdar, M., Qiang, T.U., Ragu-Nathan, B.S., Ragu-Nathan, T.S., 2007. The impact of technostress on role stress and productivity. J. Manage. Inf. Syst. 24 (1), 301–328.
Tarafdar, M., Tu, Q., Ragu-Nathan, T.S., 2010. Impact of technostress on end-user satisfaction and performance. J. Manage. Inf. Syst. 27 (3), 303–334.
The Radicati Group, Inc., 2017. Email Statistics Report, 2017-2021. Retrieved from https://www.radicati.com/wp/wp-content/uploads/2017/01/Email-Statistics-Report-2017-2021-Executive-Summary.pdf, June 26, 2019.
Van der Doef, M., Maes, S., 1999. The job demand-control (-support) model and psychological well-being: A review of 20 years of empirical research. Work Stress 13 (2), 87–114.
Van der Doef, M., Maes, S., Diekstra, R., 2000. An examination of the job demand-control-support model with various occupational strain indicators. Anxiety, Stress Coping 13 (2), 165–185.
Venters, W., Oborn, E., Barrett, M., 2014. A trichordal temporal approach to digital coordination: the sociomaterial mangling of the CERN grid. MIS Quart. 38 (3), 927–949.
Wang, Y., Meister, D.B., Gray, P.H., 2013. Social influence and knowledge management system use: evidence from panel data. MIS Quart. 37 (1), 299–313.
Wilkes, S.M., Barber, L.K., Rogers, A.P., 2018. Development and validation of the workplace interruptions measure. Stress Health 34 (1), 102–114.
Woollaston, V., 2013. How often do you check your phone? The average person does it 110 times a DAY (and up to every 6 seconds in the evening). DailyMail.com. Retrieved from https://www.dailymail.co.uk/sciencetech/article-2449632/How-check-phone-The-average-person-does-110-times-DAY-6-seconds-evening.html.
Yin, P., Ou, C.X., Davison, R.M., Wu, J., 2018. Coping with mobile technology overload in the workplace. Internet Res. 28 (5), 1189–1212.
Zhao, X., Lynch Jr., J.G., Chen, Q., 2010. Reconsidering Baron and Kenny: Myths and truths about mediation analysis. J. Consum. Res. 37 (2), 197–206.