

A Work Project presented as part of the requirements for the Award of a Master's degree in
Management from the Nova School of Business and Economics

**Organizational Innovativeness and Addiction: Moderated
mediation effect through perceived usefulness on
technostress**

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Abstract

The goal of this study is to explore the effects of innovative organizations on employee's technostress and how addiction to mobile Information and Communication Technologies (ICTs) mediates the relationship. We also included the moderator perceived usefulness of mobile ICTs to the model. By applying a survey in three different moments to a final sample of 157 employees, we analyzed whether addiction mediated the relationship between organizational innovativeness and two technostressors: techno overload and techno invasion. Additionally, we examine if individuals' perceived usefulness moderates the relationship between organizational innovativeness and addiction. Finally, we aimed to analyze whether the indirect effects of organizational innovativeness on techno overload and techno invasion, through addiction, are dependent on the level of perceived usefulness of mobile ICTs. Results have shown a significant indirect effect between organizational innovativeness and both techno overload and techno invasion, through addiction, when perceived usefulness is high.

Keywords: Organizational innovativeness, addiction to mobile ICTs, perceived usefulness, technostress, techno overload, techno invasion, Information and Communication Technologies

Introduction

Technology is a catalyst of innovation. When thinking about the history of humankind, technology, alongside with human's curiosity and willingness to understand the vastness of the world (National Academy of Engineering, 1985), plays a center role in every invention that impacted the way we live. Mobile Information and Communication Technologies (ICTs) include the internet, wireless networks and media channels (Christensson, 2020) and it is part of people's lives on a daily basis. When looking at the share of the population using the internet, it is remarkable that, around the globe, already 49% of the population have frequent contact with internet (The World Bank, 2019). In Portugal, this number is even bigger – 75% of the population is online either via computer or mobile phone (OECD, 2019). If we extend these figures to the labor force, it is evident that the number of jobs requiring some kind of technological skill is increasing and even the less developed countries are getting access to ICTs rapidly (The United Nations, 2018). Thus, ICTs will play a huge role in the number of jobs created, considering that 30% of the total working hours could be automated by the end of 2030 (Manyika, et al., 2018).

During the Covid-19 pandemic people are being forced to work remotely and encouraged to adopt new technologies as a tool to increase efficiency while working from home. Thus, it is expected that the number of hours spent in front of technology devices will increase rapidly, while at the same time the boundaries between work and life are being tested. For instance, in Portugal around 1.1 million people started to work at home since March and about 1 million reported using ICTs on a daily basis (Instituto Nacional de Estatística, 2020). Therefore, the adoption of ICTs is raising some concerns since people are already reporting physiological and psychological problems related to the increased use of technologies (Berg-Beckhoff, 2017). These negative psychological effects are normally referred as technostress, which can be defined as the mental stress that affects employees due to the use of ICTs at work

(Wiel & Rosen, 1997). Moreover, the pressure imposed by organizations to adopt technology may be associated with stress and it could lead to health-related problems among employees, such as anxiety or exhaustion, in the long-run (Tu, Wang, & Shu, 2005).

In this research, we investigate if innovative organizations, by promoting the use of ICTs, are creating technostress among their employees. We introduce that the effect in this relationship is mediated by addiction to those ICTs. Finally, we argue that perceived usefulness of ICTs is a key condition for the model as it moderates the relationship between organizational innovativeness and addiction.

Regarding our contributions to the literature, we not only challenge several assumptions that have guided technostress research but also explore a different perspective on how it emerges on individuals. Firstly, we found that literature is ample on the consequences of technostress, such as its impact on productivity (Tarafdar, Tu, Ragu-Nathan, & Ragu-Nathan, 2007), the consequences for end users in organizations (Tarafdar, Ragu-Nathan, Ragu-Nathan, & Tu, 2008) or the consequences generated by the misuse of social media (Maier, Laumer, Weinert, & Weitzel, 2015). However, we bring attention to the process behind technostress (i.e., its antecedents), taking into account the role of organizations. Considering that stress is a context-specific phenomenon (Hart & Cooper, 2001), we aim to assess the contextual antecedents of technostress, precisely if the context of innovative organizations results in technostress by promoting addictive behaviors to ICTs, especially during this pandemic.

Secondly, most of the research on innovative organizations and innovative climate tend to enhance the positive aspects of being technologic-centric (Crossan & Apaydin, 2010). Companies can foster innovation by developing working climates in which technology is supported and encouraged (Mumford, Zaccaro, Harding, & Jacobs, 2000). In addition, innovation is the most critical source of a company's performance (Mone, McKinley, & Barker, 1998). However, despite all the stated benefits, very few researchers explored the

potential downsides of working in an innovative organization. Does a climate of innovation, where technology plays a center role, impact negatively the mental health of employees considering that they develop more addiction to those mobile technologies? For the purpose of this research we will focus on two types of techno stressors because of its importance to the current pandemic: techno overload, which tend to happen when a person is forced to work more and faster by using ICTs; and techno invasion, which is related to the exposure to ICTs that a person suffers, meaning that he/she is “always online” (Tarafdar et al, 2007).

Thirdly, we build on Maier, et al (2015) findings to introduce usefulness as a moderator to the relationship between innovativeness and addiction. When facing a stressful situation, people tend to avoid it (Lazarus & Folkman, 1984). However, Maier et al (2015) found that when that situation is related to the use of technology, because people feel that technology is useful, instead of avoiding it, they actually continue to use it. Thus, it is expected that innovative organizations contribute to the increase of technostress on individuals, through addiction, because by promoting the use of ICTs, companies are enhancing this “sense of usefulness” among employees. Does the combined effect of innovativeness and usefulness emphasize technostress, through addiction? To explore this research model, we designed a time-lagged study, collecting data in three different moments, implementing the surveys during the Covid-19 pandemic, where most of the people have been working remotely.

Literature Review

On the relationship between innovative organizations and technostress

Organizations are innovative when they promote a climate where new ideas are accepted and implemented (i.e., they have an innovation climate). According to Schneider and Reichers (1983), climate focuses on employees’ perceptions of the work environment and its influence on employees’ behaviors and attitudes. Innovation can be defined as the notable

implementation of creative ideas generated within an organization (Amabile & Pratt, 2016). Therefore, innovation climate can be explained as the work environment that promotes the creation and implementation of new ideas, perceived by employees (Andersen & Michael , 1998).

Anderson and Michael (1998) continue their explanation on innovation climate by showing how important it is to understand its antecedents and outcomes. There are two major antecedents of innovation climate: leadership and team characteristics (Newman, Round, Wang, & Mount, 2019). Considering leadership styles, transformational leadership fosters higher levels of team innovation climate (Eisenbeiss, van Knippenberg, & Boerner, 2008) by promoting autonomy and ownership of the workplace. These characteristics are crucial to create an environment where employees feel motivated to take decisions and share ideas that will impact the future of the organization. Moreover, further research found that two dimensions of transformational leadership were positively related with innovation climate: articulating the vision and providing individual support (Sarros, Cooper, & Santora, 2008). Other studies found that while this type of leadership fosters innovation climate, transactional leadership, on the other hand, does not (Kang, Solomon, & Choi, 2015). Regarding team characteristics, Antoni (2005) and Mathinsen, Martisen, and Einarsen (2008) found a positive relation between associative teams and innovation climate, meaning that those teams who can think as a group tend to find more creative solutions. Furthermore, higher levels of innovation climate are also found when teams show higher levels of motivation and ambition.

While exploring the antecedents of innovation climate is important, it is also crucial to examine what researchers have found concerning the outcomes of innovation climate. Firstly, regarding team level outcomes, there are benefits of working under an innovation climate (Crossan & Apaydin, 2010). When innovation is supported by the organization, higher levels of performance are reached (Mumford et al, 2000). For instance, Agrell and Gustafson (1994)

found a positive relation between innovation and team productivity. Thus, considering that performance is one of the key drivers of successful companies, further research made by Sun, Xu, and Shang (2014) found a strong link between innovation climate and performance of R&D teams. Similarly, research conducted on several tech companies in the US market found that an organizational culture where risk-taking behaviours are encouraged by the managers, has a positive link with the number of innovations created (West & Anderson, 1996). Further research also found that team innovation climate fosters innovative outcomes amongst R&D teams, measured by the number of patents created (Bain, Mann, & Pirola-Merlo, 2001). For instance, Panuwatwanich, Stewart, and Mohamed (2008) found that employees' perception of innovation climate tends to increase the spread of ideas within a company, meaning that more people are able to adopt those ideas. Additional research found that support for innovation is positively related to organizational innovativeness (Farnese & Livi, 2016).

Secondly, considering individual level outcomes, there's a strong link between innovation climate and job satisfaction (Proudfoot, Jayasinghe, & Holton, 2007), job engagement (Lee & Idris, 2017), and organizational commitment (Antoni, 2005). Researchers also found a positive relation between innovation climate and knowledge sharing behaviours (Jaiswal & Dhar, 2015; Edú-Valsania, Moriano, & Moleroq, 2016). Organizations that can create a work environment where employees' ideas are shared and risk-taking behaviours are well accepted, experience higher levels of innovation on an individual level. Meta analytical work has found a powerful link between some dimensions of innovation climate, such as support for innovation and employees' creativity (Hulsheger, Anderson, & Salgado, 2009). Thus, working under a supportive innovation climate seems to generate higher levels of creativity among employees (Jaiswal & Dhar, 2015).

While most of the research is focused on the benefits of innovation climate, very few have focused on their negative consequences (Jansen, Van de Vliert, & West, 2004). In fact, in

the last century, technology has shown a negative impact in our daily lives, causing stressful situations (Chen & Karahanna, 2018). Information overload, attention deficit, and mobile addiction to technostress are only a few of the “dark sides” ICTs brought to the society (Tarafdar et al, 2007). For example, by promoting risky work behaviours and focusing on the process of innovation, companies are encouraging processes that are unpredictable and controversial. According to Kanter (1998), since innovation promotes risky work behaviours, the unintended costs might be greater than the benefits. Additionally, innovation climate may develop attitudinal responses such as insecurity or stress, especially for those with low levels of creativity (Jansen, 2003). The inability to contribute with innovative ideas may cause frustration and emerging conflicts with peers might arise (Jansen, 2003). A research conducted by the same author identified that innovation behaviours are stressful, especially when perceived fairness within the company is low (Jansen, Van de Vliert, & West, 2004). Therefore, this research will focus in one dimension of these negative outcomes, raising the hypothesis that innovative organizations are, unconsciously, creating technostress on its employees by promoting the use of technology.

In order to manage ICTs, people are changing their attitudes (Shenk, 1997), influencing the daily working environment negatively (i.e., spending more time in front of ICT devices) (Tarafdar et al, 2008). This behavioural response, where people try to be in touch with technologies, might be a cause of technostress. The term technostress can be defined as “a modern disease of adaptation, which is caused by the inability to cope with new computer technologies in a healthy manner” (Brod, 1984). Thus, the increased level of dependence of humans on technological devices (Tarafdar et al, 2008) is leading to increased levels of technostress, most of the times without being noticed by individuals or organizations. Tarafdar et al (2007) identified five components of technostress: techno overload, techno invasion, techno complexity, techno insecurity, and techno uncertainty. For the purpose of this study, we

believe that the current pandemic will reinforce the salience and impact of two techno stressors in which we are particularly interested: techno overload and techno invasion. The first is associated to the exposure individuals are forced to have with ICTs (Tarafdar et al, 2008). The second happens when the boundaries between work and private life blur, using ICTs. As stated before, organizations foster innovation by supporting the use of ICTs. We argue that by making the access to ICTs available to every employee and by encouraging the use of it on the daily working environment, companies are invading people's life, contributing to technostress. During Covid-19 we expect this effect to be stronger, having in mind that people are working remotely and the necessity of being "online" and available every time is even more valuable, often after the working schedule. Therefore, this study raises two hypotheses:

H1a Organizational Innovativeness is positively related with techno overload

H1b Organizational Innovativeness is positively related with techno invasion

Mediation by addiction to ICTs

One of the reasons why we argue that innovative climate should contribute to technostress is because it might make it difficult for individuals to disconnect. When individuals struggle to disconnect from ICTs, especially when there is no reason to be "online", considering this continued exposure, quite often they show symptoms of addiction. When people feel addicted, they tend to have difficulties discontinuing that behaviour (Maier et al, 2015). Craving is the unwanted desire to use a substance while attempting to abstain and has been proposed as major contribute to relapse (Weiss, 2005). Craving is also determined by internal and external factors, such as individual characteristics or the environment, respectively (Serre, Fatseas , Swendsen, & Auriacombe, 2015). Furthermore, Herd and Borland (2009) found that craving level is influenced by the duration of abstinence and by the level of dependence on the substance. According to the American Society of Addiction Medicine

(2011), addiction is a treatable but chronic disease that affects interactions between individuals' brain circuits, genetics, environment and life experiences. ICTs devices are, *per se*, very attractive and widely used not only for personal use but also in work context (Chóliz, 2010). Chóliz (2010) also state that addiction happens when there is an excessive or inappropriate use of mobile technologies.

According to Turel, Serenko, and Bontis (2011), despite enhancing performance, the nature of organizational technologies can also develop addiction. In regard to technology, addiction is a “pathological psychological dependency on using a technology” (Turel et al, 2011). High levels of technology addiction have been identified in multiple working environments (Madlock & Hessling, 2020). For instance, “mobile email addiction is a form of non-substance addiction” involving not only the use of a mobile technology but also engaging with its content (electronic communication) (Turel & Serenko, 2010). In fact, when Chapman (2006) interviewed 765 business executives from public to private sectors, he found that 2/3 of his sample predict a shift in their organizations regarding innovation, investing in business and technology integration in order to be competitive and innovative (Chapman, 2006). Considering that the amount of time spent at work has been increasing for the past 20 years (Beder, 2000), it is evident that people will be in contact with ICTs almost anytime. Furthermore, even leisure time, taking into account the rise of social media, streaming platforms or video games, will be spent in front of ICTs devices. Thus, during Covid-19 pandemic where people are forced to stay at home, it is expected that the amount of time spent without ICTs will be much lower. Additionally, the increased encouragement by organizations to work with technology raises a major concern about ICTs addiction among employees which should contribute to heightened levels of technostress. We then argue that addiction plays an important role, mediating the relationship between innovativeness and techno overload and techno invasion. Hence, this study suggests that:

H2a: The positive relationship between organizational innovativeness and techno overload is mediated by addiction to mobile technologies

H2b: The positive relationship between organizational innovativeness and techno invasion is mediated by addiction to mobile technologies

The indirect effect of innovative organizations on technostress through addiction is depending on individual's perceived usefulness of ICTs

An additional factor stated by Turel et al (2011) that may trigger or potentiate ICTs addiction is the perceived usefulness of those devices, i.e. how firmly an individual believes that working with a specific technology or device will boost his or her performance. Indeed, previous research on this topic found that perceived usefulness of ICTs is strongly connected to the extent of “technology-assisted supplemental work” (TASW) (Fenner & Renn, 2004). The TASW is essentially defined as “the work that is done after the working schedule by using mobile ICTs” (Fenner & Renn, 2004). Hence, it is expected that people will work more after working hours, as they perceive technology as useful. This coupled with a context that endorses innovation and the use of technology will increase the chances of an individual to become addicted.

This struggle to disconnect might put people in a vicious cycle, where innovative climate and usefulness of ICTs are mutually reinforcing addiction to ICTs. The technology acceptance model (TAM), proposed by Davis (1989), corroborates this statement by revealing that perceived usefulness of ICTs influence people's attitudes towards technology and tend to increase the duration and intensity with which he or she will use it, thereby increasing their addiction to the ICTs. Regarding workplace environment, this research raises the hypothesis that, since organizations are promoting the use of technology in the workplace, employees will experience technostress. We believe that this relationship is moderated by the perceived

usefulness of that technology. Considering this downward cycle between usefulness and addiction and taking into account that technology is being more used than ever in our organizations (Chapman, 2006), we expect a cumulative effect whereby, usefulness moderates the relationship between organizational innovativeness and addiction. As a result, we also predict a link between organizational innovativeness and technostress (techno overload and techno invasion), through a propensity to develop addiction to ICTs, dependent on perceived usefulness of those ICTs. By bringing these insights for the corporate world, we expect that usefulness of mobile ICTs affects addiction that will then increase technostress. Accordingly, the study suggests:

H3a: The indirect positive effect of organizational innovativeness in techno overload through addiction to mobile technologies is moderated by perceived usefulness of those technologies, such that the indirect effect is stronger when perceived usefulness is higher

H3b: The indirect positive effect of organizational innovativeness in techno invasion through addiction to mobile technologies is moderated by perceived usefulness of those technologies, such that the indirect effect is stronger when perceived usefulness is higher

Methodology

Sample and Procedure

For the purpose of this research, data was collected during Covid-19 pandemic, from June 2020 to August 2020. Participants were recruited using mainly two approaches: direct recruitment and snowball sampling. For the first method, potential study subjects were contacted through personal networks, using not only physical channels but also information technologies. Then, those people were asked to forward the invitation to others resulting in a snowball effect, crucial to gather participants from different geographies and working areas. Data was gathered in three different moments with 1 week separating each moment, using

participants' email to contact them to aggregate the responses across time. The questionnaires for the study were generated using Qualtrics^{XM} software, which combined 14, 9, and 8 questions for time 1, time 2, and time 3, respectively, including demographics. Participants could use their mobile phone, tablet or personal computer to answer the survey and the links were sent by email. Respondents had information about the main goals of the research. Anonymity and confidentiality were guaranteed by using personal information only for the purpose of the research. In each moment of the study, participants shared their informed consent as well as the indication to be contacted later to receive the main findings of the study. In the first moment of data collection, a total of 258 individuals answered completely the survey. Yet, 98 answers were not counted because they did not meet the requisites of the research, such as not completing the survey or not filling the demographic questions. There was also an expected dropdown to 197 answers in the second moment and, finally, to 157 answers in the third moment. This dropdown is partially explained by the difficulty to reach out people during the lockdown period. We had also performed an analysis of variance between two groups in order to analyze dropouts, coded as: 1- Dropout; 2- Complete. Dropout analysis revealed no significant differences among T1 variables - Organizational Innovativeness ($F_{(1,257)} = 2.14, p = .15$) and Usefulness ($F_{(1,257)} = .90, p = .34$) as well as the control variable Gender ($F_{(1,257)} = 2.93, p = .09$), between those who dropped out and those who continued. However, there was a significant difference regarding Tenure ($F_{(1,257)} = 4.75, p = .03$). The final sample was comprised of 157 answers, of which 57% were male and 43% were female.

Measures

Organizational Innovativeness (Time 1)

In order to measure organizational innovativeness we used a 4 item scale with sample items such as: "In my organization, when we hear about a new information technology, we look for ways to experiment it", "In general, in my company we are hesitant to try new

information technologies”, and “My company likes to experiment new information technologies”. We developed this measure considering the scale used by Richardson and Benbunan-Fich (2011), which was based on personal innovativeness scale developed by Agarwal and Prasad (1998). We then adapted the scale to measure innovativeness within organizations. We used the seven-point Likert scale to record the answers, ranging from 1 (Totally disagree) to 7 (Totally agree). This measure presented positive internal consistency in T1, with Cronbach’s alpha being .79 ($\alpha = .79$)

Perceived Usefulness of Mobile Technologies (Time 1)

To measure perceived usefulness of mobile technologies we used the 6 items scale developed by Davis (1989). Sample items are: “Using technological tools will improve my job performance”, “Using technological tools in my job would increase my productivity”, and “I would find technological tools useful in my job”. We used the seven-point Likert scale to record the answers, ranging from 1 (Totally disagree) to 7 (Totally agree). This measure presented significant internal consistency in T1, with Cronbach’s alpha being .95 ($\alpha = .95$).

Mobile Addiction (Time 2)

We used the 9 items scale from Charlton and Danforth (2007) to assess mobile addiction. The scale measures the addiction toward mobile technologies. Sample items of this measure are: “My social life has sometimes suffered because of me interacting with my mobile technologies”, “Arguments have sometimes arisen because of the time I spend on mobile technologies”, and “I think I am addicted to mobile technologies”. We used the Likert’s matrix type, with a scale ranging from 1 (completely disagree) to 7 (completely agree). This measure presented great internal consistency in T2, with a Cronbach’s alpha of .88 ($\alpha = .88$).

Techno overload (Time 3)

To measure techno overload, we work with the 5 items scale proposed by Tarafdar et al (2008). Sample items are: “I am forced by mobile technologies to work much faster”, “I am forced by mobile technologies to do more work than I can handle”, and “I have higher workload because of increased mobile technology complexity”. This was measured in a five-point Likert scale, from 1 (strongly disagree) to 5 (strongly agree). Answers presented great internal consistency in T3, with a Cronbach’s alpha of .86 ($\alpha = .86$).

Techno invasion (Time 3)

Techno invasion was measured using 4 items developed by Tarafdar et al (2008). This included items such as: “I spend less time with my family due to mobile technologies”, “I have to be in touch with my work even during my vacation due to mobile technologies”, and “I feel my personal life is being invaded by mobile technologies”. Responses were made in a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). This measure showed a good internal consistency in T3 with a Cronbach’s alpha of .78 ($\alpha = .78$).

Control variables

During our analysis we also decided to include gender and tenure into the model, as control variables, considering its effects on technostress, previously studied by other authors (Baroundi & Igbaria, 1994/1995; Marchiori et al, 2018). In our study we have found that technostress is related to gender, which was against our expectations. For instance, Çoklar and Sahin (2011) found that women tend to experience more technostress. Regarding tenure, Baroundi and Igbaria (1994/1995) found that the negative effects of stress and overwork are less for those with greater organizational tenure. More recent research found that academics, for example, experience less technostress if they have more duration of service in comparison with their peers (Jena & Mahanti, 2014). Respectively, gender was summarized with 0 for female and 1 for male, while tenure was coded as the following: 1 means “less than 1 year”, 2

“between 1 and 3 years”, 3 “between 3 and 5 years”, 4 “between 5 and 10 years”, and 5 “more than 10 years”.

Results

We exported all survey responses from Qualtrics into IBM SPSS Statistics 26 for Windows. Then, we added a computational tool, named PROCESS, in order to test our hypotheses. This software is useful for estimating and probing interactions and the conditional indirect effects of moderated mediation models (Hayes, 2012; Preacher, Rucker, & Hayes, 2007). Bootstrapping is suggested to avoid power problems, which arise from asymmetric and other non-normal sampling distributions of indirect effects (Mackinnon, Lockwood, & Williams, 2004). Hypotheses were tested using Model 7, with 5000 bootstrap samples. We also used 95% bias-corrected bootstrap confidence intervals including all indirect effects (our model is depicted in Figure 1). Other specifications were added to the model, such as: predicted variables were mean centered for construction of products (Aiken & West, 1991). Finally, control variables were included to the model as covariates, namely gender and tenure.

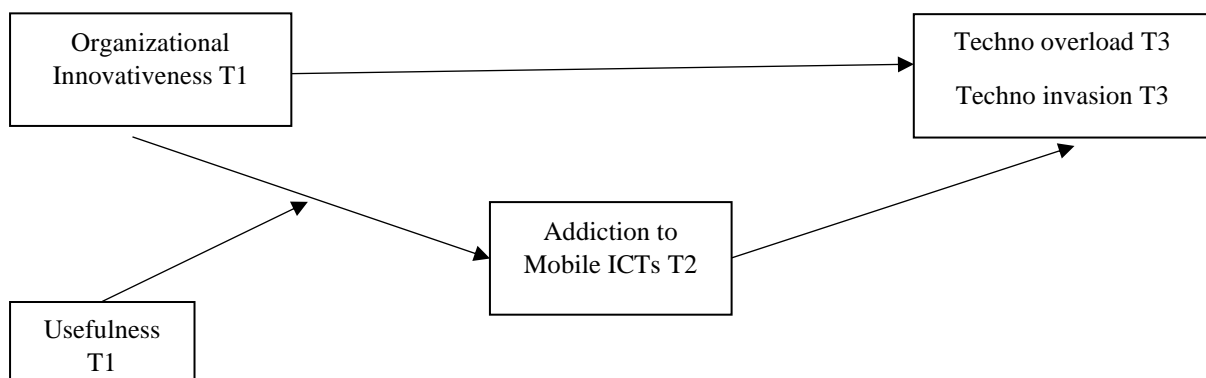


Figure 1: Theoretical Model

Table I presents the descriptive analysis, including the means, standard deviations, and a matrix of the intercorrelations of the researched variables. We also added the Cronbach’s

alpha to the table. Regarding gender, we found that men presented higher levels of addiction ($r = -.21, p < .05$) and regarding tenure, we found a positive relation with addiction ($r = .22, p < .05$).

Table I Descriptive Statistics

	Mean	S.D.	1	2	3	4	5	6	7
1. Gender (a)									
2.Tenure (b)			-.11						
3.Organizational Innovativeness T1	4.24	1.13	.08	.05	(.789)				
4.Usefulness T1	5.68	1.02	.05	.01	.33**	(.947)			
5.Addiction T2	3.39	1.16	.21**	-.22**	.10	.01	(.879)		
6.Techno Overload T3	2.64	.87	.07	-.12	.17*	.07	.38**	(.864)	
7.Techno Invasion T3	2.80	.87	.09	-.17*	.16	.04	.73**	.55**	(.777)

Notes. Usefulness = Perceived usefulness of mobile technologies; Addiction = Addiction to mobile ICTs;

(a) Gender was coded with 0 for female and 1 for male; (b) Tenure was coded as an ordinal variable where 1 means “less than 1 year”, 2 “between 1 to 3 years”, 3 “between 3 to 5 years”, 4 “between 5 to 10 years”, and 5 “more than 10 years”.

* $p < .05$; ** $p < .01$

To test Hypothesis 1, we conducted a linear regression, with the control variables, gender and tenure, and organizational innovativeness in the first block and our techno stressors, techno overload and techno invasion, in the second block. We found that organizational innovativeness is significantly related to techno overload ($B = .13, CI = [.00, .26]$), supporting Hypothesis 1a. Organizational innovativeness is also positively related to techno invasion ($B = .13, CI = [.00, .26]$), supporting Hypothesis 1b.

In order to test Hypotheses 2 and 3, in accordance with Preacher, et al (2007) we used its bootstrapping method developed. The results of the test of the conditional indirect effects model (Model 7) are presented in Table II.

When analyzing the direct relationship, we found that organizational innovativeness is not significantly related to addiction to mobile ICTs ($B = .11, CI = [-.06, .29]$). As such, Hypotheses 2a and 2b are not confirmed as there cannot be a mediation effect without the

relationship between predictor and mediator. Then, according with our prediction, we have analyzed the interaction effect of organizational innovativeness and usefulness and we have found that the relationship becomes significant ($B = .19$, $CI = [.02, .36]$). To support our findings, Figure 2 presents a depiction of the interaction effect.

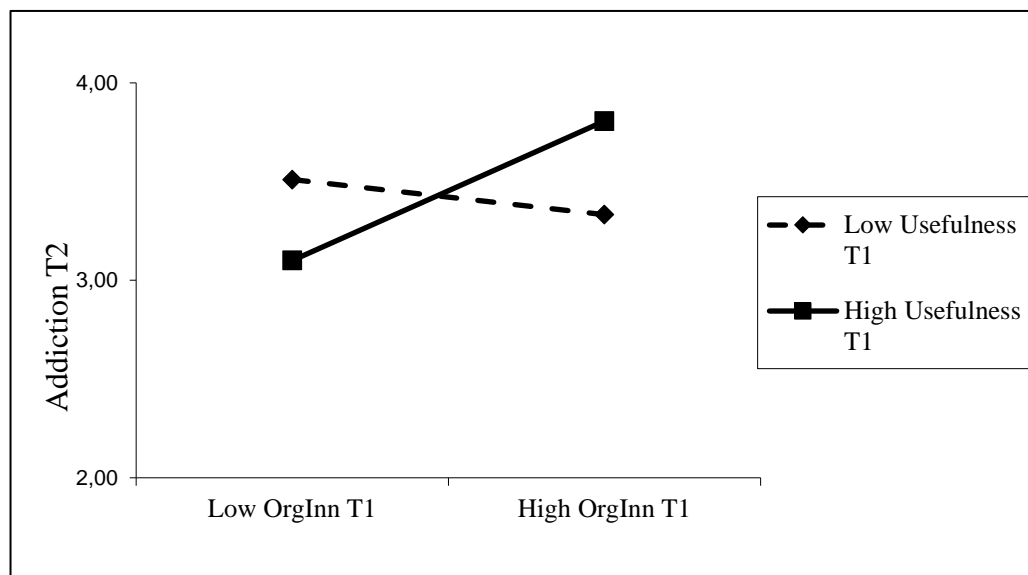


Figure 2: Interaction effects of Perceived Usefulness on Organizational Innovativeness and Addiction to Mobile ICTs

When perceived usefulness is high, organizational innovativeness is positively related to addiction to mobile ICTs ($t = 2.53$, $CI = [.07, .53]$). However, when perceived usefulness is low, the relationship becomes nonsignificant ($t = -.59$, $CI = [-.32, .17]$). For the relationship between addiction and techno stressors, we found a significant relation between addiction to mobile ICTs and techno overload ($B = .25$, $CI = [.13, .37]$). We also found a positive relation between addiction to mobile ICTs and techno invasion ($B = .54$, $CI = [.45, .63]$).

Secondly, we analyzed the conditional indirect effects model. In one side, when perceived usefulness is high, organizational innovativeness significantly increases both techno

overload ($B = .40$, $CI = [.01, .16]$) and techno invasion ($B = .07$, $CI = [.02, .31]$), through addiction to mobile ICTs. In the other side, when perceived usefulness is low, we didn't find an indirect effect of organizational innovativeness on techno overload ($B = .02$, $CI = [-.08, .04]$), and techno invasion ($B = .06$, $CI = [-.17, .08]$), via addiction to mobile ICTs. These results support, respectively, Hypotheses 3a and 3b.

Table II Bootstrapping Results (Model 7; Hayes, 2013)

	Addiction				Techno overload				Techno invasion			
	B	t	LLCI	ULCI	B	t	LLCI	ULCI	B	t	LLCI	ULCI
<u>Control Variables</u>												
Gender	.40	2.11*	.03	.78	-.06	-.41	-.34	.22	-.14	-1.33	-.35	.07
Tenure	-.12	-2.11*	-.24	-.01	-.02	-.49	-.12	.07	-.01	-.37	-.08	.05
<u>Main Effects</u>												
Organizational Innovativeness	.11	1.28	-.06	.29	.10	1.72	-.02	.22	.07	1.66	-.01	.16
Usefulness	.01	.15	-.20	.23								
<u>Interaction Effects</u>												
Organizational Innovativeness * Usefulness	.19	2.25*	.02	.36								
<u>Mediator</u>												
Addiction					.25	4.14**	.13	.37	.54	12.0**	.45	.63

Notes. Addiction = Addiction to Mobile technologies; LLCI = Lower level confidence interval; ULCI = Upper level confidence interval
 * $p < .05$; ** $p < .01$

Discussion

The main purpose of this research was to investigate whether organizations, by promoting the use of ICTs, are unconsciously creating technostress on its employees. We argue that this effect was mediated by mobile addiction and dependent on the perceived usefulness to mobile technologies experienced by the workers. Although we consider that our research is crucial for the understanding of technostress, we agree that this research is peculiar, considering the lockdown period caused by Covid-19 pandemic. This aspect not only forced many companies to implement remote working, increasing the use of ICTs at work, but also pressured people to be exposed and more dependent on mobile ICTs.

Turel et al (2011) showed that despite increasing productivity and efficiency, organizations are creating addiction to mobile ICTs among their employees. The increased level of dependence on technological devices is leading to increased levels of addiction, most of the times without being noticed by individuals or organizations (Tarafdar et al, 2007). Our first contribution to the literature is supported by the results, considering that the relationship between organizational innovativeness and addiction is significant. Thus, the context of innovative organizations promotes addictive behaviors to ICTs.

Secondly, building on the discussion on the antecedents of technostress, we examine whether innovative organizations are creating technostress, specifically techno overload and techno invasion. In fact, despite our results showing a significant direct effect of organizational innovativeness on techno overload and techno invasion, we only found a significant indirect effect through addiction, when perceived usefulness is high. This means that innovative organizations, by investing and promoting the use of ICTs, are undoubtedly creating more technostress, despite its positive effects.

Thirdly, our results also showed that this relationship is moderated by perceived usefulness to mobile ICTs, meaning that when people work in an innovative climate and

perceive ICTs as useful on a daily basis, their addiction tend to increase, reinforcing the vicious cycle and contributing to more technostress. As stated by Davis (1989), perceived usefulness of ICTs influence people's attitudes towards technology, increasing the duration and intensity with which he or she will use it, increasing their addiction to the ICT. Indeed, this is especially relevant, considering that our results have shown that when perceived usefulness is high, organizational innovativeness is significantly related to addiction to ICTs.

In the context of this research, people were working remotely due to Covid-19. Although we believe that this pandemic might have enhanced our results, not only because people were forced to work with mobile technologies but also because they were not adapted yet to this new situation, we also believe that in the future more organizations will pressure their employees to be technologic driven (Accenture, 2019). Therefore, our research contributes to the literature by addressing a major challenge within our organizations that is affecting people's wellbeing, nowadays, but it will be relevant in the future as well.

Practical Implications

The results of this study show that there are potential downsides of working in an innovative organization. Firstly, despite all the evidence showing the benefits of innovation climate, for example, boosting innovation performance in the organization (Bharadwaj & Menon, 2000), we can't disregard the way we stimulate innovation in our organizations. Top management, which usually set the boundaries of innovation practices, should ensure that potential hazards are avoided, because, as shown by Tarafdar, Pullins, and Ragu-Nathan (2014) technostress has a negative effect on performance. Therefore, reducing the use of ICTs at work or set restricted boundaries to reduce harm might be a good solution to prevent organizations to create technostress (Turel et al, 2011). Secondly, considering that organizations are creating technostress because their employees are developing addiction, the question from an

organizational perspective is whether they want to continue betting against the outcomes that will result if they pressure their people to these excess behaviours. Opportunities such as flextime and job-sharing offer time flexibility, might reduce dependency by giving workers options to choose (Porter & Kakabadse, 2006). On a different level, therapy-based approaches might be required, considering its effectiveness in reducing addiction (Turel et al, 2011). Finally, our results also demonstrated that the relationship between organizational innovativeness and techno overload and techno invasion is enhanced when perceived usefulness is high. We agree that creating this “sense of usefulness” is important within organizations (Harvard Business Review, 2019). However, we admit that recognizing the vicious cycle between innovativeness, usefulness, addiction, and technostress is the first step to avoid it. Then, implementing some practices such as creating distraction free time, reducing the time in front of technological devices, and training employees on how to manage ICTs properly and effectively, is important to reduce addiction, not only during Covid-19 pandemic, but also in the future (Zichermann, 2018).

Limitations and Future Studies

The findings this research provides should be considered in light of some limitations. Firstly, the time of data collection is a relevant factor to be taken into account. On the one hand, during the Covid-19 pandemic people are working remotely and, considering that this situation is sporadic, our data might not reflect a typical working environment. Furthermore, people are locked, therefore they might be forced to be in contact with technologies even more time, considering that people are working more in the past few months (The Economist, 2020). All these factors could enhance our results. However, we showed that the number of people using ICTs is increasing rapidly and every year more companies are investing in the use of ICTs by their employees. Thus, as we argued previously, despite the atypical reality we are facing, the

near future might be much more similar to what we are living now, in terms of working routine. Regarding additional research it would be intriguing to test our hypotheses under a “normal” working environment.

Secondly, regarding the data of this study, most of the participants were gathered through personal contacts. Therefore, our data is geographically limited to Portugal. Considering that Covid-19 is a global pandemic and that technostress might vary from country to country (Agboola & Olanmi, 2016), it would be interesting to access if this situational context impacts negatively technostress in other countries. Furthermore, considering age, most of the participants were young adults. So, it would be interesting to extend this research reaching other age groups, because they might act differently (Moore & Hancock, 2020). Does older people manage technologies in a different way?

Thirdly, most of our participants are working for less than 3 years, which means they are still in the beginning of their careers. This not only might influence their perceptions on the use of ICTs but also other technostressors, such as techno insecurity, might be relevant for the research (Tarafdar et al, 2007). For instance, the role of insecurity might be more pronounced for longer tenured individuals. Nevertheless, these people are also more used to work with ICTs and our results show important insights for the future. Despite having responses from a wide range of ages and industries and using the snowball effect to get more participants, it would be interesting to use a randomized data base not only to guarantee a representative sample but also to avoid heterogeneity.

Conclusion

To sum up, it is crucial to bear in mind that, despite being a catalyst of change, mobile ICT devices are also linked with potential dangers in the workplace. Companies must be aware of both benefits and the risks of ICTs, being especially watchful to their employees, providing training not only to foster their abilities on the use of technologies, but also to mitigate the risks

associated with them. The current pandemic showed our dependency on technological devices. Thus, in order to anticipate future problems, organizations should develop a set of practices to prevent potential technostress among their employees while reaping the benefits of innovation. Individuals, at the same time, should look for help whenever needed in order to leave the vicious cycle of addiction and technostress. Only when organizational and strategic instructions and individual behaviors are aligned will organizations be able to adequately tackle technostress issues.

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