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RESEARCH ARTICLE

The Mediating Role of Work-Family Conflict in the Relationship Between Technostress and Psychological Well-being in the COVID-19 Pandemic Context

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Abstract

The COVID-19 pandemic has brought dramatic changes both for work and employees' personal and family life domains. In this context, this research investigates the mediating role of the work-family conflict in the relationship between technostress creators (techno-overload and techno-invasion) and psychological well-being. We conducted a survey of 217 employees and the results indicated that the work-family conflict fully mediated the relationship between techno-overload and psychological well-being, thus strongly affecting the psychological well-being of employees in the context of exposure to the stress generated by ICTs overload. Similar results were identified regarding the mediating role of work-family conflict in the relationship between techno-invasion and psychological well-being. The findings suggest the need to increase the coping capacity of employees with technostress and their psychological well-being by reducing the work-family conflict and technostress.

Keywords

technostress creators; work-family conflict; psychological well-being; COVID-19.

Introduction

The sudden and global spread of the SARS-CoV-2 virus has led to the onset of the COVID-19 pandemic and created an unprecedent threat blocking most of the human activities, both nationally and globally (Curșeu, Coman, Panchenko, Fodor, & Rațiu, 2021; Todorova et al., 2021). These unprecedented circumstances have led many employees to adapt to full-time work from home, exposing themselves intensely and with no choice to information and communication technologies (ICTs). Even some of the employees in certain fields initially not suitable for telework, who physically continued to work in the office setting, were more intensely exposed to the use of ICTs in order to perform their work tasks.

These dramatic changes brought about by the pandemic had implications both on work and employees' personal and family life

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domains. The COVID-19 pandemic was a mobilizing force for the modernization of labor in general, by driving the wider spread of telework through the development and increasing spread of information and telecommunications systems. In the family life domain, employees had to spend their personal psychological resources to adapt to the new conditions generated by telework and the intensive use of ICTs, while managing interferences between work and family (Carillo, Cachat-Rosset, Marsan, Saba, & Klarsfeld, 2020). Of course, all these radical changes have affected employees' psychological well-being (PWB), including the alteration of their mood, the increase of anxiety and concerns about their personal and family well-being, their own health and the health of the loved ones, and accentuated feeling of job insecurity and intense social isolation (Pluut & Wonders, 2020; Zacher & Rudolph, 2021).

Telework can have positive effects, both for organization and employees, including saving the organization's resources, improving employee performance, increasing job satisfaction, saving time and reducing costs on commuting to and from work (Barbuto, Gilliland, Peebles, Rossi, & Shrout, 2020; Gajendran & Harrison, 2007; Thulin, Vilhelmson, & Johansson, 2020). However, it can also have negative consequences for employees, such as anxiety and ineffectiveness related to the use of technology, skepticism, mental fatigue, difficulty taking decisions or even burnout (Salanova, Llorens, & Cifre, 2013). Telework and, in particular, work from home, which involves more intense use of ITCs, is a considerable source of stress that negatively affects the employees' well-being as a result of techno-overwork (Giberson & Miklos, 2013; Perry, Rubino, & Hunter, 2018), spending energy and extra time contacting colleagues to obtain information or approvals, coordinating tasks or even performing them without having high-performance office equipment. The activation of these sources of stress due to telework, mainly when working from home, took place simultaneously with the loss of coping resources, especially those provided by spontaneous face-to-face interactions with colleagues at work, such as socio-emotional support, information and visibility within the organization (Dennis & Wixom, 2002). Much of this research has focused on the study of telework work as an employees' conscious, voluntary and active choice, mainly for reasons of work-life balance (Anderson & Kelliher, 2020).

A small body of research has been dedicated to understanding how the use or the stress generated by the use of technology is related to work-family conflict (Harris, Marett, & Harris, 2011; Harris et al., 2015; Kotecha, Ukpere, & Geldenhuys, 2014; Ma & Turel, 2019; Wang, Chen, & Duan, 2017) and well-being (Molino et al., 2020; Ninaus, Diehl, Terlutter, Chan, & Huang, 2015; Pfaffinger, Reif, & Spieß, 2020; Ragu-Nathan, Tarafdar, Ragu-Nathan, & Tu, 2008). Moreover, less is known about the relationship between these variables in the actual pandemic context (Anderson & Kellier, 2020). Whether the use of technology for work purpose in the COVID-19 epidemic-induced telework may have a positive or negative impact on work-family conflict and well-being remains an open question. Furthermore, we know little on how technostress/ tehcnostressors (i.e., factors that create stress from the use of ICTs; Ragu-Nathan et al., 2008) as variables related to work have an impact on a variable related to the interface between work and family, such as work-family conflict, and how both impact on employees' well-being, mainly on psychological dimension of well-being or positive psychological functioning (Keyes, 2002; Ryff, 1989).

In this context, our study investigates the mediating role of work-family conflict in the relationship between the stress generated by techno-overload and techno-instrusion and psychological well-being. In this in this endeavor, we draw on the Conservation of Resources Theory (COR; Hobfoll, 1989; Hobfoll, Halbesleben, Neveu, & Westman, 2018), the Job Demands-Resources Model (JD-R Model; Bakker, & Demerouti, 2007, 2017; Schaufeli & Taris, 2014) and the Theory of Role Stresss (Kahn,Wolfe, Quinn, Snoek, & Rosenthal, 1964; Katz & Kahn, 1978) to explain the relationships between these constructs.

As most of the previous studies on technostress creators and well-being have

focused on well-being rather from the hedonic approach (in terms of job satisfaction and overall life satisfaction; Al-Ansari & Alshare, 2019; Suh & Lee, 2017), our study proposes firstly to advance knowledge about the effects of technostress generated by the use of ICTs (techno-overload and techno-invasion) on employees' psychological well-being. Secondly, our study highlights the role of work-family interface variables such as work-family conflict in the relationship between technostress creators and employees' psychological well-being. Work-family interface describes the process of influence between pressures and resources from the work (or family) domain and the individual's behavior in the family (or work) domain (Bakker, ten Brummelhuis, Prins, & van der Heijden, 2011). Conflictual perspective is one of the approach to understand this process. According to COR theory (Hobfoll, 1989), family can be a resource for the employee to cope with the stress generated by the use of technology. Thirdly, because in this pandemic employees worked more in telework, we expect the technostress induced by the use of ICTs in terms of overload and intrusion to have an impact on the conflict from work to family. Our study sheds light on the role that work-family interface variables (i.e. work-family conflict) play in the relationship between technostress creators and employee's psychological well-being, knowing that the work-family conflict itself is related to the well-being of the individual.

In addition, our study provides the theoretical fundamentals to develop intervention strategies in order to alleviate the stress experienced by employees due to the intense use of ICTs, such as techono-overload and techno-invasion and to mitigate the employees' work-family conflict, which would later impact on their psychological well-being.

Technostress

The term technostress was first used by Craig Brod (1984) who defined it as a modern adjustment disorder caused by the inability to cope with new information technologies in a healthy way. Over time, technostress has been labeled by researchers as technophobia, cyberphobia, computerphobia, computer anxiety, computer stress, negative computer-related attitude.

Although there are several definitions of techonostress (La Torre, Esposito, Sciarra, & Chiappetta, 2019), Ragu-Nathan et al. (2008) provided a widely accepted definition. These authors considered technostress as "a user's stress experience when using information technology (IT)". Building on this definition, Tarafdar and colleagues (2010, pp. 304-305) described this form of stress as *"the stress that users experience as a result of multitasking, permanent connectivity, information overload, uncertainty of results due to frequent system updates, continuous re-learning and of job insecurity and technical problems associated with the use of ICT in the organization"*. The common feeling experienced by the most ICT users is the self-perceived lack of time to successfully complete tasks, despite the constant effort spent to be effective. Lately, the amount of information to be processed has increased, as well as the expectations that workers will face it as before when there were fewer demands, and maybe even faster than that (Tarafdar, Tu, & Ragu-Nathan, 2010). As computer and communication devices, including the internet connection, can operate day and night, there is an expectation that workers will be continuously connected, available and able to work (Ayyagari, Grover, & Purvis, 2011).

Tarafdar and colleagues (2007) and Ragu-Nathan and colleagues (2008) identified five technostress creators (i.e., factors that create stress from the use of ICTs) including techno-overload, techno-invasion, techno-complexity, techno-insecurity and techno-uncertainty. For the purpose of this research, techno-overload and tehno-invasion will be detailed below as these two technostressors seems to be more relevant in the telework performed in the actual pandemic context.

Techno-overload refers to the potential of ICTs to force users to work faster and harder or to change their work habits (Ragu-Nathan et al., 2008), as mobile computing devices, social networks and collaborative applications make possible the simultaneous real-time processing of information flows, which

ultimately lead to information overload, interruptions and multitasking (Tarafdar et al., 2011). Information overload consists of exposing users to more information than they can use and manage efficiently, thus leading to information fatigue (Weil & Rosen, 1997). Interruptions generated by e-mail alerts, notifications and text-based workflows force users to manage information as soon as it arrives, creating anxiety, tension, disconnection from workflow state, and difficulties in paying attention (Tarafdar et al., 2011). Multitasking assumes that employees are involved in working simultaneously in several applications and tasks, trying to do more in a shorter time, often experiencing states of tension and pressure (Tarafdar et al., 2011).

Techno-invasion refers to the intrusive effect of ICTs and the situation in which employees can be contacted at any time and feel the need to be continuously connected; so the line between work and personal contexts becomes unclear (Ragu-Nathan et al., 2008). The usual working day extends beyond the hours that should be spent with the family, including the holidays, and "not connecting" becomes frightening. Due to this type of continuous connection, individuals feel bound to these technologies and face their intrusion into their personal time and space. Therefore, they end up experiencing frustration and stress (Tarafdar et al., 2011).

One theory that describes, explains, and predicts the nature of stress in general and technostress in particular is the Conservation of Resources Theory (COR; Hobfoll, 1989; Hobfoll et al., 2018). The core of this theory is the concept of "resource (s)" that the individual fundamentally values. Resources are generally conceptualized as the total capacity that an employee has to meet the central needs that he/she values (Hobfoll, 2002). Hobfoll (2001) classified the resources into five main categories: energy resources (e.g., effort and time), work-related resources (e.g., status or reputation), material resources (e.g., financial stability), personal resources (e.g., optimism) and interpersonal resources (e.g., friendship).

When employees strive to perform their work tasks, they face several (techno) stressors, such as operating with an excessively large volume of information (information overload), interruption of work due to frequent requests for use of communication channels (overload with communications), and/ or operation with an excessively complex system (overload due to system characteristics) (Harris et al., 2015). In order to meet all these demands, employees use (spend and invest) personal resources valued by them and, as a result, they diminish their ability to manage competing demands (Hobfoll, 1989; 2001). If employees feel that their resources are threatened or not adequately replenished, they may experience technostress, thus reducing their performance (Harris et al., 2015). Resources are often difficult to obtain and maintain. Thus, their loss is greater and more impactful compared to their acquisition. It is important for individuals to protect themselves from wasting resources, as this would cause them stress (Hobfoll & Freedy, 1993).

When employees face technostress, this is a threat to their resources, and, as a result, they will invest more time and more effort in trying to conserve their existing resources than focusing on their job (Hobfoll, 1989). Wealth in resources places individuals in a less vulnerable position and makes them less likely to go through extreme and stressful situations, such as coping with job demands (Hobfoll & Freedy, 1993; Salanova et al., 2013). When work is overloaded with the use of ICTs, employees are likely to have fewer resources to meet the demands of family life. According to COR theory, losing resources in one area can lead to stress in the other domain. As such, this decrease in resources due to work overload through the use of ICTs can contribute to experiencing the conflict between work and family life (WFC; Harris, Marett, & Harris, 2011; Harris et al., 2015). In other words, when the events in the work domain exceed a person's resources that are necessary for functioning in another domain (e.g., family), those events are considered to be stressors (Lazarus & Folkman, 1984), similar to the technology-induced stress that is the focus of the present study.

Furthermore, the impact of techno-overload and techno-invasion on work-family conflict and psychological well-being may be explained also by the JD-R model (Bakker &

Demerouti, 2007, 2017). This model explains health impairment and motivational processes considering two different types of working conditions as the main determinants of the processes: demands and resources. According to this model, techno-overload and techno-invasion can be conceptualized as specific job demands. Job demands refer to those *„physical, psychological, social or organizational aspects of the job that require sustained physical and/or psychological (cognitive and emotional) effort or skill and are therefore associated with certain physiological and/or psychological costs"* (Bakker & Demerouti, 2007, p. 312). Job demands are not harmful by definition but they may be job stressors when great effort is required, which is not followed by adequate recovery (Meijman & Mulder, 1998)..

Research on the use of ICTs has revealed its effects on work-family conflict. In this sense, it was found that techo-invasion defined as the imposition of work-based technologies into an employees personal life overwhelmed their personal lives, increased personal anxiety, and eventually degraded their productivity (Tu, Wang, & Shu, 2005). Harris, Marett and Harris (2011) found that perceived pressure as a result of technology used for work was positively associated to work-family conflict and this relationship was moderated by negative affectivity and social stressor. In another study, Harris and colleagues (2015) found that technology overload in terms of information, communication, and system feature overload was positively related to work-family conflict.

According to Pfaffinger, Reif and Spieß (2020), technostress creators can be considered as stressors according to traditional stress and recovery models including JD-R Model (Bakker & Demerouti, 2007), job demands-control model (Karasek, 1979) and effort-recovery model (Meijman & Mulder, 1998). Techonostress creators constitute job demands which require effort, or reduce an employee's perceived level of control and consequently entail feelings of strain and stress and thereby reduce employees' well-being. Empirical studies found negative effects of tehnostress creators on employees' physical and mental health, job satisfaction, life satisfaction, sleep quality as dimensions of well-being and an increase in stress and strain (Ragu-Nathan et al., 2008, Pfaffinger, Reif, & Spieß, 2020). The employees' impaired well-being has subsequent negative consequences for organizations (Berg-Beckhoff et al., 2017; Tarafdar, Pullins, & Ragu-Nathan, 2015), such as reduced productivity, higher absenteeism and stronger intention to leave the organization (Ragu-Nathan et al., 2008).

Psychological well-being

Marie Jahoda (1958), one of the pioneers of positive psychology, draws attention to the need for the absence of mental health disorders to achieve WB status, but, at the same time, she acknowledges that this criterion is insufficient. Thus, Jahoda (1958) and Gurin et al. (1960) developed two complementary areas of study on positive mental health: psychological well-being, which was later developed by Ryff (1989), and subjective (or emotional) well-being, later developed by Diener (1984). The first perspective considers WB in terms of eudaimonism (Waterman, 1993), according to which the essential attribute of WB is the actualization of an individual's potential rather than happiness itself. The second one refers to WB in terms of hedonism (i.e., pleasure and happiness, including pain avoidance; Kahneman Diener, & Schwarz, 1999).

Subjective (or emotional) well-being is based on Gurin et al.'s (1960) studies and was defined as a set of phenomena, including emotional responses, related to personal areas of life satisfaction (e.g., work, leisure, family, etc.). It includes life satisfaction, positive affect, and negative affect (Machado & Bandeir, 2015). Therefore, an individual who has a high subjective well-being is generally satisfied with his life, often has positive emotions and quite rarely negative emotions (e.g., sadness, anger, disappointment, etc.) (Diener, 1984; 2000; Kahneman et al., 1999). As all of these aspects measure states and feelings, hedonia is also called emotional well-being by researchers (Keyes & Waterman 2003; Kokko, Korkalainen, Lyyra, & Feldt, 2013; Robitschek & Keyes 2009).

The concept of psychological well-being focuses on the development of individual potentials. Although previous research on WB did not include issues related to mental health, clinical theories, and lifelong development, Ryff's new conceptualization summarized these aspects and provided a clearer understanding of the basic structure of the PWB (Ryff, 1989; Ryff & Keyes, 1995). This approach resulted in a six-dimensional framework model (Ryff, 1989; Ryff & Keyes, 1995). The six dimensions of the PWB address different aspects of personal functioning and include the various facets of the optimal development of the person, such as: (1) Autonomy involves a sense of self-determination and the ability to resist social pressures, to think and act in one's own way; (2) Environmental control involves the ability to effectively manage your own life and environment and the ability to create contexts that can meet your personal needs and values; (3) Personal development presupposes the existence of the preoccupation of continuous growth and development as a person and the opening to new experiences for self-knowledge and improvement; (4) Positive relationships with others involve involvement in high quality relationships with others, including concern for the well-being of others and valuing the reciprocity of human relationships; (5). Purpose in life presupposes the belief that both past and present efforts are guided by goals and they give meaning to life; (6). Self-acceptance involves the global and unconditional confirmation and acceptance of the self, including good and bad qualities.

In the context of the conflict between work and personal life favored by work from home and the negative effects of using ICTs, it is expected, according to COR theory, that stress will appear in response to a threat of loss of resources, actual loss of resources or lack of an expected gain in resources. Among these resources that could be lost is psychological well-being (PWB). COR theory considers PWB as a resource belonging to "personal characteristics" as the overall effectiveness of the individual's psychological and social functioning (Wright & Hobfoll, 2004). It is a valuable resource, although sometimes scarce (Hobfoll, 1989). Merino, Privado and Arnaiz (2019) state that resources are fundamental for people, and well-being or "eustress", will depend on gaining these resources; and stress, also called "distress" will depend on the loss of these resources. Impairment of well-being or "distress" refers to the negative response to stressors (e.g., the negative effects of ICTs and / or the conflict between work and family life) that leads to the negative impact of individuals and also can cause major harm to their mental health. On the other hand, "eustress" is defined as a positive response to adversity and the presence of positive affect and well-being in general (McGowan, Gardnerm & Fletcher, 2006; Nelson & Simmon, 2003; Watson & Pennebaker, 1989).

Work-family conflict

Work-family conflict occurs when work and family pressures on the person are mutually incompatible, and as a result, participation in the family role is more difficult by virtue of participation in the work role (Greenhaus & Beutell, 1985). WFC may be time based, strain based or based on incompatible behavioral demands. Similar to other studies (Ghislieri, Emanuel, Molino, Cortese, & Colombo, 2017), as the research on behavioral role conflict is infrequent, in the present study, we only focused on time- and strain-based work to family conflict (Netemeyer et al., 1996).

The notion of role conflict has its roots in deficit theory and the role strain hypothesis (Goode, 1960), which assumes that personal resources, such as time and energy, are finite and that allocating more resources to a particular role requires allocating fewer resources than other roles. Thus, people who participate in several roles (e.g., work and family) are likely to experience conflicts between these roles (i.e. theory of role stress; Kahn et al., 1964; Katz & Kahn, 1978). Multiple work and family roles can lead to conflicting demands on various issues. According to theory of role stress, the experience of ambiguity and/or conflict within the same role is called intra-role conflict, and the experience of ambiguity and/or conflict between multiple roles is called personal inter-role conflict. Because the individual has to assume several roles at the same time, it will be more difficult for him to fulfill each role successfully, due to conflicting time

requirements, lack of energy, or due to incompatible behaviors between roles (Greenhaus & Beutell, 1986; Kahn et al., 1964). Thus, multiple roles compete for the limited resources of individuals, creating states of tension, strain and stress (Greenhaus & Beutell, 1985).

Research on the antecedents of work-family conflict has indicated certain characteristics related to work and personal stressors as the main predictors (Byron, 2005; Frone, Russell & Cooper, 1992; Michel, Mitchelson, Kotrba, LeBreton & Baltes, 2009; Mihelic & Tekavcic, 2014). In addition, work-family conflict has been negatively associated with a range of emotional and behavioral outcomes, including family dissatisfaction, family absenteeism, and poor performance in family-related roles (Mihelic & Tekavcic, 2014). There is evidence of a positive association between work-family conflict and a number of dysfunctional consequences for the individual's physical and psychological health and diminished individual physical and psychological well-being and satisfaction with life (Bellavia & Frone, 2005; Carlson et al., 2011; Frone, 2000; Grandey & Cropanzano, 1999).

In the context of the COVID-19 pandemic, moving work from the office to home settings could create some risks for some employees due to the blurring of boundaries, including physical ones, between work and family domains. These risks could contribute to increasing conflict between work and family life as the employee seems to be easier to be reach in order to handle family demands. In addition, permanent connection to the workplace through ICT devices could lead to an increase in work-family conflict, for example, caused by overtime, interruptions and distractions from family activities outside normal working hours (Sarbu, 2018). Overall, Sarbu (2018) concludes that working from home decreases the probability of employees to reconcile the interests of professional life with personal ones.

Integrating the role conflict related to work and family in the COR theory, Grandey and Cropanzano (1999) call the experience of ambiguity or conflict in work as "work role stress", respectively in the family as "family role stress". These authors consider that the resources in the conditions, personal characteristics and energies domains are the relevant ones for this purpose. For example, resources that belong to both the family and the work field could be: the status of being married and being employed in a well-paid position (conditions domain), resources as a buffer against stress, such as self-esteem (personal resource domain), and resources in the energy domain, such as time, money and knowledge that allow and the acquisition of other resources. All of these resources are sought after and coveted by individuals, and their threat and / or loss can cause stress. Stress related to inter-role conflict occurs because resources are lost in the process of navigating between professional and family roles (Grandey & Cropanzano, 1999). These potential losses of resources or even actual losses lead to a negative 'state of being', which can lead to dissatisfaction, as well as states of depression, anxiety or physiological stress, or, in other words, can lead to significant impairment of well-being (Merino, Privado, & Arnaiz, 2019).

Drawing on previous theoretical arguments and empirical studies, our study investigates the mediating role of the work-family conflict in the relationship between technostress (techno-overload and techno-invasion) and psychological well-being. We expect that techno-overload and techno-invasion will have a negative effect on psychological well-being through the increase of work-family conflict (Figure 1). Thus, we hypothesised that:

Hypothesis 1. Work-family conflict mediates the relationship between techno-overload and psychological well-being.

Hypothesis 2. Work-family conflict mediates the relationship between techno-invasion and psychological well-being.

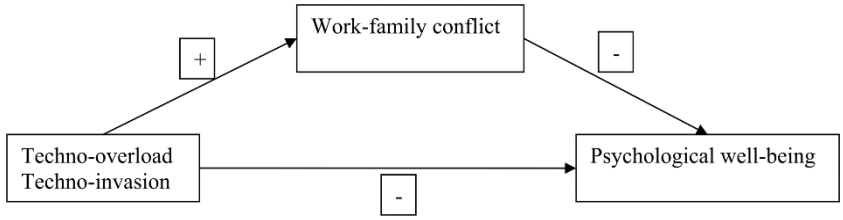

Figure 1. The conceptual model of the present study

Method

Participants

The participants were employees working in various organizations. Most of them worked from home during the restrictions on social distance imposed by the COVID-19 pandemic. Participants sampling was based on the "snowball" method. The only inclusion criterion was for the participants to have a job at the time of completing the questionnaire. Participants were included voluntarily in this study.

The sample consisted of 217 participants, aged between 21 and 56 years (M = 33.15; SD = 8.46), 80.2% of them being under 40, 119 (54.8%) women and 98 (45.2%) men. Of all participants, 57 (26.3%) were team leaders or responsible for a work group, while 160 (73.7%) were members of a team or work group. The participants in our sample stated that they work from home on average, M = 5.41 (SD = 3.75) hours per day.

Instruments

From the *Technostress Creators Inventory* (Tarafdar et al., 2007; Ragu-Nathan et al., 2008), we used the Techno-overload (5 items; "I am forced by this technology to work faster"; α =. 90) and Techno-invasion subscales (4 items; "I spend less time with my family because of this technology"; α = .92). Respondents indicated the extent to which they agreed with each of the statements, using a 5-point Likert response scale, respectively 1 (Totally Disagree) and 5 (Totally Agree).

Work-Family Conflict Scale (WFCS; Netemeyer, Boles, & McMurrian, 1996) captures the influence of work on family context. Five items ask participants about how work interferes with family life, using five answer options, from 1 (Totally Disagree) to 5 (Totally Agree). An example of item is "My work demands interfere with my family and home life" (α = .94).

To measure the criterion variable of our study we used the *Psychological Well-Being Scale* from the Mental Health Continuum-Short Form (Keyes, 2013). Participants rated how they felt in the last month, according to the item statements, on a five-point Likert scale, from 0 = Never; 1 = Once or twice; 2 = About once a week; 3 = About 2-3 times a week; 4 = Almost every day; at 5 = Every day. A typical example of a PWBS item is: "In the last month, how often have you felt that you are managing your day-to-day responsibilities well?". PWBS measures the six dimensions of psychological well-being, with one item for each dimension, reffering to the challenges that individuals face as they strive to function optimally, reach their full potential, and value their unique talents (Ryff 1989; Ryff & Keyes 1995): (1). Self-acceptance, (2). Positive relationships with others, (3). Autonomy, (4). Environmental control, (5). Purpose in life and (6). Personal development (α = .93).

For all scales, the internal consistency has met the minimum recommended value of .7 (Hair, Anderson, Tatham, & Black, 1998; Nunnally, 1978).

Procedure

Data collection took place through an online survey in Romanian, using "Google Form" platform. Participants received a link to fill tthe survey, being encouraged to distribute it online, to be accessed and filled in by other persons. The survey was distributed starting with the end of February 2021 until the end of May 2021.

The front page of the online survey contained a letter of informed consent explaining the purpose and procedure of the study, including contact information of the

authors. Respondents' confidentiality was guaranteed by using a participation code as an element of identity, and by using the data in an aggregated and anonymous way only for research purpose.

Data analysis

Data collected from 220 participants were firstly reviewed for possible errors, missing values, and outliers. Participants who failed to complete the questionnaire were completely removed from the sample, namely three participants did not provide information on the number of hours worked in telework, and thus the sample was reduced to 217 participants. Items of all scales were rated directly, there were no negatively worded items that need to be rated backwards. The gender of the participants was coded as a Dummy variable, as follows: 0 = female and 1 = male; and also the team status of the employees was coded as a Dummy variable, as follows: 0 = simple member of the team / working group and 1 = team leader / responsible for the working group.

Based on relevant past research, we identified several socio-demographic variables as control variables (Tarafdar et al., 2011): gender, age, team status (team leader/ manager or simple team member) and the number of hours worked per day in the telework regime. Gender and age are related to technostress (Krishnan, 2017; Srivastava, Chandra, & Shirish, 2015; Wang et al., 2008). Women report lower levels of stress compared to men after being exposed to a stress stimulus (Riedl, 2012). Ragu-Nathan and colleaugues' (2008) cross-sectional study revealed that men experience more technostress than women. The second controlled variable was age, as there appears to be a positive relationship between age and technostress (Shu, Tu, & Wang, 2011). However, Ragu-Nathan and colleagues (2008) found that young people tend to experience higher levels of technostress compared to the elderly. Even so, the contradictory results in the literature suggested that age needs to be controlled. The third variable controlled was team status, because the literature shows that leaders usually report a higher level of well-being and stress than subordinates, and have more effective stress management mechanisms than subordinates. Finally, time spent in telework can influence the level of work-family conflict (Madsen, 2003; Tremblay, Paquet, & Najem, 2006) and well-being (Spagnoli et al., 2020; Thulin, Vilhelmson, & Johansson, 2019).

After computing the scores on variables, we ran a Pearson bivariate correlation analysis to check the assumptions for testing a mediation model, using SPSS software (IBM Corp. Released, 2011). Subsequently, the two hypotheses were tested through the mediation analysis using the macros PROCESS v.3.5.3 (Hayes, 2017) (model 4; 95% confidence interval, 5000 bootstrap samples).

Results

Table 1 presents the mean, standard deviation and correlations between the main and control variables.

Table 1. *Pearson r correlation matrix, means and standard deviations*

Variabile	Mean	SD	1	2	3	4	5	6	7	8
1. Techno-overload	2.58	1.03	1							
2. Techno-invasion	2.25	1.19	.73***	1						
3. Work-family conflict	2.42	1.18	.59***	.72***	1					
4. Psychological well-being	3.49	1.03	-.19**	-.29***	-.35***	1				
5. Team status	-	-	-.00	.05	.05	.01	1			
6. Age	33.15	8.46	-.00	.03	-.05	.09	.16	1		
7. Gender	-	-	-.00	-.06	-.00	.10	-.11	.00	1	
8. Telework, hours/day	5.41	3.75	-.10	-.06	.08	-.12	.10	-.39***	-.07	1

N = 217; * $p < 0.05$ (2-tailed); ** $p < 0.01$ (2-tailed).

Table 2. *The results of the mediation analysis regarding work-family conflict as mediator in the relationship between techno-overload and psychological well-being*

Variables	Work-family conflict			Psychological well-being		
	b_{boot}	**95%CI Lower**	**95%CI Upper**	**b_{boot}**	**95%CI Lower**	**95%CI Upper**
Constant	.38	-.29	1.01	4.01	3.24	4.82
Techno-overload	.69	.57	.81	.01	-.15	.17
Work-family conflict				-.31	-.44	-.17
Age	-.001	-.02	.01	.01	-.01	.02
Gender (M/F)	.04	-.21	.30	.21	-.06	.48
Status (No/Yes)	.13	-.18	.42	.10	-.42	.44
Telework hours/day	.05	.01	.08	-.02	-.07	.02
R	.61			.38		
R^2	.37			.15		
df1	5			6		
df2	211			210		
F	25.06***			5.95***		
p	.000			.000		

Note: $N = 217$, ***$p < .001$.

The data reveal a high positive correlation between techno-overload and work-family conflict ($r = .59$, $p < .001$), as well as between techno-invasion and work-Family conflict ($r = .72$, $p < .001$). Along with the increase of the technostress level of the employees, respectively increase of the techno-overload and techno-invasion levels, the work-family conflict will also increase.

Technostress creators have a negative association with psychological well-being. Techno-overload and psychological well-being are weakly associated ($r = -.19$, $p < .01$), while techno-invasion and psychological well-being are moderately correlated ($r = -.29$, $p < .001$). Thus, as the stress generated by the techno-stressors increases, psychological well-being decreases. In addition, increased

work-family conflict is associated with poor psychological well-being ($r = -.35$, $p < .001$).

Following the mediation analyses, the results highlight a significant positive effect of the stress generated by techno-overload on work-family conflict ($b_{boot} = .69$, $95\%CI_{boot}$ [.57; .81]), but not a direct one on employees' psychological well-being ($b_{boot} = -.01$, $95\%CI_{boot}$ [-.15; .17]) (Table 2). Only work-family conflict has a significant negative effect on psychological well-being ($b_{boot} = -.31$, $95\%CI_{boot}$ [-.44; -.17]). The total effect of techno-overload on psychological well-being is statistically significant (-.20, $p < .01$, 95%CI [-.34; -.07]). The indirect effect is also statistically significant (-.21, $95\%CI_{boot}$ [-.31; -.12] (Table 4). The relationships between variables were controlled for gender and age, team status, and the number of hours worked per day in telework. Consequently, the results indicate that the work-family conflict fully mediates the relationship between techno-overload and psychological well-being, thus strongly affecting the employees' psychological well-being in the context of exposure to the stress generated by ICTs overload. The first hypothesis was supported by the data.

Similar results were identified regarding the mediating role of work-family conflict in the relationship between techno-invasion and psychological well-being (Table 3). We identified a positive relationship between techno-invasion and work-family conflict ($b_{boot} = .73$, $95\%CI_{boot}$ [.64; .82]). In contrast, techno-invasion did not have a significant direct relationship with psychological well-being ($b_{boot} = -.09$, $95\%CI_{boot}$ [-. 27; .08]). Only work-family conflict had a negative impact on psychological well-being ($b_{boot} = -.24$, $95\%CI_{boot}$ [-. 40; -.07]). As a result, the indirect effect of the techno-invasion of ICTs on psychological well-being through the work-family conflict is significant (-.17, 95% CI [-. 29; -.05]; Table 4). The results were controlled for gender and age, team status, and the number of hours per day worked in telework. Therefore, work-family conflict partially mediates the relationship between the techno-invasion with ICTs of employees and their psychological well-being; thus significantly affecting the psychological well-being of employees in the context of their exposure to stress due to the invasion of ICTs. The second hypothesis was supported by the data.

Discussion

The present research investigated the relationship between stress due to the techno-overload and the techno-invasion of ICTs (in the context of the COVID-19 pandemic, when telework was the rule rather than the exception), employees' psychological well-being and work-family conflict. As restrictions imposed during the lockdown in the COVID-19 pandemic limited social life and interpersonal contacts, including those related to work, we assumed that during this period the conflict between work and family life will increase as a result of the stress generated by the intense use of ICTs in telework.

Our findings revealed that stress generated by the overload and invasion of ICTs had a significant positive effect on work-family conflict. Employees who faced a high level of technostress due to exposure to ICTs in order to perform their work tasks, reported a high level of work-family conflict. The stress generated by the techno-invasion of ICTs had a greater impact on the work-family conflict than that generated by the overload of ICTs. These results support and strengthen previous evidence in the literature that stress caused by exposure and use of ICTs increases work-family conflict (Leung & Zhang, 2017). For example, Harris and colleagues (2021) found that techno-overload and techno-invasion of ICTs were significantly associated with a high intensity of work-family conflict, intentions to leave the organization and high family burnout.

In addition, employees who faced a high level of work-family conflict reported low level of psychological well-being. These findings are in line with previous literature that evidenced work-family conflict as a negative predictor of well-being in general (Karimi, Karimi, & Nouri, 2011) and psychological well-being in particular (Koyuncu, Burke, & Wolpin, 2012).

Table 3. *The results of the mediation analysis regarding work-family conflict as mediator in the relationship between techno-invasion and psychological well-being*

Variables	Work-family conflict			Psychological well-being		
	b_{boot}	**95%CI Lower**	**95%CI Upper**	**b_{boot}**	**95%CI Lower**	**95%CI Upper**
Constant	.68	.10	1.25	4.09	3.32	4.91
Techno-invasion	.73	.64	.82	-.09	-.27	.08
Work-family conflict				-.24	-.40	-.07
Age	-.01	-.02	.01	.01	-.01	.02
Gender (M/F)	.13	-.07	.35	.20	-.07	.47
Status (No/Yes)	.04	-.22	.31	.10	-.25	.45
Telework hours/day	.04	.01	.07	-.02	-.07	.02
R	.74			.39		
R^2	.54			.15		
df1	5			6		
df2	211			210		
F	49.68***			6.19***		
p	.000			.000		

Note: $N = 217$, ***$p < .001$.

Table 4. *The indirect effect of techno-stress on psychological well-being through work-family conflict*

				95% CI	
Predictor variables	**Mediator**	**b**	**BootSE**	**LL**	**UL**
Techno-overload	Work-family conflict	-.21	.04	-.31	-.12
Techno-invasion		-.17	.06	-.29	- .05

Note: $N = 217$

We found that the higher the level of employees' stress caused by the overload and invasion of ICTs, the lower the level of their psychological well-being would be. In general, there is evidence in the literature supporting the negative association between technostress and well-being (Brooks, 2015; Nimrod, 2018).

The results of the mediation analysis showed a significant mediation effect of the work-family conflict, in a negative direction, in the relationship between the techno-overload with ICTs and psychological well-being. The total mediation effect indicated that the work-family conflict was the mechanism explaining the relationship between the techno-overload with ICTs and employees' psychological well-being. In other words, the lower the level of psychological well-being in conditions of exposure to techno-overload with ICTs , the higher the level of their work-family conflict; employees who had a low level of work-family conflict would experience a high level of psychological well-being, under the same conditions of exposure to techno-overload with ICTs. The lack of a direct relationship between techno-overload and psychological well-being could be explained by the domain referent. While techno-overload is a constrruct in which an individual's work is the referent, psychological well-being has life domain as referent.

The results of the mediation analysis also revealed a significant mediation effect of the work-family conflict, in a negative direction, in the relationship between ICTs techno-invasion and the psychological well-being. The analyses indicated a partial mediation, so that the effect of ICTs techno-invasion on psychological well-being was transmitted directly and through the work-family conflict too.

Implications

This study investigated the mediating role of work-family conflict in the relationship between technostress, respectively between techno-overload and techno-invasion of ICTs and the psychological well-being of employees working form home during the Covid-19 pandemic. As many organizations intend to further computerize their production processes, maintain and intensify remote work, especially work from home, our findings will be useful and relevant even after the pandemic ends. In this respect, our findings provide a particular understanding of the relationship between technostress generated by the use of ICTs and psychological well-being with the involvement of variables belonging to the work-family interface, such as work-family conflict.

Using the COR Theory, we explained how job demands related to the use of ICTs to work from home interfere with those existing in the family life domain. Thus, each of the demands belonging to one or another of the domains will constantly try to take over from the resources of the other domain until depletion. This tandem of resource disputes from one field to another triggers the so-called spiral of resource loss, and this will inevitably lead to negative results on both the employees' well-being and their performance in the organization (respectively, higher level technostress, emotional exhaustion, poor performance, etc.). Also, our findings indicate that technostress can have a major negative impact on both psychological well-being and work-family conflict, in the sense of its intensification, being in line with contemporary literature on the negative effects and consequences of technostress (Harris et al., 2021; Ragu-Nathan et al., 2008; Salanova et al., 2013). Also, even there has been a growing interest in technostress and well-being research, strategies on how to cope with technostress in an effective and appropriate way are still missing from the literature, especially from an organizational perspective. To this end, COR theory helps us to identify those resources that could have a significant counterbalancing impact of these negative effects. In this respect,ur study pointed out the work-family interface as a major area that can provide important resources for employees if the work-family conflict is kept to a minimum.

Subsequently, these resources can be directed both to strengthen employees' psychological well-being and to manage more efficiently the stress generated by the use of ICTs.

In order to increase the coping capacity of employees with technostress and their psychological well-being, the interventions should rather aim at work-family conflict, in order to keep it under control. Therefore, we suggest some recommendations to minimize the work-family conflict as much as possible. First, managers could create a more supportive organizational environment that minimizes work-family conflict, with the effect of improving job satisfaction (Hassan, Dollard, & Winefield, 2010). Organizations could also consider establishing flexible work schedules for their employees, and encourage family-oriented activities, thus helping their employees to maintain clear boundaries between work and personal family life. Promoting such policies would also benefit the organization, because increasing employee satisfaction with work would lead to good results.. Similarly, organizations could invest in training programs or workshops to support employees in managing their time more effectively coping with the technostress generated by the use of ICTs. In this situation, it would also be beneficial to provide employees with regular psychological counseling sessions to help them dealing with work and family problems. Also, a supportive climate in organizations would lead to freely sharing family issues without being blamed and judged. Furthermore, managers should pay particular attention to the high workload that involves intense exposure of employees to ICTs, overtime hours, excessive stress and unnecessary changes of employees from one job position to another (Gözükara & Çolakoğlu, 2015).

To increase the well-being of employees who use ICTs intensively in their work, the solution would be to find mechanisms to reduce technostress, which would also have beneficial effects on the results of the organizations. In this regard, our research has provided evidence that more careful management by organizations of the work-family interface, and specifically the work-family conflict, can have beneficial effects on employees' psychological well-being and, consequently, on their performance, for the benefit of the organization.

Limitations

Findings of our study should be considered in the light of some limitations. First, given that the participants were able to decide for themselves whether or not to participate in the research, and moreover they were free to invite known persons to the study, the data are not based on random sampling. This could have an impact on the results, as individuals who, for example, have recently experienced emotional distress due to ICTs techno-overload or techno-invasion may have been more interested in participating in our study and, thus, certain precautions must be maintained regarding the generalization of the results to the general population. Second, all the measures used were self-reported scales, so the results reflect participants' subjective perceptions of their own experiences of perceptions of technostress, psychological well-being, and work-family conflict. Third, these results are based on a non-representative study sample and this makes it questionable to generalize the results to employees in other countries and/ or cultures. Fourth, our design was a correlational descriptive one preventing us from inferring causal relationships.

Future research

In order to extend the reporting of the results to larger populations, we recommend that future replications of this study be performed under different conditions of other cultures / countries, as well as by setting up more representative samples. As future research directions, we suggest the inclusion and measurement of all five "technostress creators" (techno-overload, techno-invasion, techno-complexity, techno-insecurity, and techno-uncertainty; Ragu-Nathan et al., 2008) in the study to examine the effect of these variables mediated by the work-family conflict on the psychological well-being of employees. We consider that measuring all "technostress creators" in the same sample could provide a deeper understanding of how work-family conflict could mediate the effects

of technostress on employees' psychological well-being.

Conclusions

This study investigated whether the stress generated by the use of information and communication technologies, more precisely, techno-overload and techno-invasion, had a negative effect on psychological well-being, through work-family conflict, during the period when a large part of the employees faced the relocation of work at home, in the context of the COVID-19 pandemic.

Our findings revealed that techno-overload and techno-invasion have significant negative effects on work-family conflict and well-being. The results of the mediation analysis identified the work-family conflict as the mechanism by which the techno-overload of ICTs significantly and negatively affects the psychological well-being of employees, and this mediation is total. Regarding the role of the work-family conflict in the relationship between the ICTs techno-invasion and the psychological well-being of employees, we can conclude that the work-family conflict partially mediates this relationship, in a negative sense.

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