Information and communication technology demands: outcomes and interventions

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Abstract

Purpose – The purpose of this paper is to review four demands employees face when communicating through information and communication technologies (ICTs). The authors review the outcomes associated with each demand and discuss relevant interventions to provide a set of evidence-based recommendations.

Design/methodology/approach – This paper reviews the following demands associated with ICTs: response expectations, constant availability, increased workload and poor communication. The authors draw upon empirical research to highlight outcomes and intervention strategies, before discussing implications for research and practice.

Findings – The findings suggest that there are diverse outcomes associated with each demand. The outcomes were not inherently negative as evidence suggests that positive performance outcomes can arise from response expectations and constant availability, although they may be allied by health and well-being costs.

Practical implications – A number of practical strategies are described to help organizations address computer-mediated communication demands, including tailored training, organizational policies and role modeling. The paper also outlines suggestions for future research on the dark side of IT use.

Originality/value – This paper integrates four interrelated demands that employees can face when communicating through technology. The authors extend knowledge by analyzing interventions which enables a synthesis of implications for practice.

Keywords Performance, Stress, Organizational communication, Productivity, Information and communication technology (ICT), E-mail

Paper type Literature review

1. Introduction

Many employees are reliant on information and communication technologies (ICTs) to communicate with colleagues, clients and partners. Actual data concerning the spread of ICTs across different industries is difficult to capture due to the evolving nature of work, but it is clear that communication technologies are highly prevalent. In 2009, 90 percent of UK businesses had access to the internet (Office for National Statistics, 2009), while in the USA 62 percent of employees could be considered networked workers, a term coined to describe individuals who use the internet or e-mail in their workplace (Madden and Jones, 2008).

Journal of Organizational Effectiveness: People and Performance
Vol. 2 No. 4, 2015
pp. 327-345

2051-6614
DOI 10.1108/JOEPP-09-2015-0031

In this paper, we examine evidence relating to ICT working practices from an organizational effectiveness perspective. At present, the productivity gains that arise from ICTs (including efficient file sharing and travel cost savings) are well known (Palvalin *et al.*, 2013), however, research in this area has often focussed on the benefits without signaling the risks. We argue that the effectiveness of utilizing ICTs for computer-mediated communication is debatable. This debate concerns "whether the tools used are risk-free, or at least do not produce undesirable 'side-effects'" (Mano and Mesch, 2010, p. 67). In this respect, it has been argued that ICTs can be viewed as both a support and a demand for employees (Day *et al.*, 2010). Day *et al.* (2012) empirically identified eight demands associated with ICTs, including ICT hassles, response expectations and constant availability. ICT demands can negatively impact on organizational effectiveness by directly affecting how employees function. For example, ICT hassles (e.g. computer crashes, viruses, slow internet speed) could inhibit task completion, while poor communication could promote misunderstanding and ineffective decision making.

This paper will review how four of the demands identified by Day *et al.* (2012) impact on organizational effectiveness. The research builds on Day *et al.*'s (2012) empirical study by updating the evidence on ICT demand outcomes, but perhaps more centrally by reviewing interventions which have been developed to address each ICT demand. In conducting this review, we aim to provide a more transparent picture of how ICTs contribute to organizational effectiveness, while also presenting evidence that can inform the design of more effectual organizational interventions. The paper concludes with implications for research and practice.

2. Literature review

Four of the demands identified by Day *et al.* (2012) specifically link to the way ICTs are used for employee communication, these are: the extent that employees are expected to respond quickly to computer-mediated communication; the extent that ICTs enable constantly availability; the use of ICTs to increase workload; and poor communication. We examine each factor in turn to identify how these demands relate to organizational outcomes. For each factor we first analyze the organizational outcomes and then provide suggestions for interventions that can address them. After reviewing each communication demand we elaborate on interventions used to mitigate their impact in order to provide suggestions for managers and organizations.

2.1 Response expectations

2.1.1 Organizational outcomes. Having to respond quickly to requests is not a demand specific to ICT or technology, indeed employees are often interrupted more in person (Van Solingen *et al.*, 1998). ICT has, however, provided new opportunities for constant interruptions that ask for immediate responses. The phone has been interrupting employees for long enough (Van Solingen *et al.*, 1998), but recent literature is now focussing on e-mails (e.g. Barber and Santuzzi, 2015) and instant messaging (e.g. Gupta *et al.*, 2013) due to their increasing prevalence within organizations. Unlike phone calls, e-mails are supposed to be asynchronous and as such could be replied to whenever convenient. However, a study that investigated the responding habits of employees within a large UK company found that most e-mails were dealt with within six seconds of reception, with an average of one minute 44 seconds (Jackson *et al.*, 2001). The fast pace at which incoming e-mails are checked (along with arrival notifications) can thus

make them as disturbing as synchronous media (e.g. phone calls, instant messaging) (Jackson *et al.*, 2001). Regarding the impact of such interruptions on performance, Mano and Mesch (2010) found that e-mail interruptions led to enhanced work performance, perhaps because they "increase the acquisition of work-related information critical for getting the job done" (p. 68). Yet this explanation only covers e-mails which contain critical information and typologies suggest that other interruptions, such as those transmitting systems information, might actually have the opposite effect (Addas and Pinsonneault, 2015).

The impact may also depend on the type of task at hand, as well as how performance is evaluated. An experimental study found that simple tasks were accomplished quicker and with greater accuracy than more complex tasks because of interruptions, as interruptions focussed participants' attention on important cues (Speier *et al.*, 2003). Therefore performance on simple or short tasks might be less negatively impacted by interruptions than performance on more complex or longer projects (Addas and Pinsonneault, 2015). Similarly, interruptions asking for an immediate response unrelated to the task at hand fragment attention and reduce time dedicated to primary task activities. This can potentially result in lowered performance, efficiency and work quality (Addas and Pinsonneault, 2015). These negative effects can be further nuanced by contextual elements. An experimental study found that instant messages became more disruptive as the hierarchical level of the sender increased (Gupta *et al.*, 2013). Individual variables might also moderate response expectations, as individuals who enjoy multitasking might be less negatively affected by instant message interruptions (Li *et al.*, 2011). Furthermore, self-disciplined individuals might be more capable of resisting interruptions, which enables them to maintain their productivity (Al-Dabbagh *et al.*, 2014).

Interruptions not only fragment attention, they also make it harder for an individual to return to their primary task. Employees within a large UK organization took an average of 64 seconds to recover from an e-mail interruption to reengage in their primary task (Jackson *et al.*, 2001). Other studies have referenced recovery times as long as 15 minutes (Van Solingen *et al.*, 1998). Given the time taken away from the primary task to deal with response expectations, it has been estimated that knowledge workers lose 4-5 percent or 28 minutes of their workday to interruptions (Gupta and Sharda, 2008), while more than ten interruptions per day can severely hinder worker productivity (Van Solingen *et al.*, 1998).

Although interruptions that transmit information necessary for task completion might actually increase performance (Mano and Mesch, 2010) (as opposed to other interruptions) (Addas and Pinsonneault, 2015; Speier *et al.*, 2003), these productivity gains may be counterbalanced by detrimental effects on mental and physical health (Barber and Santuzzi, 2015). Indeed, the "workplace telepressure" created by response expectations was associated with higher physical and cognitive burnout, health-related absenteeism and poorer sleep quality (Barber and Santuzzi, 2015).

2.1.2 Possible interventions. In order to tackle interruptions and response expectations, researchers have made several suggestions. A frequent suggestion has been to increase the interval at which incoming messages are checked (Addas and Pinsonneault, 2015; Gupta *et al.*, 2011; Jackson *et al.*, 2001, 2006), although this does not apply to phone calls. It has been estimated that increasing the e-mail checking frequency from five minutes to 45 minutes could save employees 13.16 minutes

per day, which would have accounted for a £10,000 per day saving in the organization surveyed for the study (Jackson *et al.*, 2006). Other researchers went as far as to suggest a checking frequency of between two and four times per day (Gupta *et al.*, 2011; Kushlev and Dunn, 2015). Increasing the e-mail checking frequency has been found to increase task coordination, perhaps because it increases certainty among recipients that their messages will be dealt with at a specific time (Dabbish and Kraut, 2006). Though increasing the e-mail checking frequency can improve productivity and task coordination, it can also increase e-mail overload, as checking e-mails whenever they arrive as opposed to in batch prevents the inbox piling up (Dabbish and Kraut, 2006).

As an additional strategy, employees could work on their e-mail or instant message checking self-discipline (Addas and Pinsonneault, 2015; Al-Dabbagh *et al.*, 2014). Although recipients are not the only ones to blame, as senders should also try to limit the number of interrupting messages they dispatch (Addas and Pinsonneault, 2015). This can be done by only contacting the relevant individual and by avoiding "reply-to-all" messages (Jackson *et al.*, 2003). If senders do not expect immediate responses, they could avoid synchronous messages such as instant messages or phone calls as they create stronger response expectations (Gupta *et al.*, 2013). Managers need to be particularly aware that sending messages which are unrelated to their subordinates primary task can divert attention and reduce its final quality, especially if the task is more complex (Addas and Pinsonneault, 2015). Managers might also consider their subordinate's orientation toward multi-tasking and avoid interrupting employees who prefer to focus on a single task (Li *et al.*, 2011).

On an organizational level, a "company-wide awareness of interruptions' impact on productivity" (Van Solingen *et al.*, 1998, p. 101) needs to be promoted by assessing the impact within a company (Al-Dabbagh *et al.*, 2014) and by collectively discussing the results in order to create a more empathetic organizational culture (Barber and Santuzzi, 2015). Response expectations can also occur outside of working hours, thus blurring work-home boundaries and creating pressure for 24/7 availability (Barber and Santuzzi, 2015). We now discuss the implications of constant availability.

2.2 Constant availability

2.2.1 Organizational outcomes. This widely researched and reported aspect of the work-related ICT culture concerns how ICTs make it possible for work to cross into the non-work domain (Currie and Eveline, 2011; Diaz *et al.*, 2012) and increase productivity expectations (Ayyagari *et al.*, 2011; Tarafdar *et al.*, 2007). A survey of Australian workers found that 38 percent of Australians check their e-mails during non-work hours and kept their mobile phones switched on (*The Weekend Australian*, 2007). Moreover, in the UK it was recently reported that managers work an extra day each week in unpaid overtime, a finding that was attributed to the smartphone culture and "tech pressure" (BBC News, 2014).

This constant connectivity materializes in corporate smartphones, such as BlackBerrys or remote access to work communication media (e.g. e-mail). Although these devices and media have sometimes been described as an "electronic leash" tying employees to their workplaces (Boswell and Olson-Buchanan, 2007), studies have found that employees rarely resist the introduction of such technologies and even embrace it (Cavazotte *et al.*, 2014; Mazmanian, 2013), feeling more satisfied with their jobs as a result (Diaz *et al.*, 2012). Most are even eager to claim that they accepted the introduction of these technologies of their own free will and with no organizational

pressure (Mazmanian, 2013), while some think it is an inherent necessity of their jobs (Waller and Ragsdell, 2012). These desires might actually emerge less from organizational demands and more from friends, family, industry or society in general which perpetuate or glorify this "always-on" culture (Matusik and Mickel, 2011). Indeed, employees often consider these devices and media as "empowering," and feel a greater sense of professionalism, productivity, autonomy and control when using them (Cavazotte *et al.*, 2014). They also feel more productive and more able to multi-task due to having these technologies (Matusik and Mickel, 2011). Similarly, teleworkers – who mostly work outside the office – feel a greater sense of productivity (Bailey and Kurland, 2002) which is sometimes reflected by higher supervisor ratings and job performance (Gajendran and Harrison, 2007). Accordingly, availability was the only dimension of ICT demands that was positively associated with professional efficacy in Day *et al.*'s (2012) framework.

These positive organizational outcomes and employee perceptions, however, can come at a personal cost, making constant availability a "double-edged sword" (Dén-Nagy, 2014). "Advantages that appear in the domain of work can require sacrifices in private life" (p. 208) and studies have linked constant availability to increased work-life conflict and work-life imbalance (Derks *et al.*, 2015; Diaz *et al.*, 2012; Matusik and Mickel, 2011; Wright *et al.*, 2014), outcomes which have been associated with job burnout (Wright *et al.*, 2014). Although ICT facilitates these outcomes, individuals also share some of the responsibility (Mazmanian, 2013). Employees and especially managers who send messages outside working hours implicitly encourage constant availability by creating response expectations (Derks *et al.*, 2015). Nevertheless, individuals who have a more positive view of this connectivity do not experience as much work-life conflict as those who view it negatively (Wright *et al.*, 2014). Similarly, employees who are highly engaged experience less work-home interference (Derks *et al.*, 2015), while employees who prefer to segment their home and work roles report greater psychological detachment (Park *et al.*, 2011).

Qualitative studies have shown that employees are generally aware of these trade-offs when they choose to become available outside working hours (Cavazotte *et al.*, 2014; Matusik and Mickel, 2011). Participants in Waller and Ragsdell's (2012) study and especially "middle and senior managers who appear to be the victims (and culprits) of a 24/7 culture of accessibility" (p. 170) were clearly aware that these technologies had a negative impact on their lives outside work; yet they continued to use them. Paradoxically, employees often claim these technologies give them greater autonomy, while they remain aware that technologies also allow for increased organizational control and surveillance (Cavazotte *et al.*, 2014) and even decrease autonomy in practice by reducing the ability to disengage from work (Mazmanian *et al.*, 2013). As employees are often aware of these trade-offs, they cope with the demands created by 24/7 availability by taking them less seriously or finding justifications for the choices they make (Cavazotte *et al.*, 2014).

2.2.2 Possible interventions. Given that employees often choose to remain constantly available and embrace technologies that facilitate constant connectivity (Cavazotte *et al.*, 2014; Mazmanian, 2013), they may feel empowered by these technologies and be more productive as a result (Matusik and Mickel, 2011). Therefore organizations might have a hard time protecting their workers from the resulting "self-inflicted work-life conflict" (Wright *et al.*, 2014, p. 524). The ability to detach from work is, however, important for employee well-being as empirical evidence demonstrates that a lack of

recovery from work is associated with negative health outcomes, including burnout and psychosomatic health complaints (Eden, 2001; Lundberg and Lindfors, 2002).

In terms of organizational policies and culture, a main element to consider is whether to promote or react against norms of constant availability (Matusik and Mickel, 2011). If these norms were to be promoted, organizations should try to increase awareness of associated work-life issues (Diaz *et al.*, 2012). For example, collective discussions could be held about the topic (Barber and Santuzzi, 2015) and support groups could be implemented where employees could share suggestions on best practice (Leonardi *et al.*, 2010). Training interventions could even be designed to better prepare employees for the work-life conflicts that they might face once they adopt these technologies (Leonardi *et al.*, 2010). Managers should also give special consideration to employees who are more vulnerable to the work-life conflict, such as older, less engaged, less tech-savy workers or those who view these norms negatively (Waller and Ragsdell, 2012; Wright *et al.*, 2014).

If constant availability were to be fought, organizational policies that limit access to ICT at night and during weekends could be enforced (Barber and Santuzzi, 2015; Wright *et al.*, 2014). More informally, organizations could circulate guidelines that explicitly discourage work communication beyond working hours (Wright *et al.*, 2014). Managers should also make clear their expectations on constant availability (Derks *et al.*, 2015). If managers want to limit interactions beyond working hours, they should act as role models by refraining from sending any such messages themselves. Otherwise they are likely to create response expectations and encourage the same "always-on" culture they wish to prevent (Derks *et al.*, 2015). Finally, a more subtle approach identified by Matusik and Mickel (2011) is to limit the use of corporate smartphones or similar devices to organizational-specific interactions. The authors state that when employees are encouraged to use devices for organizational and personal interactions, the organization is "encouraging the highest degree of responsiveness and accessibility" (Matusik and Mickel, 2011, p. 1023).

As response expectations expand beyond working hours creating pressures for constant availability, employees might experience increased workloads and longer work days. This changing nature of workload is now discussed.

2.3 Workload

2.3.1 Organizational outcomes. When examining the impact of ICT on workload and its associated organizational outcomes, several questions arise. What is the contribution of ICT to the overall workload of employees? Has workload increased or decreased with the introduction of ICT? If so, under what circumstances? Regarding the initial question, one study found that interruptions from instant messaging systems led to a higher perceived workload (Gupta *et al.*, 2013). Similarly, it has been found that receiving more e-mails increases the length of the workday and produces greater feelings of overload (Barley *et al.*, 2011). In addition, studies have examined the volume of interactions by calculating the average time spent reading or sending e-mails in organizations. Jackson *et al.* (2006) found that employees spent 29 minutes reading e-mails each day, which cost their organization £40,848 per day or £9.8 million per year, on the basis of the hourly cost of work. These figures do not, however, take into account how reading these e-mails might have allowed the organization to save time and money elsewhere. For instance, it has been found that the more work-related e-mails received, the higher the work effectiveness (Mano and Mesch, 2010).

Nevertheless, stress and distress were also higher because of more numerous work-related e-mails, leading the authors to state that "technology has provided excellent means for achieving competition driven goals. But insofar as it affects employees, it may have given rise to unexpected side-effects" (Mano and Mesch, 2010, p. 68).

Stress also arises from ICT communications in form of information overload. In particular, e-mail overload which has been defined by Dabbish and Kraut (2006) as "users" perceptions that their own e-mail use has gotten out of control because they receive and send more e-mail than they can handle, find or process effectively" (p. 431). Their study found that e-mail overload led to reduced task coordination. This was the result not of the sheer volume of e-mails, but of e-mail overload as subjectively perceived by individuals. On a more transverse level, perceived communication overload has been found to lead to perceived losses in productivity for individuals who depend highly on communication technology in their jobs (Karr-Wisniewski and Lu, 2010). Other workers might also be more at risk of e-mail overload. Jackson *et al.* (2006) found that employees in geographically dispersed teams frequently returned to their inbox to find that e-mails had piled up while they were on the move or in meetings, thus leading to increased overload.

2.3.2 Possible interventions. Most studies have focussed on interventions targeted at reducing e-mail overload. E-mail overload is based not only on e-mail volumes but also on users' ability to handle their e-mails (Dabbish and Kraut, 2006). Reducing feelings of e-mail overload could be done by either "reducing the amount of incoming information" or "enhancing recipients' information processing capabilities" (Soucek and Moser, 2010, p. 1459). Regarding the former, studies have suggested that organizations should design and circulate e-mail guidelines to encourage users to limit the amount of e-mails they send (Soucek and Moser, 2010). As informational e-mails sent by the organization contribute to e-mail overload, these types of e-mails could instead be sent via alternative channels, such as an intranet or an RSS news feed "rather than sending e-mail 'blasts' that necessitate action by every employee" (Mark *et al.*, 2012, p. 10).

In order to enhance users' abilities to deal with e-mail overload, training interventions could be designed and implemented (Burgess *et al.*, 2005; Jackson and Lichtenstein, 2011; Soucek and Moser, 2010). A comprehensive training intervention designed by Soucek and Moser (2010) consisted of improving people's ability to use e-mail features such as filters, improving personal workflow and enhancing the quality of written e-mails. Trainers first demonstrated techniques such as e-mail filtering or archiving and discussed effective e-mail communication. Participants then took part in role-playing exercises in which they had to filter, categorize and respond to fictional e-mails designed to reflect common problems such as newsletters, spams or poorly written e-mails. After each exercise, participants received feedback from the trainer and discussed their actions with peers. In the final part, the trainer displayed examples of poorly written e-mails and debated recommendations for best practices. As a take-away activity, participants had to draft an e-mail policy that they could circulate among their colleagues or team members. Following the training, participants had greater knowledge of e-mail functions and applied them more in their jobs, which reduced strain and improved productivity. Although the volume of e-mails did not change post-training, participants were able to cope with this volume because of enhanced information processing abilities.

Finally, organizations could try to "promote a culture with a high perception of e-mail as a business critical tool" (Sumecki *et al.*, 2011, p. 413), as more positive views

toward e-mail can also mitigate feelings of e-mail overload. Organizations could also assess information overload in order to help individuals who are most at risk of becoming overloaded (Karr-Wisniewski and Lu, 2010). Furthermore, technical solutions could be implemented by adding task management features in e-mail applications (Bellotti *et al.*, 2005), setting e-mail applications to check incoming messages less frequently (Dabbish and Kraut, 2006) or even sharing the e-mail volume with a personal assistant, a crowdsourced assistant or an algorithm (Kokkalis *et al.*, 2013).

As overload can also be the result of poorly formulated e-mails or misunderstandings (Jackson *et al.*, 2006), we now discuss the organizational outcomes and interventions associated with poor communication.

2.4 Poor communication

2.4.1 Organizational outcomes. The literature suggests that there are two main ways in which employee and organizational functioning can be interrupted by poor communication. First, individuals may misunderstand the messages they receive through ICTs which can produce frustration, stress (Day *et al.*, 2010) and poor decisions (Jackson and Van den Hooff, 2012). Second when employees are subjected to online communications perceived as uncivil or aggressive it can produce detrimental individual-level and organizational-level outcomes, including reduced well-being and turnover intentions (Baruch, 2005; Giumetti *et al.*, 2013).

A significant body of literature has focussed on how ICT produces understanding costs for employees (Daft and Lengel, 1986; Kock, 2004; Sproull and Kiesler, 1986). Byron (2008) suggests that the primary outcome of miscommunication via e-mail is a reduction in the quality of interpersonal relationships, which are integral to organizational functioning. Although, Byron (2008) also speculated that miscommunication may inhibit task performance when positive feedback is interpreted as emotionally neutral by a subordinate. In similar vein, Friedman and Currall (2003) developed a framework that outlines how structural elements of e-mail communication (including diminished feedback and excess attention) are particularly amenable to misunderstanding and conflict.

Although it is generally accepted that miscommunication impairs individual and team effectiveness, limited empirical study has focussed on outcomes of computer-mediated misunderstandings. However, research has shown that when virtual teams are distributed, a degree of situation invisibility exists as communication partners are less aware of contextual factors in their partner's environment (Cramton *et al.*, 2007). This has implications for virtual team outcomes as teams have reported lower social cohesion and satisfaction when situation invisibility exists (Cramton *et al.*, 2007). When employees are less aware of their communication partner's environment, they are more likely to make dispositional attributions about negative partner behavior than situational attributions (Walther *et al.*, 2002). Dispositional attributions occur when behavior is attributed to an individual's personality, whereas situational attributions are made when behavior is believed to stem from a person's environment. Walther *et al.* (2002) found that unwarranted dispositional attributions were linked to lower task performance and lower relational attraction. These unwanted by-products of distributed communication may be less problematic when communication is fairly infrequent and facilitates the completion of simple tasks. However, it has been suggested that even synchronous media, such as video conferencing should not be used for discussing controversial topics or creative ideas (Panteli and Dawson, 2001), as it encourages more formal communication whereby it is difficult to build chemistry and rapport.

Poor communication also encompasses negative interpersonal communication, including cyber incivility (Lim and Teo, 2009), cyberaggression (Weatherbee and Kelloway, 2006) and cyberbullying (Privitera and Campbell, 2009). Cyber incivility has been defined as "communicative behavior exhibited in computer-mediated interactions that violate workplace norms of mutual respect" (Lim and Teo, 2009, p. 419). Several studies have demonstrated how cyber incivility can reduce organizational effectiveness by depleting employee resources. Giumetti *et al.* (2013) conducted a within subjects experiment whereby participants completed math tasks while interacting electronically with a supportive and an unsupportive supervisor. The results showed that individuals reported higher negative affect, lower energy and lower task performance in the uncivil condition. A field study identified similar findings, as experiencing day-specific cyber incivility was associated with greater distress on that work day which persisted until the following work day (Park *et al.*, 2015).

Workplace cyberbullying has also been linked to detrimental outcomes. Cyberbullying differs from cyber incivility as it involves repeatedly experiencing negative behaviors from a more powerful perpetrator (Heatherington and Coyne, 2014). Cyberbullying has been associated with intention to quit (Baruch, 2005), frustration, anxiety and vengefulness (Hong *et al.*, 2014) and lower job satisfaction (Farley *et al.*, 2015; Snyman and Loh, 2015).

A study by Porath and Pearson (2010) outlined the costs of offline incivility, which included decreased work effort, decreased attendance, reduced work quality, reduced organizational commitment, reduced time spent working due to worrying and increased turnover intentions. Yet online harassment may more readily undermine effectiveness because online acts are more visible which may affect an organizations reputation. For instance, in April 2014 it was reported that one in five British workers had criticized their boss on social networking sites (*The Metro*, 2014). Furthermore, cyber harassment can be anonymous and it can affect employees outside working hours, which can heighten fear of future harassment as experiencing unwanted messages from an unknown perpetrator produces greater ambiguity (Ford, 2013).

2.4.2 Possible interventions. Several interventions geared toward improving communication have involved employee training. Jackson *et al.* (2006) administered a questionnaire to Plc employees to identify difficulties associated with sending and receiving e-mails. Sender training was then administered to employee groups within the organization which involved targeting e-mails, getting the message across and using an effective subject line. The results showed that there was a significant improvement in the overall quality of messages received by recipients as a result of the training. Most notably, the training has a significant impact on e-mail clarity as recipients reported that e-mails were better written, easier to read and more to the point after training. Jackson *et al.* (2006) estimated that the training could save the company £3,071 per day or £737,000 per year thanks to the reduced time spent reading more efficient e-mails. Organizations that rely heavily on e-mail communication should therefore consider implementing e-mail training as these results suggest it may produce significant financial savings.

Organizations should also consider whether employees would benefit from video conferencing training. Panteli and Dawson (2001) reviewed video conferencing training in a multinational oil company to find that 90 percent of employees who received the training felt competent using video technology to communicate post-intervention.

When virtual teams are highly prevalent within organizations, managers should also consider implementing training for virtual team members. Rosen *et al.* (2006)

surveyed 440 organizations to identify best practice in virtual team training, although more than 60 percent of the 440 organizations surveyed for the study did not provide any training at all. Practitioners seeking to develop virtual team training may consider including content on "sensitivity to cultural differences" and "creating a team mission statement" as a comparison of effective compared to less effective training demonstrated that more effective virtual team training incorporated these aspects (Rosen *et al.*, 2006).

At present there is limited available research on organizational interventions designed to address workplace cyber harassment. Nonetheless researchers have suggested that civility, respect and engagement at work (CREW) training could be adapted by practitioners to cover cyber communication (Giumetti *et al.*, 2013; Park *et al.*, 2015). CREW is an intervention designed to reduce acceptance of uncivil behaviors whereby workgroups attend weekly meetings to learn civil ways of interacting. It may be particularly relevant for volatile virtual teams, as it aims to help work units identify ways to reduce incivility (Osatuke *et al.*, 2009). This is done by helping workgroups develop and implement their own intervention, rather than imposing an intervention upon them. Organizations struggling with cyber incivility may consider the method as studies demonstrate that CREW training reduces face-to-face incivility, absenteeism and burnout (Leiter *et al.*, 2011; Osatuke *et al.*, 2009).

A further strategy concerns the implementation of organizational policies that prohibit negative ICT communication. West *et al.* (2014) interviewed human resources professionals on the effectiveness of cyberbullying policies. All interviewees reported that their organization had some form of workplace harassment policy, however, respondents noted that even when their organizations policy covered cyberbullying, training was needed to heighten awareness. Organizations may also consider developing social media policies. The popular press has coined the term "Facebook Fired" to refer to instances where employees have been sacked from their jobs as a result of posting on social media (Schmidt and O'Connor, 2015). To prevent such occurrences, Schmidt and O'Connor (2015) suggest organizations craft clear policies that do not overly restrict employees and include examples of prohibited wrongdoing.

3. Summary of findings

The key findings from this review are summarized in Figure 1 for each of the four dimensions. In addition to this figure, we now provide a summary of the key findings across all dimensions.

3.1 Organizational outcomes

As noted in this review, some demands created by ICTs are just plain detrimental to organizational performance. Cyber forms of harassment can deplete employee resources, reduce positive affect and increase distress (Giumetti *et al.*, 2013; Park *et al.*, 2015). Poor communication in general can create misunderstandings which may cause frustration, stress (Day *et al.*, 2010), poor decisions (Jackson and Van den Hooff, 2012) or weaker interpersonal relationships (Byron, 2008). In addition, employees can take from 64 seconds to 15 minutes to recover from an e-mail interruption and reengage in their primary task (Jackson *et al.*, 2001; Van Solingen *et al.*, 1998), and knowledge workers might lose up to 28 minutes of their workday because of interruptions (Gupta and Sharda, 2008). Similarly, those being overloaded by e-mails experience reduced task coordination and productivity (Dabbish and Kraut, 2006; Karr-Wisniewski and Lu, 2010).

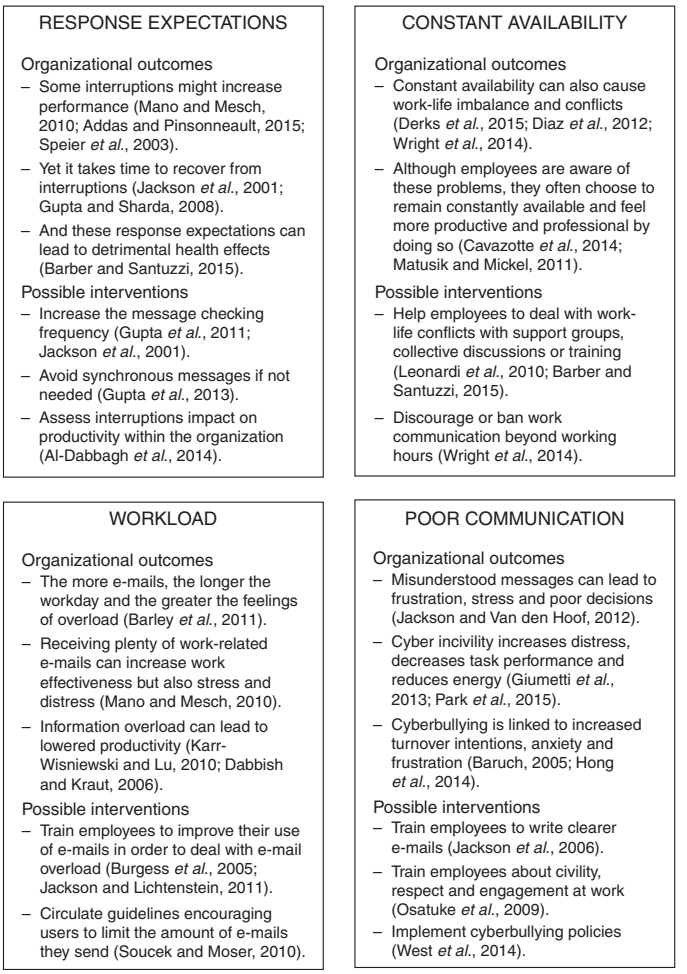

Figure 1. Summary of key findings

However, some demands act as a "double-edged sword" (Dén-Nagy, 2014) by increasing organizational performance under certain circumstances, but at a personal cost. On one hand, performance might be increased by interruptions carrying work-related information or a higher volume of work-related e-mails (Mano and Mesch, 2010). Individuals having access to ICT outside working hours might feel empowered by devices such as BlackBerrys resulting in a greater sense of satisfaction, professionalism, productivity, autonomy, control (Cavazotte *et al.*, 2014; Day *et al.*, 2012; Matusik and Mickel, 2011). On the other hand, ICT response expectations have been found to increase physical and cognitive burnout, health-related absenteeism and cause poorer sleep quality (Barber and Santuzzi, 2015). The 24/7 availability increases work-life conflict and work-life imbalance (Derks *et al.*, 2015; Diaz *et al.*, 2012; Matusik and Mickel, 2011; Wright *et al.*, 2014), outcomes which have been associated with job burnout (Wright *et al.*, 2014). This paradox is intriguing, as employees are often aware of these tradeoffs and often embrace the introduction of some these technologies rather than resisting it (Cavazotte *et al.*, 2014; Mazmanian, 2013).

3.2 Possible interventions

To tackle some of these outcomes, this review discussed several possible interventions suggested in previous studies. First, training interventions could be implemented to improve e-mail quality, clarity and efficiency (Jackson *et al.*, 2006), to tackle e-mail overload (Soucek and Moser, 2010), to reduce cyber incivility (Giumetti *et al.*, 2013) or to prepare for ICT-related work-life conflict (Leonardi *et al.*, 2010). The review discussed some content proposed in these training interventions such as role-playing activities or commented examples.

Organizational policies could also be designed to mitigate the negative outcomes identified. The impact of these demands on productivity should be assessed in the organization (Al-Dabbagh *et al.*, 2014), then collectively discussed (Barber and Santuzzi, 2015). Researchers have suggested that organizations should then decide on which behaviors to promote and which to restrict (Matusik and Mickel, 2011). Depending on the results of internal surveys, discussions and debates, policies could be designed; indeed the review discussed some examples such as guidelines or restrictions.

Finally, we discussed what can be done at an individual level. For example, managers could act as role models in terms of constant availability by refraining from sending messages beyond working hours (Derks *et al.*, 2015) or individuals could change the setup of their e-mail software in order to tackle ICT interruptions (Addas and Pinsonneault, 2015; Jackson *et al.*, 2006).

Having summarized the key findings across the four dimensions, we now discuss their implications for research as well as key gaps in this literature.

4. Implications for research

The current digital environments that individuals face at work places demands on them that are potentially detrimental to performance and well-being (Tarafdar *et al.*, 2015b). Although research is beginning to examine some of these issues, there is a need to theoretically structure these "dark side" ICT-related phenomena in order to understand what we already know about them and to provide directions for future research. This paper tackles these two objectives from the point of view of ICT communication in organizations. Specifically it accomplishes the following objectives. One, current studies examine different kinds of impacts of ICT such as loss of employee control (Mazmanian *et al.*, 2013) and poor performance (Tarafdar *et al.*, 2015a). However, these studies look at disparate characteristics of and expectations from IT use without providing an integrated understanding of these demands. By focussing on four key characteristics of ICT communication, this paper looks at the different demands and their possible organizational consequences in an integrated manner, thus providing theoretical structure to this phenomenon. Two, we identify the organizational interventions that can offset the negative consequences of ICT. In doing so, we theoretically link the demands from ICT, their organizational consequences and possible organizational interventions. This takes the literature forward by explicitly focussing on interventions rather than just on the demands of ICT or their consequences. Finally, in reporting systematically on the state of the current literature we are able to suggest directions where future research should direct its efforts to further develop the area of negative consequences of ICT communication.

Specifically, the review highlighted the double-edged nature of ICT in that some productivity benefits also come at a personal cost. This paradox could be further investigated if studies on ICT and productivity were to systematically include

well-being-related outcomes. Looking at both productivity and well-being emphasizes that organizational effectiveness is about both people and performance. This paper also discussed innovative and clear suggestions for practice identified by other researchers. Future studies could follow the example of some of the papers cited to improve their recommendations for practice. We suggest that the "implications for practice" section should be considered key here. These suggestions for practice could then be investigated in other research studies such as quasi experiments. For example, studies have suggested that training interventions might be designed to tackle e-mail overload, and Burgess *et al.* (2005) successfully built upon this suggestion by designing an actual training intervention and by evaluating its outcomes. Some interventions discussed in this paper such as e-mail guidelines or interventions on cyber harassment are yet to be investigated in practice. These studies have much to bring to both research and practice. Finally, most ICT methods leave behind a trail of their existence, which presents opportunities for researchers as it may be possible to identify objective instances of overload, interruption or cyber harassment and determine their subsequent impact on organizational effectiveness. In this paper, we reviewed experimental research which demonstrated that interacting with an uncivil supervisor was associated with lower task performance (Giumetti *et al.*, 2013). This suggests that there is potential for field studies that can use objective indicators of overload or interruption (e.g. number or volume of e-mails received) and how they are linked with subsequent indicators of employee health and performance.

5. Implications for practice and conclusions

We have reviewed four aspects of ICT communication that affect the health and performance of employees: expectations that they should respond immediately to communications, 24/7 availability, increased workload and the potential for poor communication. There are a number of potential interventions that could minimize the nefarious aspects of these downsides. Regarding response expectations, employees could be trained to let recipients know whether their e-mail is a priority so that recipients can determine when they need to respond and can then prioritize their workload. Furthermore, longer message checking intervals can enable people to get on with their primary work, rather than constantly tuning in. Also employees should be discouraged from "reply to all" and not cc people who really have no "need to know." In terms of "constant availability," both employee and employer have a responsibility to set personal and organizational guidelines about accessing e-mail and other forms of ICT outside of working hours. The research evidence is clear that this 24/7 culture is damaging people's health and relationships outside, as well as their productivity. The reactions from those concerned about this have led some employers to shut down servers at the weekends and to create "e-mail free" times during the week. The very least employers should do is create guidelines and diktats which encourage people to be "e-mail free" during non-work time unless absolutely necessary. In respect of the impact of ICT on workloads, we would encourage people to severely limit the "ccing" of people into e-mails, let the recipient know the priority of the e-mail, train people on e-mail filtering or archiving, develop a detailed e-mail policy and encourage employees to check their e-mails less frequently and not in the evening or on holiday unless absolutely necessary. Finally, there are a range of practical implications to minimize the risk of misunderstandings. Many organizations are now stopping e-mail communications within the same building to encourage

colleagues to meet face to face, as this can minimize communication difficulties and promote team building. Guidelines should also emphasize that difficult conversations (e.g. about job loss, promotions, performance management) should not be done by any form of ICT. Another worrying trend alluded to earlier is the increase in cyberbullying, so training that addresses this (i.e. the CREW program), should be considered by employers if they identify this as an increasing problem area. As much as possible when it comes to difficult or complex or nuanced conversations they should be done by face-to-face communications or at the very least video conferencing.

In summary, senior management should be responsible for ICT guidelines, employer expectations, encouraging better work-life balance and minimizing the potential negative effects of poor use of ICT. As Einstein once wrote about technology "I fear the day that technology will surpass our human interaction the world will have a generation of idiots." Technology can be an enormously important tool but we need to manage it rather than it manage us!

References

Addas, S. and Pinsonneault, A. (2015), "The many faces of information technology interruptions: a taxonomy and preliminary investigation of their performance effects", *Information Systems Journal*, Vol. 25 No. 3, pp. 231-273. doi: 10.1111/isj.12064.

Al-Dabbagh, B., Sylvester, A. and Scornavacca, E. (2014), "To connect or disconnect – that is the question: ICT self-discipline in the 21st century workplace", *Proceedings of the 25th Australasian Conference on Information Systems, ACIS, December 8-10*, available at: http://aut.researchgateway.ac.nz/handle/10292/8166?show=full

Ayyagari, R., Grover, V. and Purvis, R. (2011), "Technostress: technological antecedents and implications", *MIS Quarterly*, Vol. 35 No. 4, pp. 831-858.

Bailey, D.E. and Kurland, N.B. (2002), "A review of telework research: findings, new directions, and lessons for the study of modern work", *Journal of Organizational Behavior*, Vol. 23 No. 4, pp. 383-400. doi: 10.1002/job.144.

Barber, L.K. and Santuzzi, A.M. (2015), "Please respond ASAP: workplace telepressure and employee recovery", *Journal of Occupational Health Psychology*, Vol. 20 No. 2, pp. 172-189. doi: 10.1037/a0038278.

Barley, S.R., Meyerson, D.E. and Grodal, S. (2011), "E-mail as a source and symbol of stress", *Organization Science*, Vol. 22 No. 4, pp. 887-906.

Baruch, Y. (2005), "Bullying on the net: adverse behavior on e-mail and its impact", *Information & Management*, Vol. 42 No. 2, pp. 361-371. doi: 10.1016/j.im.2004.02.001.

BBC News (2014), "Managers 'work extra day per week in unpaid overtime", available at: www.bbc.co.uk/news/business-28220312

Bellotti, V., Ducheneaut, N., Howard, M., Smith, I. and Grinter, R.E. (2005), "Quality versus quantity: e-mail-centric task management and its relation with overload", *Human-Computer Interaction*, Vol. 20 No. 1, pp. 89-138. doi: 10.1207/s15327051hci2001&2_4.

Boswell, W.R. and Olson-Buchanan, J.B. (2007), "The use of communication technologies after hours: the role of work attitudes and work-life conflict", *Journal of Management*, Vol. 33 No. 4, pp. 592-610.

Burgess, A., Jackson, T. and Edwards, J. (2005), "Email training significantly reduces email defects", *International Journal of Information Management*, Vol. 25 No. 1, pp. 71-83. doi: 10.1016/j.ijinfomgt.2004.10.004.

Byron, K. (2008), "Carrying too heavy a load? The communication and miscommunication of emotion by email", *Academy of Management Review*, Vol. 33 No. 2, pp. 309-327. doi: 10.5465/AMR.2008.31193163.

Cavazotte, F., Heloisa Lemos, A. and Villadsen, K. (2014), "Corporate smart phones: professionals' conscious engagement in escalating work connectivity", *New Technology, Work and Employment*, Vol. 29 No. 1, pp. 72-87.

Cramton, C.D., Orvis, K.L. and Wilson, J.M. (2007), "Situation invisibility and attribution in distributed collaborations", *Journal of Management*, Vol. 33 No. 4, pp. 525-546. doi: 10.1177/0149206307302549.

Currie, J. and Eveline, J. (2011), "E-technology and work/life balance for academics with young children", *Higher Education*, Vol. 62 No. 4, pp. 533-550. doi: 10.1007/s10734-010-9404-9.

Dabbish, L.A. and Kraut, R.E. (2006), "Email overload at work: an analysis of factors associated with email strain", *Proceedings of the 2006 20th Anniversary Conference on Computer Supported Cooperative Work, ACM Banff, Alberta, November 4-8*, pp. 431-440.

Daft, R.L. and Lengel, R.H. (1986), "Organizational information requirements, media richness and structural design", *Management Science*, Vol. 32 No. 5, pp. 554-571.

Day, A., Scott, N. and Kelloway, E.K. (2010), "Information and communication technology: implications for job stress and employee well-being", in Perrewe, P. and Ganster, D. (Eds), *New Developments in Theoretical and Conceptual Approaches to Job Stress: Research in Occupational Stress and Well Being*, Vol. 8, Emerald Group Publishing Ltd, Burlington, VT, pp. 317-350.

Day, A., Paquet, S., Scott, N. and Hambley, L. (2012), "Perceived information and communication technology (ICT) demands on employee outcomes: the moderating effect of organizational ICT support", *Journal of Occupational Health Psychology*, Vol. 17 No. 4, p. 473.

Dén-Nagy, I. (2014), "A double-edged sword?: a critical evaluation of the mobile phone in creating work-life balance", *New Technology, Work and Employment*, Vol. 29 No. 2, pp. 193-211.

Derks, D., van Duin, D., Tims, M. and Bakker, A.B. (2015), "Smartphone use and work-home interference: the moderating role of social norms and employee work engagement", *Journal of Occupational and Organizational Psychology*, Vol. 88 No. 1, pp. 155-177. doi: 10.1111/joop.12083.

Diaz, I., Chiaburu, D.S., Zimmerman, R.D. and Boswell, W.R. (2012), "Communication technology: pros and cons of constant connection to work", *Journal of Vocational Behavior*, Vol. 80 No. 2, pp. 500-508. doi: 10.1016/j.jvb.2011.08.007.

Eden, D. (2001), "Vacations and other respites: studying stress on and off the job", in Cooper, C.L. and Robertson, I.T. (Eds), *International Review of Industrial and Organizational Psychology*, Wiley, Chichester, pp. 121-146.

Farley, S., Coyne, I., Sprigg, C., Axtell, C. and Subramanian, G. (2015), "Exploring the impact of workplace cyberbullying on trainee doctors", *Medical Education*, Vol. 49 No. 4, pp. 436-443. doi: 10.1111/medu.12666.

Ford, D.P. (2013), "Virtual harassment: media characteristics' role in psychological health", *Journal of Managerial Psychology*, Vol. 28 No. 4, pp. 408-428, available at: http://dx.doi.org/10.1108/JMP-12-2012-0398

Friedman, R.A. and Currall, S.C. (2003), "Conflict escalation: dispute exacerbating elements of email communication", *Human Relations*, Vol. 56 No. 11, pp. 1325-1347. doi: 10.1177/00187267035611003.

Gajendran, R.S. and Harrison, D.A. (2007), "The good, the bad, and the unknown about telecommuting: meta-analysis of psychological mediators and individual consequences", *Journal of Applied Psychology*, Vol. 92 No. 6, pp. 1524-1541.

Giumetti, G.W., Hatfield, A.L., Scisco, J.L., Schroeder, A.N., Muth, E.R. and Kowalski, R.M. (2013), "What a rude e-mail! Examining the differential effects of incivility versus support on mood, energy, engagement, and performance in an online context", *Journal of Occupational Health Psychology*, Vol. 18 No. 3, pp. 297-309. doi: 10.1037/a0032851.

Gupta, A. and Sharda, R. (2008), "SIMONE: a simulator for interruptions and message overload in network environments", *International Journal of Simulation and Process Modelling*, Vol. 4 Nos 3/4, pp. 237-247.

Gupta, A., Li, H. and Sharda, R. (2013), "Should I send this message? Understanding the impact of interruptions, social hierarchy and perceived task complexity on user performance and perceived workload", *Decision Support Systems*, Vol. 55 No. 1, pp. 135-145. doi: 10.1016/j.dss.2012.12.035.

Gupta, A., Sharda, R. and Greve, R.A. (2011), "You've got email! Does it really matter to process emails now or later?", *Information Systems Frontiers*, Vol. 13 No. 5, pp. 637-653, available at: http://dx.doi.org/10.1007/s10796-010-9242-4

Heatherington, W. and Coyne, I. (2014), "Understanding individual experiences of cyberbullying encountered through work", *International Journal of Organization Theory and Behaviour*, Vol. 17 No. 2, pp. 163-192.

Hong, J.C., Chien-Hou, L., Hwang, M.Y., Hu, R.P. and Chen, Y.L. (2014), "Positive affect predicting worker psychological response to cyber-bullying in the high-tech industry in northern Taiwan", *Computers in Human Behavior*, Vol. 30, pp. 307-314. doi: 10.1016/j.chb.2013.09.011, available at: www.sciencedirect.com/science/article/pii/S0747563213003397

Jackson, T.W. and Lichtenstein, S. (2011), "Optimising e-mail communication: the impact of seminar- and computer-based training", *International Journal of Internet and Enterprise Management*, Vol. 7 No. 2, pp. 197-216. doi: 10.1504/IJIEM.2011.039915.

Jackson, T.W. and Van den Hooff, B. (2012), "Understanding the factors that effect information overload and miscommunication within the workplace", *Journal of Emerging Trends in Computing and Information Sciences*, Vol. 3 No. 8, pp. 1240-1252.

Jackson, T.W., Burgess, A. and Edwards, J. (2006), "A simple approach to improving email communication", *Communications of the ACM*, Vol. 49 No. 6, pp. 107-109.

Jackson, T.W., Dawson, R. and Wilson, D. (2001), "The cost of email interruption", *Journal of Systems and Information Technology*, Vol. 5 No. 1, pp. 81-92.

Jackson, T.W., Dawson, R.J. and Wilson, D. (2003), "Breaking bad habits: the negative effect of email and instant messaging on the workplace", in Khosrow-Pour, M. (Ed.), *Information Technology & Organisations: Trends, Issues, Challenges & Solutions*, Idea Group, Hershey, PA, pp. 399-401.

Karr-Wisniewski, P. and Lu, Y. (2010), "When more is too much: operationalizing technology overload and exploring its impact on knowledge worker productivity", *Computers in Human Behavior*, Vol. 26 No. 5, pp. 1061-1072.

Kock, N. (2004), "New theory of computer-mediated communication based on Darwinian evolution", *Organization Science*, Vol. 15 No. 3, pp. 327-348.

Kokkalis, N., Köhn, T., Pfeiffer, C., Chornyi, D., Bernstein, M.S. and Klemmer, S.R. (2013), "EmailValet: managing email overload through private, accountable crowdsourcing", *Proceedings of the 2013 Conference on Computer Supported Cooperative Work, ACM, San Antonio, TX, February 23-27*, pp. 1291-1300.

Kushlev, K. and Dunn, E.W. (2015), "Checking email less frequently reduces stress", *Computers in Human Behavior*, Vol. 43, pp. 220-228. doi: 10.1016/j.chb.2014.11.005, available at: www.sciencedirect.com/science/article/pii/S0747563214005810

Leiter, M.P., Laschinger, H., Day, A. and Oore, D. (2011), "The impact of civility interventions on employee social behavior, distress, and attitudes", *Journal of Applied Psychology*, Vol. 96 No. 6, pp. 1258-1274.

Leonardi, P.M., Treem, J.W. and Jackson, M.H. (2010), "The connectivity paradox: using technology to both decrease and increase perceptions of distance in distributed work arrangements", *Journal of Applied Communication Research*, Vol. 38 No. 1, pp. 85-105. doi: 10.1080/00909880903483599.

Li, H., Gupta, A., Luo, X. and Warkentin, M. (2011), "Exploring the impact of instant messaging on subjective task complexity and user satisfaction", *European Journal of Information Systems*, Vol. 20 No. 2, pp. 139-155. doi: 10.1057/ejis.2010.59.

Lim, V.K. and Teo, T.S. (2009), "Mind your e-manners: impact of cyber incivility on employees' work attitude and behavior", *Information & Management*, Vol. 46 No. 8, pp. 419-425.

Lundberg, U. and Lindfors, P. (2002), "Psychophysiological reactions to telework in female and male white-collar workers", *Journal of Occupational Health Psychology*, Vol. 7 No. 4, pp. 354-364.

Madden, M. and Jones, S. (2008), "Networked workers", Pew Research Center, Washington, DC, September 24, available at: www.pewinternet.org/2008/09/24/networked-workers/

Mano, R.S. and Mesch, G.S. (2010), "E-mail characteristics, work performance and distress", *Computers in Human Behavior*, Vol. 26 No. 1, pp. 61-69. doi: 10.1016/j.chb.2009.08.005.

Mark, G., Voida, S. and Cardello, A. (2012), "A pace not dictated by electrons: an empirical study of work without email", *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, ACM*, pp. 555-564.

Matusik, S.F. and Mickel, A.E. (2011), "Embracing or embattled by converged mobile devices? Users' experiences with a contemporary connectivity technology", *Human Relations*, Vol. 64 No. 8, pp. 1001-1030. doi: 10.1177/0018726711405552.

Mazmanian, M. (2013), "Avoiding the trap of constant connectivity: when congruent frames allow for heterogeneous practices", *Academy of Management Journal*, Vol. 56 No. 5, pp. 1225-1250. doi: 10.5465/amj.2010.0787.

Mazmanian, M., Orlikowski, W.J. and Yates, J. (2013), "The autonomy paradox: the implications of mobile email devices for knowledge professionals", *Organization Science*, Vol. 24 No. 5, pp. 1337-1357. doi: 10.1287/orsc.1120.0806.

Office for National Statistics (2009), "Statistical bulletin: e-commerce and ICT 2009", available at: www.statistics.gov.uk/pdfdir/ecom1110.pdf

Osatuke, K., Moore, S.C., Ward, C., Dyrenforth, S.R. and Belton, L. (2009), "Civility, respect, engagement in the workplace (CREW): nationwide organization development intervention at veterans health administration", *Journal of Applied Behavioral Science*, Vol. 45 No. 3, pp. 384-410. doi: 10.1177/0021886309335067.

Panteli, N. and Dawson, P. (2001), "Video conferencing meetings: changing patterns of business communication", *New Technology, Work and Employment*, Vol. 16 No. 2, pp. 88-99. doi: 10.1111/1468-005X.00079.

Park, Y., Fritz, C. and Jex, S.M. (2011), "Relationships between work-home segmentation and psychological detachment from work: the role of communication technology use at home", *Journal of Occupational Health Psychology*, Vol. 16 No. 4, pp. 457-467.

Park, Y., Fritz, C. and Jex, S.M. (2015), "Daily cyber incivility and distress the moderating roles of resources at work and home", *Journal of Management*, Vol. 16 No. 4, pp. 457-467. doi: 10.1177/0149206315576796.

Palvalin, M., Lönnqvist, A. and Vuolle, M. (2013), "Analysing the impacts of ICT on knowledge work productivity", *Journal of Knowledge Management*, Vol. 17 No. 4, pp. 545-557, available at: http://dx.doi.org/10.1108/JKM-03-2013-0113

Porath, C.L. and Pearson, C.M. (2010), "The cost of bad behavior", *Organizational Dynamics*, Vol. 39 No. 1, pp. 64-71. doi: 10.1016/j.orgdyn.2009.10.006.

Privitera, C. and Campbell, M.A. (2009), "Cyberbullying: the new face of workplace bullying?", *CyberPsychology & Behavior*, Vol. 12 No. 4, pp. 395-400. doi: 10.1089/cpb.2009.0025.

Rosen, B., Furst, S. and Blackburn, R. (2006), "Training for virtual teams: an investigation of current practices and future needs", *Human Resource Management*, Vol. 45 No. 2, pp. 229-247. doi: 10.1002/hrm.20106.

Schmidt, G.B. and O'Connor, K.W. (2015), "Fired for Facebook: using NLRB guidance to craft appropriate social media policies", *Business Horizons*, Vol. 58 No. 5, pp. 571-579.

Snyman, R. and Loh, J.M. (2015), "Cyberbullying at work: the mediating role of optimism between cyberbullying and job outcomes", *Computers in Human Behavior*, Vol. 53, pp. 161-168. doi: 10.1016/j.chb.2015.06.050, available at: www.sciencedirect.com/science/article/pii/S0747563215300108

Soucek, R. and Moser, K. (2010), "Coping with information overload in email communication: evaluation of a training intervention", *Computers in Human Behavior, Online Interactivity: Role of Technology in Behavior Change*, Vol. 26 No. 6, pp. 1458-1466. doi: 10.1016/j.chb.2010.04.024.

Speier, C., Vessey, I. and Valacich, J.S. (2003), "The effects of interruptions, task complexity, and information presentation on computer-supported decision-making performance", *Decision Sciences*, Vol. 34 No. 4, pp. 771-797.

Sproull, L. and Kiesler, S. (1986), "Reducing social context cues: electronic mail in organizational communication", *Management Science*, Vol. 32 No. 11, pp. 1492-1512. doi: 10.2307/2631506.

Sumecki, D., Chipulu, M. and Ojiako, U. (2011), "Email overload: exploring the moderating role of the perception of email as a 'business critical' tool", *International Journal of Information Management*, Vol. 31 No. 5, pp. 407-414. doi: 10.1016/j.ijinfomgt.2010.12.008.

Tarafdar, M., Gupta, A. and Turel, O. (2015a), "The dark side of information technology use: introduction to the special issue and a research framework", *Information Systems Journal*, Vol. 25 No. 3, pp. 161-170. doi: 10.1111/isj.12070.

Tarafdar, M., Pullins, E.B. and Ragu-Nathan, T.S. (2015b), "Technostress: negative effect on performance and possible mitigations", *Information Systems Journal*, Vol. 25 No. 2, pp. 103-132. doi: 10.1111/isj.12042.

Tarafdar, M., Qiang, Tu, Ragu-Nathan, B.S. and Ragu-Nathan, T.S. (2007), "The impact of technostress on role stress and productivity", *Journal of Management Information Systems*, Vol. 24 No. 1, pp. 301-328.

The Metro (2014), "Mozilla chief Brendan Eich resigns: can you criticise your boss on Twitter?", available at: http://metro.co.uk/2014/04/03/mozilla-chief-brendan-eich-resigns-can-you-criticise-your-boss-on-twitter-4688332/

The Weekend Australian (2007), "More weekends spent in office", Careers, *The Weekend Australian*, October 13, p. 11.

Van Solingen, R., Berghout, E. and Van Latum, F. (1998), "Interrupts: just a minute never is", *IEEE Software*, Vol. 15 No. 5, pp. 97-103.

Waller, A.D. and Ragsdell, G. (2012), "The impact of e-mail on work-life balance", *Aslib Proceedings*, Vol. 64 No. 2, pp. 154-177, available at: http://dx.doi.org/10.1108/00012531211215178

Walther, J.B., Boos, M. and Jonas, K.J. (2002), "Misattribution and attributional redirection in distributed virtual groups", *HICSS. Proceedings of the 35th Annual Hawaii International Conference on System Sciences*, *IEEE*, *Waikaloa, HI, January 7-10.* doi: 10.1109/HICSS.2002.994427.

Weatherbee, T.G. and Kelloway, E.K. (2006), "A case of cyberdeviancy: cyberaggression in the workplace", in Kelloway, E.K., Barling, J. and Hurrell, J.J. (Eds), *Handbook of Workplace Violence*, Sage Publications, Inc., Thousand Oaks, CA, pp. 445-487.

West, B., Foster, M., Levin, A., Edmison, J. and Robibero, D. (2014), "Cyberbullying at work: in search of effective guidance", *Laws*, Vol. 3 No. 3, pp. 598-617.

Wright, K.B., Abendschein, B., Wombacher, K., O'Connor, M., Hoffman, M., Dempsey, M., Krull, C., Dewes, A. and Shelton, A. (2014), "Work-related communication technology use outside of regular work hours and work life conflict the influence of communication technologies on perceived work life conflict, burnout, job satisfaction, and turnover intentions", *Management Communication Quarterly*, Vol. 28 No. 4, pp. 507-530. doi: 10.1177/0893318914533332.

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