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A REVIEW OF WORKPLACE STRESS IN THE VIRTUAL OFFICE

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Abstract:

Virtual offices give employees the ability to work anytime, anywhere, using information and communication technologies, thereby blurring the temporal and geographical boundaries of work. Workplace stress is thus allowed to spill over from traditional offices to virtual offices, and vice versa. This review article presents key research from work psychology and information systems on workplace stress experienced in virtual offices (interruptions, workload and the work-home interface). It further discusses the main threats faced by organizations and office managers: reduced social interactions, poor communication, and deviant behaviors. Suggestions are also offered to practitioners seeking to design virtual offices in which employees can feel and work well, and to academics seeking to research this phenomenon in a transdisciplinary way.

Keywords: Virtual Place-Making, Occupant Comfort, Human-Computer Interaction, Human Behavior, Flexibility.

1. INTRODUCTION

Office work that relies on information systems and ICTs does not necessarily need to be performed in office buildings. Using Internet and remote access technologies (e.g., virtual private networks – VPN), employees can work anytime, anywhere (Reijula et al., 2015). In 2009, 40 percent of IBM employees were working remotely, which led IBM to give up millions of square feet of office space (Useem, 2017). In 2017, IBM decided to bring its remote workers back to the office. Remote work indeed presents new and harsh challenges for employees and organizations.

The term *virtual office* describes this condition of being able to work in and out of office and office hours using ICTs (Messenger and Gschwind, 2016). Despite not having geographical boundaries (Richert and Lehvila, 2014), the virtual office is tied to real places, such as the office, home, trains, planes, customers' offices, coworking spaces (Kojo and Nenonen, 2017), cafes or public parks (Vartiainen and Hyrkkänen, 2010). The virtual office does not necessarily have temporal boundaries either, as ICTs allow people to work anytime, even outside of office hours.

As will be discussed in this review article, workplace stress that results from these extensions of the boundaries of work is often not specific to virtual offices. Stress originating from traditional offices can spill over into virtual ones, such as when bullying becomes cyberbullying. Likewise, stress originating in virtual offices can spill over into traditional offices, such as when information overload creates work overload. Although studies and reviews on the matter acknowledge these spillover effects (E.g., Dén-Nagy, 2014), most focus solely on virtual offices (e.g., ICTs, email, telecommuting) and rarely discuss non-virtual offices. Consequently, such research has mostly been conducted within the

disciplines of information systems, organizational behavior and psychological stress (Tarafdar, Cooper, et al., 2019), thereby ignoring other disciplines such as architecture and engineering that also contribute to making work less stressful for employees (Clements-Croome, 2015).

The purposes and contributions of this review article are (1) to extend the disciplinary boundaries of research on workplace stress in virtual offices by providing an overview of its state of knowledge upon which engineering and architecture researchers can build (Appel-Meulenbroek, 2019), (2) to review the links between workplace stress in virtual and in traditional offices, and (3) to suggest ways to design both virtual and traditional offices to mitigate stress and nurture well-being. The paper uses the “overview of reviews” method (Baker et al., 2014) to achieve these purposes.

The paper is structured as follows. Section 2 presents the methodology that is used for the review. Section 3 reviews studies on three sources of workplace stress for employees in traditional and virtual offices (interruptions, workload and the work-home interface). Section 4 discusses themes related to workplace stress that threaten organizations and office managers, especially in the context of virtual offices (reduced social interactions, poorer communication, and increased deviant behaviors). The final section provides suggestions to academics and practitioners for researching and mitigating workplace stress in the context of virtual offices.

2. METHODOLOGY

The purposes of this review are to extend the disciplinary boundaries of research on workplace stress in virtual offices, to review the links between workplace stress in virtual and traditional offices, and to suggest ways to mitigate stress and nurture well-being in such offices.

Table 1. Reviews used in the overview.

Themes	Reviews used for traditional offices	Reviews used for virtual offices
Overarching frameworks and definitions		
Virtual office	Messenger, J.C. and Gschwind, L. (2016), "Three generations of Telework: New ICTs and the (R)evolution from Home Office to Virtual Office", <i>New Technology, Work and Employment</i> , Vol. 31 No. 3, pp. 195-208.	
Workplace stress	Cooper, C.L., Dewe, P.J. and O'Driscoll, M.P. (2001), <i>Organizational Stress: A Review and Critique of Theory, Research, and Applications</i> , SAGE Publications, Thousand Oaks, CA.	
Threats for employees		
Interruptions	Jett, Q.R. and George, J.M. (2003), "Work Interrupted: A Closer Look at the Role of Interruptions in Organizational Life", <i>Academy of Management Review</i> , Vol. 28 No. 3, pp. 494-507.	Addas, S. and Pinsonneault, A. (2018), "Theorizing the Multilevel Effects of Interruptions and the Role of Communication Technology", <i>Journal of the Association for Information Systems</i> , Vol. 19, pp. 1097-1129.
Workload	Bowling, N.A., Alarcon, G.M., Bragg, C.B. and Hartman, M.J. (2015), "A meta-analytic examination of the potential correlates and consequences of workload", <i>Work & Stress</i> , Vol. 29 No. 2, pp. 95-113.	McMurtry, K. (2014), "Managing Email Overload in the Workplace", <i>Performance Improvement</i> , Vol. 53 No. 7, pp. 31-37.
Work-home interface	Ashforth, B.E., Kreiner, G.E. and Fugate, M. (2000), "All in a day's work: Boundaries and micro role transitions", <i>Academy of Management Review</i> , Vol. 25 No. 3, pp. 472-491.	Dén-Nagy, I. (2014), "A double-edged sword?: a critical evaluation of the mobile phone in creating work-life balance", <i>New Technology, Work and Employment</i> , Vol. 29 No. 2, pp. 193-211.
Threats for organizations and office managers		
Social relationships	Khazanchi, S., Sprinkle, T.A., Masterson, S.S. and Tong, N. (2018), "A Spatial Model of Work Relationships: The Relationship-Building and Relationship-Straining Effects of Workspace Design", <i>Academy of Management Review</i> , Vol. 43 No. 4, pp. 590-609.	Raghuram, S., Hill, N.S., Gibbs, J.L. and Maruping, L.M. (2019), "Virtual Work: Bridging Research Clusters", <i>Academy of Management Annals</i> , Vol. 13 No. 1.
Poor communication	Branch, S., Ramsay, S. and Barker, M. (2013), "Workplace Bullying, Mobbing and General Harassment: A Review", <i>International Journal of Management Reviews</i> , Vol. 15 No. 3, pp. 280-299.	Stich, J.-F., Farley, S., Cooper, C.L. and Tarafdar, M. (2015), "Information and communication technology demands: outcomes and interventions", <i>Journal of Organizational Effectiveness: People and Performance</i> , Vol. 2 No. 4, pp. 327-345.
Deviant behaviors	Steven H. Appelbaum, Giulio David Iaconi and Albert Matousek. (2007), "Positive and negative deviant workplace behaviors: causes, impacts, and solutions", <i>Corporate Governance: The International Journal of Effective Board Performance</i> , Vol. 7 No. 5, p. 586.	Weatherbee, T.G. (2010), "Counterproductive use of technology at work: Information & communications technologies and cyberdeviancy", <i>Human Resource Management Review</i> , Vol. 20 No. 1, pp. 35-44.
Designing virtual offices for well-being		
Researching well-being in the virtual office	Tarafdar, M., Cooper, C.L. and Stich, J.-F. (2019), "The technostress trifecta - techno eustress, techno distress and design: An agenda for research", <i>Information Systems Journal</i> , Vol. 29 No. 1, pp. 6-42.	
Nurturing well-being in the virtual office	Stich, J.-F., Farley, S., Cooper, C.L. and Tarafdar, M. (2015), "Information and communication technology demands: outcomes and interventions", <i>Journal of Organizational Effectiveness: People and Performance</i> , Vol. 2 No. 4, pp. 327-345.	

A number of reviews already exist on workplace stress in virtual offices, but they (1) are published in the disciplines of information systems, organizational behavior and psychological stress, (2) tend to focus on specific sources of stress, such as interruptions, workload, communication or work-life conflict (see Table 1), and (3) are about either virtual or traditional offices.

For these reasons, this paper adopts the “overview of reviews” as a method (Baker et al., 2014). This method leverages existing reviews to integrate findings from distinct disciplines and themes. In comparison, a systematic review would not have been adequate given the large diversity of keywords used to cover all themes related to workplace stress. For instance, reviewing workload research would require the use of keywords such as overload, underload, role conflict, and overtime, whereas reviewing the work-home interface would lead to keywords such as work-life balance, work-home conflict, work-family conflict or boundaries.

This overview thus focuses on several key reviews to compare workplace stress in virtual and traditional offices (see Table 1). These articles were selected for being (1) review papers (conceptual, systematic, narrative) and (2) about one of the themes related to workplace stress (Cooper et al., 2001). For each theme, a review was selected for traditional offices and another for virtual offices (Messenger and Gschwind, 2016). Themes were further separated between those threatening employees and those threatening organizations. The former corresponds to sources of stress and is discussed in section 3, whereas the latter corresponds to counterproductive coping responses and is discussed in section 4. Finally, section 5 presents ways to address or research these threats.

3. WORKPLACE STRESS IN THE VIRTUAL OFFICE – THREATS FOR EMPLOYEES

This section discusses how virtual offices impact three sources of workplace stress intrinsic to the job itself (Cooper et al., 2001): (1) interruptions, (2) workload, and (3) the work-home interface.

3.1. Interruptions

Time is an essential resource that employees need to meet the various demands they face (Keller et al., 2019). Time is, however, often made scarce because of unscheduled interruptions, both in virtual and traditional offices (Perlow, 1999). In traditional offices, physical proximity increases the likelihood of colleagues spontaneously stopping by (Jett and George, 2003). Although the consequences of these unexpected encounters can be positive when they allow crucial information to be shared (Addas and Pinsonneault, 2018), they are mostly negative in that the time lost will have to be made up (Jett and George, 2003). Employees can be further interrupted in traditional offices because of background noise and events that hinder their performance and, thus, goal achievement (Brennan et al., 2002; Jett and George, 2003). Therefore, interruptions in traditional offices tend to be detrimental to employees’ well-being (Keller et al., 2019).

Virtual offices introduce additional ways for employees to be interrupted (Keller et al., 2019). In virtual offices, frequent sources of interruptions include email notifications, incoming instant messages, phone calls and system-generated notifications. Employees tend to be interrupted more frequently through ICTs than they are in person (Van Solingen et al., 1998). Even in a quiet office with no colleagues around, one can still be ‘tapped on the shoulder virtually’ and find this experience as disturbing as a physical interruption (Stich et al., 2017). It is difficult for employees to resist these ICT interruptions, as most leave their email inboxes open all day (Renaud et al., 2006). Although emails are supposed to be

asynchronous, they are handled as they arrive (Barley et al., 2011) and the majority are even acknowledged in under six seconds (Jackson et al., 2001). Employees can then take up to fifteen minutes to re-engage in the primary task following the interruption (Jackson et al., 2001). It is estimated that employees lose 28 minutes every day because of such interruptions (Gupta and Sharda, 2008), which increases feelings of work overload (Gupta et al., 2013). In the specific context of teleworking, employees can be further interrupted by family members and the need to deal with home demands (Delanoije et al., 2019). Interruptions in virtual offices have thus been associated with detrimental effects on mental and physical health, such as increased levels of stress (Akbar et al., 2019; Kushlev and Dunn, 2015), risk of burnout, and poorer sleep quality (Barber and Santuzzi, 2015; Hu et al., 2019). As interruptions take time to address, employees may also face increasing workloads (Keller et al., 2019), as discussed in the next section.

3.2. Workload

Workload has long been a source of workplace stress, since well before virtual offices (Bowling et al., 2015; Cooper et al., 2001). It can be stressful either in excess (i.e., overload) or in deficit (i.e., underload, boredom, lack of challenge) (Cooper et al., 2001). In traditional offices, workload can become excessive when time is lost due to interruptions, as discussed in the previous section, or because tasks are more easily given to employees who are visible (Yap and Tng, 1990). Employees affected by Sick Building Syndrome (i.e., those who are seemingly healthy but negatively impacted by office buildings) also tend to experience greater overload, perhaps due to the higher rates of absenteeism (Mendelson et al., 2000). Work underload can occur when employees are forced to stay at the office despite significant downtimes or a lack of tasks or customers (Stock, 2016).

One of the main advantages of virtual

offices is that critical business information can freely flow between employees (Sumecki et al., 2011). However, this mass transmission of information can represent a source of overload for employees.

In a non-virtual office, transmitting a message to multiple recipients requires producing multiple letters or carbon copies. In virtual offices, email 'carbon copies' are done effortlessly, resulting in unlimited and uncontrolled volumes of email (McMurtry, 2014). Emails arrive continuously and continue to pile up while employees are on the move, in meetings or at home (Jackson et al., 2006). Email threads continue to increase in size and complexity with the continuous addition of recipients, tasks, updates and requests (Thomas and King, 2006).

It has been estimated that 29 minutes are spent on average each day reading email, let alone answering it (Jackson et al., 2006). In addition, most employees spend time 'spring-cleaning' their email inboxes (Kalman and Ravid, 2015; Whittaker and Sidner, 1996), as they would do for their desks if letters were to pile up there. As a result, employees have increased feelings that their information load is out of control and exceeds their coping abilities (Dabbish and Kraut, 2006). Dealing with such information overload also tends to lengthen the workday and increase feelings of work overload (Barley et al., 2011; Stich et al., 2019a), the risk of burnout (Reinke and Chamorro-Premuzic, 2014), distress (Mano and Mesch, 2010), emotional exhaustion (Brown et al., 2014) and job dissatisfaction (Yin et al., 2018). Additionally, employees in virtual offices are at risk of being 'out of mind' (Nayani et al., 2017) and thus left out of important communication, possibly depriving them of necessary information. This phenomenon of information underload can be as stressful for employees as information overload (Stich et al., 2019b). Fears of being left out or of not staying on top of one's information load may also lead to the

desire to remain constantly connected and available, as will be discussed in the next section.

3.3. The work-home interface

Having to manage the interface between work and life is an important source of stress (Cooper et al., 2001). Traditional and virtual offices differ in their capacity to create and cross boundaries between work and home roles (Park et al., 2011). In traditional offices, employees work at certain places and times, thereby facilitating the creation of role boundaries (Ashforth et al., 2000). However, these role boundaries are also rendered difficult to cross, given that transitioning from one role to another requires significant psychological effort (Ashforth et al., 2000). Additionally, the impossibility of bringing work home creates the risk of having to stay longer at work. Generally, given the scarcity of time, the longer the work hours, the more work-life conflicts that develop (Matthews et al., 2012) and stress (Sparks et al., 1997).

In virtual offices, however, work and home roles are easier to integrate. Unfortunately, this integration allows work to escape office buildings and hours and spill over into employees' personal lives (Diaz et al., 2012). Employees tend to be 'leashed' to virtual offices (Boswell and Olson-Buchanan, 2007) and thus experience 'constant connectivity' and difficulties disengaging from work (Mazmanian et al., 2005).

Generally, studies have shown that constant connectivity makes work last longer (Eurofound and the International Labour Office, 2017). It also interferes with personal and family time (Derks et al., 2015), as employees tend to interrupt personal activities to respond to work demands (Delanoeije et al., 2019). The outcomes include increased levels of stress (Mazmanian et al., 2013), work-life conflict (Derks et al., 2015; Diaz et al., 2012; Matusik and Mickel, 2011; Wright et al.,

2014), emotional exhaustion (Xie et al., 2018), and risks of burnout (Wright et al., 2014), as well as depleted energy (Gadeyne et al., 2018). However, these outcomes tend to be reduced when employees prefer to integrate rather than to segment work and home roles (Wright et al., 2014) or are highly engaged to begin with (Derks et al., 2015).

4. WORKPLACE STRESS IN THE VIRTUAL OFFICE – THREATS FOR ORGANIZATIONS AND OFFICE MANAGERS

The previous section has reviewed three threats that virtual offices create for employees: increased interruptions, workload, and difficulty managing the work-home interface. This section now discusses three threats that virtual offices create for organizations and office managers: (1) changed social relationships, (2) poorer communication, and (3) deviant behaviors.

4.1. Social relationships

Some large organizations, such as Yahoo!, Bank of America or IBM, recently decided to bring telecommuters back to the office to encourage social relationships and foster creativity (Spector, 2019). These organizations found that many employees preferred working remotely to working in the office, which they considered a threat to collaboration and morale (Khazanchi et al., 2018; Rockmann and Pratt, 2015).

For certain employees, the office can indeed be an important source of stress. In their eyes, virtual offices can be a way to 'escape' the office and mitigate the emotional exhaustion caused by social interaction (Windeler et al., 2017), office politics (Mann and Holdsworth, 2003), office interruptions (Fonner and Roloff, 2010) and the office environment in general (Smolders et al., 2012). For instance, when employees are not able to claim and customize their workspaces (e.g., unassigned workspaces) (Brown et al., 2005), the virtual office is the last place they can express territoriality. Employees

may thus be tempted to hide away in virtual offices, thereby changing office relationships for the whole organization.

Relationships are first changed for those employees who work in virtual offices, as the experience can be socially isolating (Cooper and Kurland, 2002; Mulki and Jaramillo, 2011; Pinsonneault and Boisvert, 2001). For employees working remotely, being 'out-of-sight' often turns into staying 'out-of-mind' (Marshall et al., 2007). Relationships are then changed for employees who remain in the office while their colleagues work remotely. They tend to experience decreased job satisfaction (Golden, 2007) and poorer social interactions (Rockmann and Pratt, 2015). They also tend to experience greater work overload, as they have to deal with people who stop by the office (Yap and Tng, 1990), or because they choose to handle tasks themselves (Golden, 2007). They can also feel frustrated since they cannot enjoy the same work-life benefits as their colleagues who work remotely. Furthermore, these feelings of being 'left behind' in the office (Rockmann and Pratt, 2015) are amplified for employees whose manager is the one working remotely (Golden and Fromen, 2011). In such circumstances, the subordinates left at the office experience greater work overload, poorer work climate and increased job dissatisfaction (Golden and Fromen, 2011).

Even if all employees were to stay within the office buildings, their dependence on ICT can still result in reduced social interactions (Brown et al., 2005; Mark et al., 2012). Employees can be located on the same floor and yet interact virtually rather than face-to-face, a condition described as being 'alone together' (Turkle, 2011). Studies have found that forcing employees to interact face-to-face from time to time (e.g., through an email ban) reduces their levels of stress and increases both their physical activity and sense of enjoyment (Mark et al., 2012). Overall, virtual offices indeed change social relationships for all

employees, whether in the office or not. This challenges the way organizations manage social relationships within their offices. The next section reviews how virtual offices also create changes in communication.

4.2. Poor communication

Communication is essential to organizational functioning. Organizations can thus be threatened by poor communication or communication that is destructive to their employees (e.g., bullying - Branch et al., 2013). On the one hand, face-to-face communication is considered to be the most efficient and rich way to communicate (Daft and Lengel, 1986), and prevails in traditional offices. It may, nevertheless, be impoverished in several ways. Face-to-face communication is made more difficult, exhausting and hostile in the presence of noise (Cooper et al., 2001) or in crowded offices (Khazanchi et al., 2018) because of the resources necessary to focus. Face-to-face communication is also difficult to record, making it a prime medium for uncivil, harassing and bullying behaviors (Baruch, 2005).

On the other hand, communication taking place in virtual offices (i.e., computer-mediated communication) is difficult to master as it follows a specific etiquette (Whitty and Carr, 2006) and requires specific abilities (Wang and Haggerty, 2011). Employees are often ill-equipped and undertrained to communicate in virtual offices (Soucek and Moser, 2010). The result is a poor quality of communication in these environments overall. Email, for instance, is a common source of conflicts and misunderstandings (Friedman and Currall, 2003). Recipients have to decode messages in the absence of senders, visual cues and opportunities for clarification (Byron, 2008). In this impoverished context, messages can be erroneously interpreted, which may result in ambiguity, inaccuracy, overload (Brown et al., 2014) or conflict escalation

(Friedman and Currall, 2003).

Virtual communication that is particularly poor and disrespectful is further studied under the term 'cyber incivility' (Lim and Teo, 2009). For instance, emails containing profanity, all capital letters and excessive exclamation points tend to be perceived as more hostile (Turnage, 2007). Intimidation and insults are the most common forms of hostility in email exchanges (Baruch, 2005). Cyber incivility has been associated with increased blood pressure (Taylor et al., 2005), stress and stress-related illness (Park et al., 2018), negative affect (Giumetti et al., 2013) and lower levels of energy (Giumetti et al., 2013).

Finally, studies have investigated the spillover of bullying and harassing behaviors in virtual offices under the term 'cyberbullying' (Baruch, 2005). Contrary to cyber incivility, cyberbullying involves negative experiences that are repeated and perpetrated by a more powerful other (Heatherington and Coyne, 2017). Research has found that cyberbullying may be even more damaging to employees than traditional bullying (Coyne et al., 2017; Ford, 2013). Indeed, virtual offices make it harder for bullied employees to detach psychologically, as the negative experiences can carry on anytime, anywhere (Coyne et al., 2017). Cyberbullying has been associated with increased anxiety (Baruch, 2005), emotional exhaustion (Farley et al., 2016), mental strain (Coyne et al., 2017), and stress (Snyman and Loh, 2015). Virtual offices thus introduce new ways for communication to become impoverished and for poor communication to spill over. The next section argues that virtual offices similarly allow deviant behaviors to spill over and expand.

4.3. Deviant behaviors

Employee deviance is the serious and voluntary violation of organizational policies, rules, or procedures (Robinson and Bennett, 1995), and creates large costs for organizations (Steven H. Appelbaum et

al., 2007). In addition to bullying, which was discussed in the previous section, employee deviance includes behaviors such as stealing, sabotaging, taking excessive breaks, withholding job effort, or drug and alcohol abuse (Robinson and Bennett, 1995). Such behaviors are more likely to occur in offices where employees are in contact with the public (e.g., serving them alcohol, having to deny their requests, exercising physical control over them) or working alone in the office (LeBlanc and Kelloway, 2002). Employees may also show aggressive behavior in case of territorial infringements (e.g., when their desks are claimed by others – for instance in flexible offices – or when their items are borrowed or moved) (Fennimore, 2020).

In the context of virtual offices, employee deviance is studied under the term 'cyberdeviancy' (Weatherbee, 2010). Although employees may also damage and steal organizational property in traditional offices, virtual offices allow them to damage and steal the virtual property of their employers. Cyberdeviancy includes activities such as stealing data and intellectual property, hacking into internal or external infrastructures (Davis and Braun, 2004), hacking into colleagues or supervisors' computers and accounts, downloading illegal content (i.e., piracy), gambling, or accessing pornographic websites (Weatherbee, 2010).

In virtual offices, employees may also be tempted to use the internet available to them for non-work activities, a practice that is called 'cyberloafing' (Lim, 2002). Cyberloafing includes non-work-related internet surfing, personal use of email, and interactive personal activities (e.g., online gaming) (Blau et al., 2006). Employees are particularly at risk of engaging in cyberloafing when they work remotely, as it is easier for them to avoid being caught (O'Neill et al., 2014). These counterproductive practices are further amplified by the fact that employees may not find them negative (Lieberman et al.,

2011) or tend to rationalize them (Lim, 2002). Cyberloafing is, however, categorized as a minor form of production deviance (Weatherbee, 2010) and can even result in being let go (Drouin et al., 2015).

These deviant behaviors can be considered coping responses to workplace stress (Henle and Blanchard, 2008; Weatherbee, 2010). For instance, employees may engage in cyberloafing as a way to emotionally cope with cyberbullying and psychologically detach from work (Andel et al., 2019) or to distract themselves away from stressors they encounter in virtual offices (Tarafdar, Maier, et al., 2019).

5. VIRTUAL OFFICES DESIGNED FOR WELL-BEING

This review has shown that virtual offices have created new threats for both employees and their organizations. Employees are at risk of suffering from increased interruptions, workload, and difficulty managing the work-home interface. The way organizations used to operate in traditional offices is then threatened by changes in social relationships, communication, and deviant behaviors. This section will now present suggestions for researchers and practitioners based on the literature.

5.1. Nurturing well-being in virtual offices

Most challenges discussed in this review somehow originate from employee behavior. Employees interrupt and send numerous messages (workload) to one another day-in, day-out (the work-home interface). They may hide away at the first opportunity (social relationships), send messages of poor quality (poor communication) and engage in cyberdeviant activities (deviant behaviors). A first suggestion for organizations is thus to train employees and help them be more mindful of their behaviors. Research has indeed shown that training employees can help tackle these challenges. For instance,

training employees to use email appropriately reduces not only the trainees' stress but also the stress of people with whom the trainees interact (Burgess et al., 2005; Soucek and Moser, 2010). In particular, managers tend to be the ones who both cause and suffer from these behaviors the most (Waller and Ragsdell, 2012). Helping them understand these challenges is thus a crucial way to build a more positive organizational culture (Derks et al., 2015). Finally, organizations can benefit from policies that explicitly prohibit cyberdeviancy (including cyberbullying and cyberloafing) (Schmidt and O'Connor, 2015; West et al., 2014).

A second suggestion would be to design offices in a way that corresponds to the needs of employees who are also working virtually to nurture their well-being. These employees express the need for "plug and play" workplaces (Venezia and Allee, 2007) where they can drop in to socialize, attend meetings or focus. Informal areas can reduce the isolation of virtual work when these employees pass by the office (Wilson et al., 2008). Meeting spaces need to be adapted to virtual conferencing to gather employees regardless of their locations (Venezia and Allee, 2007). Finally, benefits such as concierge services, childcare or restaurants could further incentivize employees to spend more time at the office (Thompson and Aspinwall, 2009). In a way, this design would make the office resemble a coworking space (Kojo and Nenonen, 2017). Organizations could thus either provide their employees access to networks of coworking spaces or create internal coworking spaces that could welcome both their employees and external freelancers (Leclercq-Vandelannoitte and Isaac, 2016). Similar to office buildings, virtual offices can also be designed to ease employees' lives and help them cope with workplace stress. Collaboration between office managers and information systems managers is thus crucial. The design of information systems can indeed play a great role in mitigating

workplace stress due to technology (Tarafdar, Cooper, et al., 2019). In general, technologies that are complex, invasive and unreliable are considered stressful (Fischer et al., 2019). Office buildings often include spaces for employees to relax and contemplate (Oseland, 2009). Virtual offices could thus also include calming features (Weiser and Brown, 1997) such as help pages, reassuring system-generated feedback, or invitations to take breaks and switch off.

5.2. Researching well-being in virtual offices

As implied in the aforementioned suggestions, research on workplace stress in virtual offices is likely to require collaboration between different disciplines such as information systems, work psychology, engineering and architecture (Appel-Meulenbroek, 2019). To date, research on this phenomenon has remained rooted either in information systems or in work psychology, although inter-disciplinary collaborations have emerged (Tarafdar and Davison, 2018). In these collaborations, information systems bring a fine-grained understanding of the design, implementation and use of technology, and work psychology brings a deep understanding of stress processes (Tarafdar, Cooper, et al., 2019). Engineering and architecture could provide further knowledge of employees' use and enjoyment of space, of the design of spaces adapted to new ways of working (Kojo and Nenonen, 2017), and of the design of spaces fostering employees' well-being (Clements-Croome, 2015).

The previous section has presented ways in which organizations can nurture well-being and mitigate stress. Research on the potential of virtual offices to create well-being or eustress is currently lacking but needed (Tarafdar, Cooper, et al., 2019). Research on workplace stress in virtual offices is also likely to require a more subtle definition of the boundaries of virtuality. This review relied on the

framework of Messenger and Gschwind (2016) to distinguish virtual offices from home and mobile offices. Future research or reviews can also rely on the concept of 'virtual work' (Gibson and Gibbs, 2006; Raghuram et al., 2019) that banishes temporal and geographical boundaries at the cost of technology dependence. Finally, overlaps between virtual and traditional offices may need to be addressed to account for when employees work virtually yet together in office buildings.

In summary, virtual offices create new ways for workplace stress to threaten employees and their organizations. These threats are, however, addressable, for instance, through design and training. This paper has provided an overview of findings from information systems and organizational behavior on workplace stress in virtual and traditional offices. This overview was conducted in a way that emphasized the roles of workplaces such as offices and home offices, with the goal of welcoming architecture and engineering researchers into this investigation. Although the focus of this review was on workplace stress – a negative phenomenon, one should not forget that virtual offices also have the potential to challenge employees positively (Tarafdar, Cooper, et al., 2019) and to thus be turned into places where employees can both feel and perform well.

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