Zagreb International Review of Economics & Business, Vol. 27, No. 2, pp. 327-351, 2024

Faculty of Economics and Business, University of Zagreb and Sciendo. Printed in Croatia.
ISSN 1331-5609; UDC: 33+65
DOI: 10.2478/zireb-2024-0030
CONFERENCE PAPER

Mastering Computing in the Presence of Functional vs. Emotional Technostress: The Moderating Influence of Technology and Task Dependency

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Abstract: *Our study investigates the moderating effects of perceived task interdependence (PTI) and ICT-Dependence (ICTD) on the relationship between various technostress creators and computer self-efficacy. We advance the technostress literature by introducing a framework that categorizes technostress creators into emotional (techno-insecurity, techno-uncertainty) and functional (techno-invasion, techno-complexity, techno-overload) dimensions. Using data from 187 employees and a cross-sectional design with two measurement points, we confirmed distinct inhibitory effects depending on the type of technostress creator. Our findings highlight the need to consider individual perceptions of technostress and demonstrate that different technostress creators trigger varied stress responses. Additionally, the study emphasizes the critical role of organizational measures in managing technostress within digitalization strategies. By distinguishing between different technostress causes and identifying key interactions with organizational factors, this research provides a foundation for future studies to further refine and test our framework.*

Keywords: technostress; computer self-efficacy; perceived task interdependence; ICT-dependence; technology use

JEL classification: M12, M14

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Introduction

Technology has become an integral part of organizations, revolutionizing the way work is conducted and impacting various aspects of employees' daily tasks and interactions (Mangia, 2022). Even more so, some professional groups are used to working only with information and communication technology (ICT), confronting both its advantages and limitations simultaneously (La Torre, Esposito, Sciarra, & Chiappetta, 2019; Tarafdar, Cooper, & Stich, 2019). While technology offers numerous benefits in the workplace, its pervasive use can lead to technology-induced stress (Tarafdar et al., 2019). Therefore, understanding how different technostress creators affect individuals´ confidence in using technology is crucial because some might decrease technological self-assurance and others can potentially enhance it.

While the impacts of technology use in the workplace have been widely studied (e.g., Tarafdar et al., 2007), there's a lack in our understanding of how technology-induced stress (technostress) affects individuals' confidence in using digital systems, known as computer self-efficacy (CSE). Previous research has primarily focused on CSE as a mitigating factor in technostress outcomes (e.g., Shu et al., 2011), but less attention has been given to how various technostress creators affect CSE itself (Tarafdar et al., 2019). By positioning technostress creators as antecedents to CSE, our research offers a novel approach in understanding the complex dynamics between technology-induced stress and an individual's confidence in using digital systems. Further, we introduce organizational-level moderators (perceived task interdependence and ICT dependence) to provide a more nuanced understanding of the relationship between technostress creators and CSE. These moderators allow us to examine how organizational factors influence the impact of technostress on CSE, offering both theoretical depth and practical insights for managing technology-induced stress in the workplace (e.g., Maier et al., 2015; Pearce & Gregersen, 1991).

To provide a more comprehensive understanding of the relationship between technostress creators and CSE, we introduce a novel classification of technostress creators into an emotional and functional dimension. Previous research has categorized technostress creators in various ways (e.g., Ragu-Nathan et al., 2008; Tarafdar et al., 2007) but the distinction between emotional and functional stressors has not been explicitly made. The classification is crucial as it considers that different types of technostress creators induce distinct psychological and physiological responses, potentially leading to different impacts on computer self-efficacy.

Emotional technostress creators, such as techno-insecurity and techno-uncertainty, primarily affect an individual's psychological state and feelings towards technology. On the other hand, functional technostress creators, including techno-overload, techno-invasion, and techno-complexity, are more related to the practical challenges of using technology in the workplace. Our framework is grounded in established stress theories, such as the Transactional Model of Stress and Coping

(Lazarus & Folkman, 1984), which emphasizes the importance of cognitive appraisal in stress responses. Furthermore, the distinction between emotional and functional technostress creators is vital to explain how organizational factors interact differently with emotional versus functional stressors, potentially revealing more targeted strategies for mitigating technostress. We posit that the moderating roles of perceived task interdependence and ICT dependence vary depending on whether the technostress creator is emotional or functional in nature. The emotional-functional framework enhances our theoretical understanding of the multifaceted nature of technostress and allows to introduce more targeted interventions in practice.

Our research responds to the call for a deeper understanding of individual technostress creators (Nastjuk et al., 2023) and offers a theoretical framework that can guide future investigations into the multifaceted nature of technostress. Our findings not only contribute to the theoretical field of technostress research but also provide practical implications for organizations seeking to manage technology-induced stress effectively and enhance employee performance in increasingly digital work environments.

Theoretical Framework and Hypotheses Development

Emotional and Functional Technostress Creators

Technostress creators are stress-inducing factors linked to the use of ICT. Tarafdar et al. (2007) identified five conditions representing stressors arising from the organizational use of ICT that end-users commonly encounter: Techno-overload pertains to scenarios where the use of ICT forces users to work at an accelerated pace for extended periods and implies an information overload. Techno-invasion delineates the pervasive influence of ICT, where individuals may be accessible at all times, fostering a perpetual feeling of connectivity and blurring the distinction between work-related and personal environments. The next dimension, techno-complexity, pertains to scenarios where the complexity of ICT engenders a sense of inadequacy in users' abilities, requiring them to invest time and effort in acquiring proficiency and comprehension of diverse ICT facets. Techno-insecurity is linked to instances where users fear job loss either due to automation resulting from new ICT or competition from individuals with a better grasp of ICT. Techno-uncertainty refers to circumstances in which ongoing changes and upgrades in ICT create unease and uncertainty among users, prompting concerns about the continual need for learning and staying informed about new ICT developments.

Building on existing stress and coping theories (e.g., Lazarus & Folkman, 1987) and technostress research (e.g., Ragu-Nathan et al., 2008), our study proposes a new framework of technostress creators based on their impact on individuals: emotional technostress creators (techno-insecurity and techno-uncertainty) that primarily affect psychological states, and functional technostress creators (techno-invasion, techno-complexity, and techno-overload) that primarily challenge the practical use of technology. This classification derives from the understanding that stressors can induce different types of responses (Tarafdar et al., 2019), and addresses the distinct cognitive and behavioral implications of various technostress creators. The emotional technostress creators (techno-insecurity and techno-uncertainty) affect individuals' emotional experiences when socially interacting with technology. Emotional techno stressors predominantly impact the emotional and psychological well-being of users. Techno-insecurity emanates from the apprehension of job displacement by technology or being regarded as less proficient. This induces emotional distress and diminishes self-esteem. Techno-insecurity constitutes a significant source of emotional stress, as users are anxious that their skills are becoming obsolete and that they may be supplanted by more technologically adept colleagues (Ragu-Nathan et al. 2008). Techno-Uncertainty stems from the incessant evolution and advancement of technology, which engenders uncertainty and anxiety due to the continuous need for adaptation. Further, it exacerbates emotional strain, as users are persistently challenged by doubts regarding their competencies and knowledge (Ragu-Nathan et al. 2008). This phenomenon can be explained using the concept of psychological entropy, which suggests that the growing complexity and need for constant adaptation intensify anxiety as users are increasingly confronted with uncertainties about their skills and knowledge (Hirsh et al., 2012).

In contrast, functional technostress creators (techno-overload, techno-complexity and techno-invasion) directly affect work performance and task management capabilities. Techno-overload arises when users perceive that they must accomplish more tasks due to technological demands, leading to an increased workload and potential reductions in efficiency. Techno-overload amplifies perceived work demands, thereby adversely affecting work performance (Ayyagari et al., 2011). Techno-complexity pertains to the challenges associated with learning and utilizing new technologies. This complexity can foster inefficient work practices and diminish productivity. Techno-complexity hinders users' task completion efficacy as it necessitates greater time and effort to comprehend and operate the technology (Tarafdar et al., 2007). Techno-invasion disrupts the boundary between professional and personal life, leading to increased stress and diminished well-being, and further describes the intrusion of technology into users' private lives, which can result in a lack of rest and a decline in work performance (Ragu-Nathan et al., 2008).

Drawing from previous research in the field of stress, it is acknowledged that stressors lead to coping reactions or stress and individuals' responses can vary significantly (Lazarus & Folkman, 1987; Lazarus, 1966). In the context of technostress, it is posited that the stress response is contingent upon the specific technostress creator, determining whether it trigger an emotional or functional response. This differentiation is crucial to introduce potential moderating effects at the organizational level.

Emotional and Functional Technostress Creators and Computer-Self-Efficacy

Self-efficacy refers to the confidence or belief in one's capability to successfully complete a particular task or achieve success in a specific situation (Ale, Loh, & Chib, 2017). It is considered a foundational element and a key determinant of individuals' engagement and competence in utilizing digital tools and platforms (e.g., Eastin & LaRose, 2006; Peiffer, Ellwart, & Preckel, 2020; Ulfert-Blank & Schmidt, 2022). Therefore, self-efficacy can be characterized as cognitive beliefs tied to specific goals, involving future-oriented judgments that are relatively context-specific (Bong & Skaalvik, 2003; Marsh, Chan, & MacBeth, 2018). According to Social Cognitive Theory (SCT), individual behaviors and attitudes related to digital devices are collectively shaped by personal and environmental factors (Bolt et al., 2001, 2001; Liaw et al., 2006). As we already know from previous studies, technostress creators negatively correlate with CSE (Shu, Tu, & Wang, 2011). In conclusion, understanding the role of self-efficacy is crucial for promoting effective engagement with digital tools, especially in environments where technostress creators can hinder digital competence and confidence.

Interactive Effect of Functional Technostress Creators and Perceived Task Interdependence

Autonomy, competence and relatedness are basic psychological needs within the scope of Self-Determination Theory (Ryan & Deci, 2017). Autonomy in relation to the use of digital technologies, can be described as the need to feel self-determined and to feel in control of using digital devices. Competence is the psychological need for individuals to feel competent enough to accomplish difficult tasks, and to be productive, efficient, and organized (Brunelle & Fortin, 2021) when using ICT. Relatedness as the need to feel connected and supported at work is satisfied when individuals interact with others to satisfy their desired level of closeness and support (Wax et al., 2022). When mutual dependencies arise in the context of the fulfilment of tasks (task interdependences), individuals feel related to other individuals in the organization. Further, task interdependence refers to the degree to which the accomplishment of a task necessitates collaboration among different team members (Ganesh & Gupta, 2010). Individuals strive for a sense of belonging and connection with others (Baumeister & Leary, 1995; Brewer, 1991; Ferris et al., 2009; Fritz et al., 2011; Spreitzer et al., 2005). and support from others can change the evaluation of different demands such that individuals feel challenged and not hindered when using ICT (Beaudry & Pinsonneault, 2010; Folkman et al., 1986). Further, relying on others can foster increased levels of self-efficacy (Haines & Taggar, 2006) but also impose an obligation to fulfill the expectations of others, requiring the person to facilitate the work of others (Doerr et al., 2004). When the degree of interdependence introduced between tasks is high, the individual builds stronger connections among team members (Burke et al., 2006). The degree of task interdependence determines the amount of collaboration, such as sharing resources, communicating, and relying on each other to get work done. This collaboration is important because it helps employees recognize the importance of others in completing tasks (Wageman, 1995).

Our study anticipates that the level of task interdependence will play a crucial role in determining the magnitude to which functional stressors (technostress overload, technostress complexity and technostress invasion) adversely relate to self-efficacy. The functional technostress creators' dimension is particularly relevant in the context of task interdependence due to the direct impact on work processes and task execution. Techno-overload occurs when the use of ICT compels users to work rapidly for extended durations, leading to an overwhelming amount of information. Techno-complexity emerges when the intricate features of ICT make users feel insufficient, necessitating time and effort to grasp and comprehend various aspects (Tarafdar et al., 2007). Techno-Invasion refers to the encroachment of technology into users' personal lives, which can result in insufficient rest and subsequently a decrease in work performance (Ragu-Nathan et al., 2008).These three stressors directly affect work performance and task management capabilities. In contrast, the emotional technostress creators (techno-insecurity and techno-uncertainty) primarily impact individual psychological states and are less likely to be directly influenced by task-related interactions with colleagues.

Social interaction through interdependence of tasks can play a decisive role. Individuals recognize that they can leverage the knowledge and skills of interdependent team members to solve challenges arising from the complexity, invasion and overload of tasks and information, even in challenging circumstances (Shalley & Gilson, 2004). This collaborative problem-solving approach is particularly relevant to addressing issues related to work processes and task execution, but may be less applicable to the more personal andemotional aspects of technostress. Therefore, it is hypothesized that task interdependence has a mitigating effect on the relationship between the functional techno-stressors: techno-overload, techno-invasion, techno-complexity and CSE:

H1: Task independence mitigates the negative relationship between techno-overload and computer self-efficacy.

H2: Task independence mitigates the negative relationship between techno-invasion and computer self-efficacy.

H3: Task independence mitigates the negative relationship between techno-complexity and computer self-efficacy.

Moderating Role of ICT-Dependence

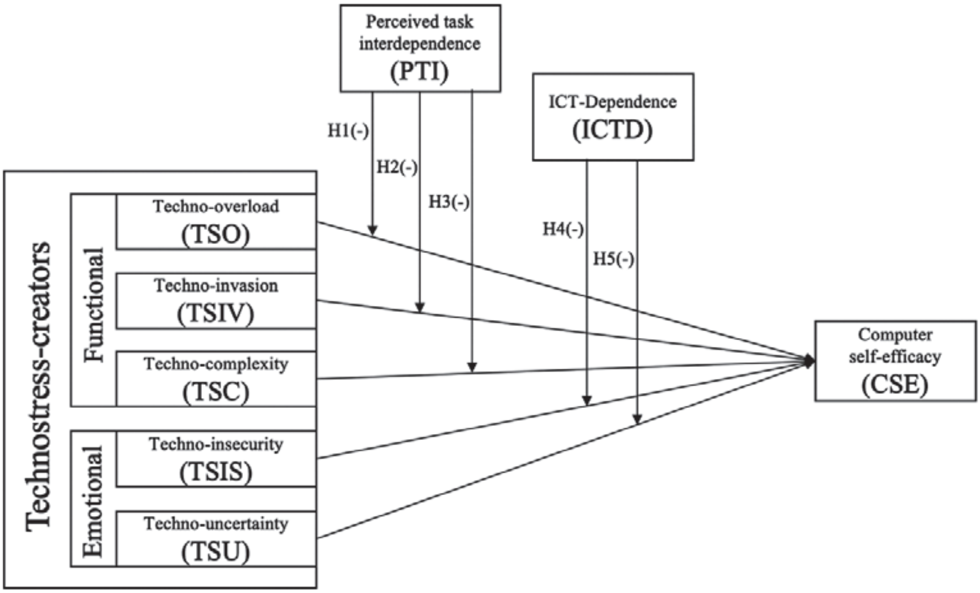
Organizations have the ability to shape the degree of dependence on digital technologies in the execution of daily work processes. A high level of dependency on digital technologies compels employees to accumulate more experience and build competencies because they lack alternatives for task execution. The development of self-efficacy is facilitated through mastery experiences (Bandura, 1977). ICTD is defined as the flexibility to choose work tools and decide whether to complete daily tasks using ICT or not (Jonušauskas & Raisiene, 2016). Users' involvement, denoting a subjective psychological state that mirrors the significance and personal relevance of an object or event (Barki & Hartwick, 1994), has a positive impact on their behavioral intention to adopt the technology (Amoako-Gyampah, 2007). In consequence, the dependence on digital technologies represents a positive organizational effect because individuals relying more heavily on technology are likely to encounter more challenges associated with computer-related technology, thereby building their competencies. This necessitates also regular computer training to effectively handle job responsibilities due to the constant evolution of computer-related technologies. The dependence on digital technologies often requires a swift adaptation to new technologies and platforms. Individuals who cultivate this adaptability may experience an elevated level of self-competence and flexibility (Hargittai & Hsieh, 2013). Now, it is desired to relate all previous findings to techno-stressors, which tend to elicit more of an emotional response. These include techno-insecurity, and techno-uncertainty. Techno-insecurity is linked to users' anxiety about potential job loss due to automated processes or to the competitive advantage of those who are more proficient in using ICT. Techno-uncertainty stems from ongoing changes in ICT, necessitating continuous learning (Tarafdar et al., 2007). As digital technologies facilitate quick access to knowledge and resources, thereby easing the overcoming of challenges (Warschauer, 2003), competence plays a crucial role according to self-determination theory (Ryan & Deci, 2017). Relying on digital technologies at work leads to more experience and provides the most authentic evidence for dealing with digital technologies. A significant reliance on digital technologies forces employees to gain more experience and develop competencies, as they need it for task execution. As established, the cultivation of self-efficacy is aided by mastery experiences (Bandura, 1977). So, it is suspected that the experience and accompanying competence will cause a positive emotional response, which will then reduce the negative emotional consequences of technostress creators. Therefore, it is hypothesized that ICTD has a mitigating effect on the relationship between the emotional technostress creators: techno-insecurity, and techno-uncertainty, and CSE:

H4: Dependence on digital technologies mitigates the negative relationship between techno-insecurity and computer self-efficacy.

H5: Dependence on digital technologies mitigates the negative relationship between techno-uncertainty and computer self-efficacy.

The theoretical model in Figure 1visually represents the aforementioned hypotheses.

Figure 1: Theoretical Model



Research methods

Data Collection

The sampling strategy was designed to capture data from a population that is likely to experience techno-stressors. To avoid sector-specific biases, the scope of the sample was broad, encompassing various industries, functional areas, and educational levels as previous scientists have done (Tarafdar et al., 2007; Umair et al., 2023). Only those who are employed and regularly engage with digital technologies in their work are included. Focusing on employed individuals who regularly engage with digital technologies, allows for a targeted examination of those likely to experience heightened techno-stressors. This facilitates the identification of specific challenges associated with the professional use of digital technologies, ensuring that the insights gained are directly applicable to work-related situations and contexts (Ayyagari et al., 2011; Tarafdar et al., 2007).

This study disseminated the survey using Prolific, an established online platform for psychological and behavioral research as recommended by previous studies

(Palan & Schitter, 2018; Peer et al., 2021; Stanton et al., 2022), which enabled us to reach a diverse range of US participants. To address potential common method bias (CMB), independent and dependent variables were measured at different points in time, with a time gap of two to four weeks. Additionally, time-lagged designs help mitigate endogeneity issues that occur when independent and dependent variables are simultaneously influenced or share common causes. This approach clarifies the causal direction between variables and reduces biases from feedback effects (Barros et al., 2020). We excluded participants who had been affiliated with the current company for less than one year to ensure that the individuals possessed adequate familiarity with the existing ICT infrastructure. The survey took place between October and December 2023. It is noteworthy that there were no instances of missing data, as all survey questions were designated as mandatory during the data collection phase.

Survey Development

The operationalization of the variables follows the already developed and tested scales. The questionnaires were administered in English using the original English scales. Technostress-creators were measured using the Technostress Creators Scale by Ragu-Nathan, Tarafdar, Ragu-Nathan and Tu (2008). Sample items are: "I am forced by this technology to do more work than I can handle."; "I need a long time to understand and use new technologies." The moderation variable PTI was operationalized using the scale developed by Van Der Vegt and Janssen (2003). A sample item is: "I need information and advice from my colleagues to perform my job well." ICTD is measured according to Jonušauskas and Raisiene (2016). A sample item is: "All the required information in my work is shared through ICT networks – internet or intranet". The dependent variable, CSE, is assessed based on the scale created by Compeau and Higgins (1995). A sample item is: "I could complete the job using the new software package if I had seen someone else using it before trying it myself." For the control variables, demographic data as age and gender have been captured. Prior research indicates that they may influence how individuals perceive and interact with technology, as well as the level of stress they experience related to technology (Ragu-Nathan et al., 2008; Tarafdar et al., 2019). Unless otherwise stated, all measures used a 5-point Likert scale (1 strongly disagree to 5 strongly agree).

Of the 187 respondents, 41 (21.9%) were over 50 years old, 38 (20.3%) were between the ages of 41 and 50, 63 (33.7%) were between the ages of 31 and 40, and 45 (24.1%) were younger than 30. 81 (43.3%) were male, 103 (55.1%) were female, and three (1.6%) did not specify their gender. The findings additionally showed that a majority of the participants possessed a higher level of education, with 84% holding at least a college or university degree, which is comparable to other studies measuring technostress (Hwang et al., 2021; Tarafdar et al., 2015).The industry with the greatest percentage of respondents was Finance (13.4%), followed by Education and Training

(10.7%) and Medicine (10.7%). The organizational level with the greatest percentage of respondents was middle management with 42 participants (22.5%), followed by trained professionals with 35 participants (18.7%) and administrative staff with 27 participants (14.4%). Age, gender, educational level and industry of the respondents were uniformly examined, indicating no significant differences. Every participant was in their current role for over a year, signifying their familiarity with Information Technology within their respective organization.

Data analysis and results

Validity and reliability

We utilized AMOS 29.0.0 to conduct Confirmatory Factor Analysis (CFA) on the variable responses. Various assessments, encompassing overall fitness, validity of individual items, discriminant validity, and reliability, were conducted to establish the validity and reliability of the variables and identify any necessary adjustments. Hu and Bentler (1999), along with Beauducel and Wittmann (2005), suggested a two-index approach to assess model fit, focusing on specific threshold levels. According to their recommendations, for a model to be considered a good fit, at least two of the following criteria should be met: an RMSEA of 0.06 or lower, an SRMR of 0.09 or lower, and a CFI of 0.90 or higher. The initial analysis revealed low-loading issues along several items. Consequently, eight items intended to assess techno-insecurity, CSE, and ITCD were excluded from the model due to suboptimal loadings on the target variables, in accordance with the recommendations of Wei et al. (2022). Cronbach's alpha values for all latent variables surpassed the recommended threshold of 0.7 (Nunnally, 1978), ranging from 0.753 to 0.886. All variables also achieve the required convergent validity, as indicated by the average variance extracted (AVE), which surpasses the recommended threshold of 0.5, as suggested (Hair, 2014; Hair et al., 2022). Following the removal of these items, the model fit was reevaluated.

The findings indicated the overall fitness of the model, as evidenced by the value of CFI 0.936, RMSEA 0.045, SRMR 0.0598 and $\chi 2$/df 1.379. This result indicates acceptable model fits (Beauducel & Wittmann, 2005; Hu & Bentler, 1999).

Common methods' bias

To address common method bias (CMB), data for the independent and dependent variables were collected at different points in time. Additionally, Harman's single-factor analysis was conducted, loading all items into a single-factor test, using AMOS 29.0.0 (Fuller et al., 2016). The results show inadequate model fits (CFI 0.436, RMSEA 0.131, SRMR 0.1499, $\chi 2$/df 4.191), indicating the absence of common method bias (Fuller et al., 2016).

Structural model assessment

All moderating hypotheses were tested using SPSS PROCESS v.4. (Hayes, 2022). In the investigation of the individual technostress creators, the remaining technostress creators were used as control variables in addition to age and gender. For the analysis, Model 2 in PROCESS macro was selected with two moderators, as the moderators PTI and ICTD exhibit a slight correlation and therefore need to be considered together.

H1 posits a negative interaction effect of PTI on the negative relationship between technostress-overload and CSE, H2 posits a negative effect of PTI on the negative relationship between technostress-invasion and CSE and H3 posits a negative effect of PTI on the negative relationship between technostress-complexity and CSE. In line with the hypothesized directed relationships, significance testes were one-tailed.

The techno-overload dimension predicted 24.6% of the variability in CSE, alongside PTI and ICTD. The interaction in one-tailed test between techno-overload and PTI is significant on the p-level < 0.10. The interaction with ICTD is not significant.

The results from the techno-invasion dimension are as follows: 25.7% of the variance in CSE is predicted by techno-invasion PTI and ICTD. These interaction between techno-invasion and PTI in one-tailed test is significant at the p-level < 0.10. The interaction with ICTD is not significant.

The results from the techno-complexity dimension are as follows: 26.3% of the variance in CSE is predicted by techno-complexity, PTI and ICTD. Interaction between Techno-complexity and PTI in one-tailed is significant at the p-level < 0.05. The interaction between techno-complexity and ICTD is not significant.

H4 suggests that ICTD mitigates the negative relationship between technostress-insecurity and CSE. Findings from the techno-insecurity dimension indicate that 25.8% of the variance in CSE was anticipated by techno-invasion, PTI and perceived ICTD. The interaction of techno-invasion with ICTD (H4) in one-tailed test is statistically significant at $p < 0.05$. The interaction between techno-insecurity and PTI is not significant.

The results from hypothesis 5, concerning the techno-uncertainty dimension, are as follows: 24.7% of the variance in CSE was predicted by technostress-uncertainty, PTI and ICTD. The interaction between techno-uncertainty and ICTD in one-tailed test is significant at the p-level < 0.05, indicating that hypothesis 5 can also be supported. The interaction between techno-uncertainty and PTI is not significant.

In Table 1, detailed results of the moderated regression analysis for each Technostress-Creator predicting CSE are presented.

Table 1: Summary of Moderated Regression Analysis for each Technostress-Creator Predicting CSE.

	Techno-Overload	**B**	**t**	**p**
H1	Int_TSOxPTI	0.0948†	1.5157	0.0657†
	Int_TSOxICTD	0.0083	0.1028	0.4591
	Techno-Invasion			
H2	Int_TSIVxPTI	0.1095†	1.5224	0.0649†
	Int_TSIVxICTD	0.0920	1.0507	0.1475
	Techno-Complexity			
H3	Int_TSCxPTI	0.1797*	2.3372	0.0103*
	Int_TSCxICTD	0.0466	0.6417	0.2610
	Techno-Insecurity			
H4	Int_TSISxICTD	0.1727*	1.9482	0.0265*
	Int_TSISxPTI	0.0432	0.4985	0.3094
	Techno-Uncertainty			
H5	Int_TSUxICTD	0.1059*	1.6600	0.0494*
	Int_TSUxPTI	0.0061	0.1193	0.4526

†p < .10; *p < .05; ** p < .01;***<001

We also employed stepwise regression analysis to test our hypotheses. The results for all regressions from models 1–4 are presented in Table 2. Model 1 shows the results of the linear regression, which includes only the control variables and the dependent variable, CSE. Model 2 adds the technostress creators as independent variables for each variant. Model 3 introduces one moderator (PTI for TSO, TSIV, TSC, and ICTD for TSIS and TSU) as a moderation variable. Finally, Model 4 includes both moderators, PTI and ICTD, as moderation variables.

For the calculation of the first two models (Models 1 and 2), we used linear regression in SPSS. To calculate Model 3, we applied the PROCESS Macro in SPSS, selecting Model 1 with one moderator. For Model 4, which incorporates two moderators, we used the PROCESS Macro with the Model 2 function.

Table 2: Results of hierarchical regressions with CSE as dependent variable.

Technostress-Creator	Variables	Model 1	Model 2	Model 3	Model 4
TSO	*Controls*				
	Age	0.00	0.00	0.01	0.00
	Gender	-0.18	-0.16	-0.16	-0.17
	TSC	-0.41***	-0.43***	-0.43	-0.04**
	TSU	0.07	0.03	-0.01	-0.17
	TSIV	-0.15*	-0.25**	-0.24	-0.25**
	TSIS	0.15	0.06	0.08	0.04
	Main effects				
	TSO		0.25**	-0.18	-0.19
	PTI			-0.17	-0.16
	ICTD				0.15
	Interaction effects				
	H1: TSOxPTI			0.10*	0.09†
	TSOxICTD				0.00
	F	6.09***	6.55***	5.47***	5.01***
	R-Square	0.17	0.21	0.22	0.25
	Adjusted R-square	0.14	0.18	0.18	0.21
TSIV	*Controls*				
	Age	0.00	0.00	0.01	0.00
	Gender	-0.12	-0.16	-0.16	-0.18†
	TSO	0.13	0.25**	0.26**	0.23*
	TSC	-0.45***	-0.43***	-0.41***	-.03***
	TSIS	0.03	0.06	0.07	0.03
	TSU	0.03	0.03	0.02	0.00
	Main effects				
	TSIV		-0.25**	-0.88**	-1.11**
	PTI			-0.22†	-0.17
	ICTD				0.00
	Interaction effects				
	H2: TSIVxPTI			0.15*	0.11†
	TSIVxICTD				0.09
	F	5.84***	6.55***	5.78***	5.42***
	R-Square	0.17	0.21	0.23	0.26
	Adjusted R-square	0.13	0.18	0.20	0.22
TSC	*Controls*				
	Age	0.00	0.00	0.00	0.00
	Gender	-0.22†	-0.16	-0.19†	-0.20
	TSO	0.22*	0.25**	0.22*	0.21*
	TSIV	-0.28**	-0.25**	-0.24**	-0.24**
	TSIS	-0.18†	0.06	0.04	0.00
	TSU	0.02	0.03	0.04	0.01
	Main effects				
	TSC		-0.43***	-1.25***	-1.25***

Technostress-Creator	Variables	Model 1	Model 2	Model 3	Model 4
TSC	PTI			-0.34*	-0.30*
	ICTD				0.06
	Interaction effects				
	H3: TSCxPTI			0.21**	0.18*
	TSCxICTD				0.05
	F	3.73***	6.55***	6.18***	5.58***
	R-Square	0.11	0.21	0.24	0.26
	Adjusted R-square	0.08	0.18	0.20	0.22
TSIS	*Controls*				
	Age	0.00	0.00	0.00	0.00
	Gender	-0.16	-0.16	-0.20†	-0.21
	TSO	0.27**	0.25**	0.23**	0.22
	TSIV	-0.25**	-0.25**	-0.27**	-0.26**
	TSC	-0.40***	-0.43***	-0.32**	-0.32**
	TSU	0.03	0.03	-0.00	-0.00
	Main effects				
	TSIS		0.06	-0.82*	-0.92*
	ICTD			-0.10	-0.08
	PTI				-0.07
	Interaction effects				
	H4: TSISxICTD			0.19*	0.17*
	TSISxPTI				0.04
	F	7.61***	6.55***	6.68***	5.43***
	R-Square	0.21	0.21	0.26	0.26
	Adjusted R-square	0.18	0.18	0.23	0.22
TSU	*Controls*				
	Age	0.00	0.00	0.00	0.00
	Gender	-0.15	-0.16	-0.19†	-0.19†
	TSO	0.27**	0.25**	0.23*	0.22*
	TSIV	-0.25**	-0.25**	-0.25**	-0.24**
	TSC	0.43***	-0.43***	-0.31**	-0.31**
	TSIS	0.07	0.06	0.01	0.01
	Main effects				
	TSU		0.03	-0.48†	-0.50
	ICTD			-0.08	-0.08
	PTI				-0.01
	Interaction effects				
	H5: TSUxICTD			0.11†	0.11*
	TSUXPTI				0.00
	F	7.63***	6.55***	6.34***	5.13***
	R-Square	0.21	0.21	0.25	0.25
	Adjusted R-square	0.18	0.18	0.22	0.21

The results display the regression coefficient B; † p < .10; *p < .05; ** p < .01; ***<001

Gender was a dummy variable where 0 = male and 1 = female.

Figures 2, 3 and 4 depict the interactive relationship between each technostress creator and CSE, highlighting how the moderator PTI mitigates the negative association. As hypothesized, employees encountering higher levels of techno-overload, technostress invasion and techno-complexity witness a notable decrease in perceived CSE, but this reduction is alleviated to some extent by PTI.

Figure 2: Two-way interaction of Techno-overload and Perceived Task Interdependence.

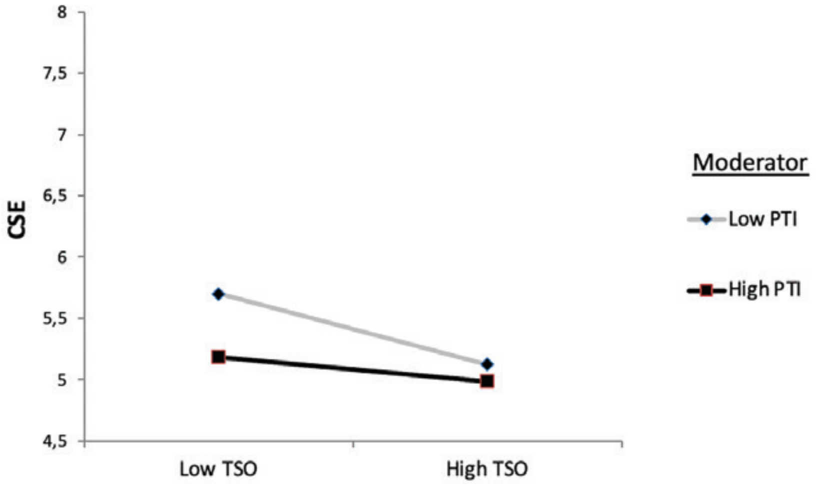


Figure 3: Two-way interaction of Techno-invasion and Perceived Task Interdependence.

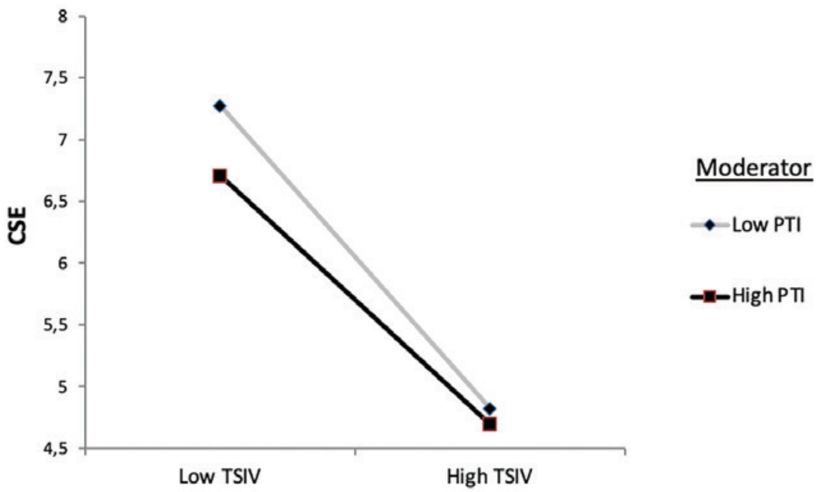
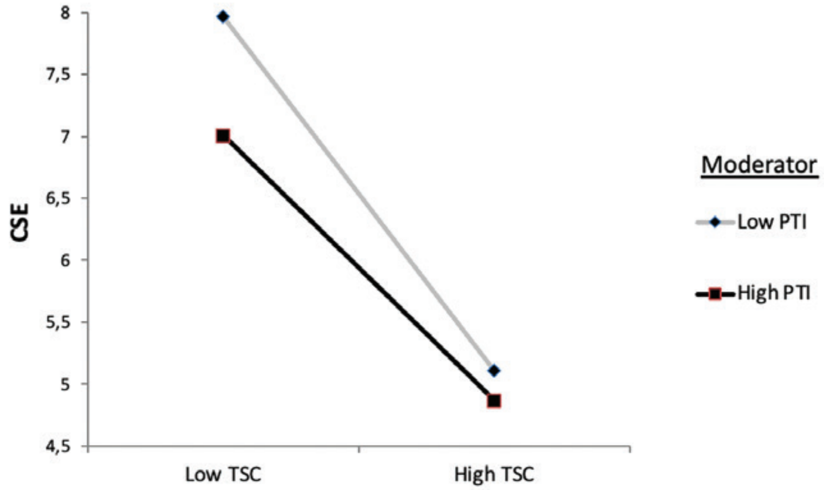


Figure 4: Two-way interaction of Techno-complexity and Perceived Task Interdependence.



Figures 5, and 6 depict the interactive relationship between each technostress creator (techno-insecurity, and techno-uncertainty) and CSE while considering the moderator ICTD. These figures demonstrate how the presence of ICTD moderates the negative relationship between technostress creators and perceived CSE. Specifically, individuals experiencing higher levels of techno-insecurity, and techno-uncertainty tend to encounter a notable decrease in their perceived CSE. However, the impact of these technostress factors on CSE is alleviated or reduced to some extent by the presence of ICTD.

Figure 5: Two-way interaction of Techno-insecurity and ICT-dependence.

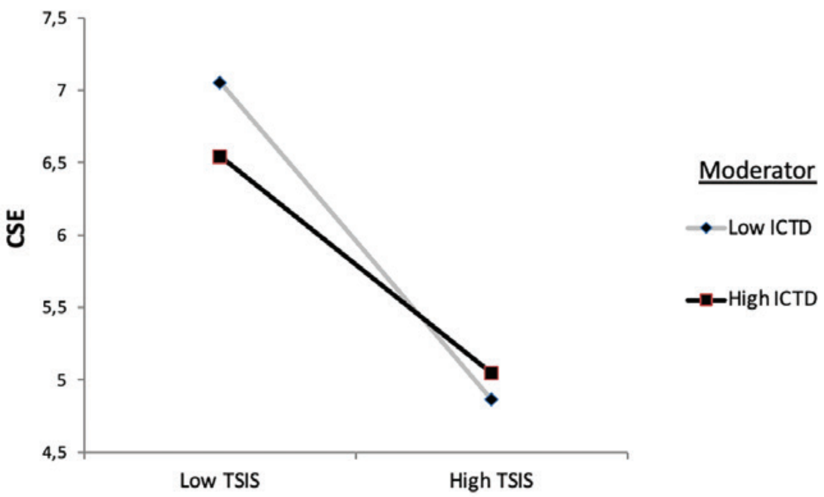
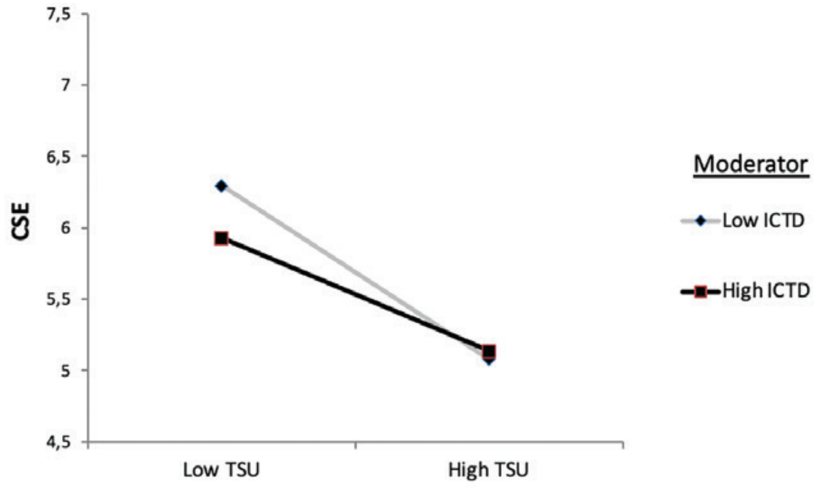


Figure 6: Two-way interaction of Techno-uncertainty and ICT-dependence.



Discussion

This study provides valuable insights into technostress at the individual level, highlighting the differing effects of two moderating factors (PTI and ICTD) depending on whether the technostress creators are classified as emotional or functional. The moderation analysis for PTI confirms hypotheses H1, H2, and H3, showing that PTI mitigates the negative impact of techno-overload, techno-invasion, and techno-complexity on CSE. PTI reflects how much individuals view their work as dependent on collaboration and resource sharing within their team, influencing their appreciation for group efforts to achieve common goals (Campion et al., 1993; Shalley & Gilson, 2004; Wageman, 1995). The findings suggest that higher task interdependence negatively affects CSE when dealing with these technostress creators. The reasoning is that if an individual lacks the expertise to manage techno-complexity, techno-invasion, or techno-overload, another team member they regularly work with may offer the necessary skills and support to address these functional challenges (Lee et al., 2015).

Additionally, the moderating effect of ICTD reduces the negative relationship between techno-insecurity, techno-uncertainty, and CSE, supporting hypotheses H4 and H5. These technostress creators, specifically insecurity and uncertainty, are linked to the psychological and emotional challenges of technology use, emphasizing the mental strain and disruptions caused by concerns about security and the unpredictability of technological changes (Ragu-Nathan et al., 2008; Tarafdar et al., 2007). This can be explained due to the fact that extensive digital technology usage optimizes routine tasks, lowering the workload and enhancing productivity (Brynjolfsson &

McAfee, 2014). Furthermore, the widespread use of digital technologies allows for quicker access to information and resources, helping individuals navigate challenges more effectively (Warschauer, 2003). It is suggested that relying on digital systems requires a deeper understanding of their capabilities, which in turn improves one's ability to manage these technostress factors. By fostering more frequent and in-depth interaction with digital technologies, ICTD shapes emotional responses and coping strategies (Lazarus, 1966), thus significantly reducing the negative effects of these technostress creators on CSE.

Theoretical and Practical Contributions

The introduction of a new classification that divides technostress creators into emotional and functional categories is the key contribution of this study. This classification advances the debate on unidimensional vs. multidimensional models of technostress by demonstrating that different dimensions of technostress interact with organizational factors in distinct ways. Specifically, this classification complements existing frameworks by providing a more nuanced understanding of how external variables influence technostress creators (Wang et al., 2020). This multidimensional approach suggests that rather than entirely revising current models, these findings complement them, refining our understanding of technostress and highlighting the need for more precise interventions.

This study also makes also a valuable contribution to the field of technostress by empirically validating the varying effects of different technostress creators in interaction with organizational factors. Specifically, this study focuses on the individual dimensions of technostress creators, yielding significant findings that demonstrate the diverse ways in which these dimensions interact with external variables and produce a range of effects.

According to the self-determination theory, individuals' intrinsic motivation is driven by the satisfaction of basic psychological needs for autonomy, competence, and relatedness. In the proposed model, it is posited that competence, stemming from dependencies on digital technologies, and relatedness, arising from task interdependencies, elicit motivational responses and positive emotional outcomes (Sapolsky, 2015). Digital dependence is associated with the development of competencies, as individuals are compelled to complete tasks using digital technologies. Prior research consistently supports a positive link between previous usage of digital technologies and CSE, as it provides individuals with opportunities for mastery experiences (Dunlap, 2008). Engaging with digital technologies enhances individuals' confidence in their computer abilities, as meaningful interactions with technology contribute to a sense of capability (Bandura, 1994).

At an organizational level, task interdependence promotes not just interpersonal interactions, cooperation, and assistance, but also increases individuals' recognition of the necessity to participate in such actions to reach their work objectives. Previous studies have shown a positive correlation between task interdependence and general helping behaviors (Ellington et al., 2014; Ozer et al., 2014). In collaborative work settings, individuals are more inclined to seek and expect assistance from their colleagues (Anderson & Williams, 1996; Bachrach et al., 2006; Berkowitz, 1972; R. J. Burke et al., 1976; Pearce & Gregersen, 1991). This collaborative environment can mitigate the negative effects of technostress creators on self-efficacy, as people perceive technological challenges as less threatening when they can share responsibility and feel connected to others. This concept aligns with self-determination theory, which emphasizes the importance of feeling competent and related to others for motivation and emotional well-being.

It is crucial for organizations to recognize that individuals hold various perceptions regarding specific Information Systems (IS)-related policies or technological changes. This research provides a practical framework for organizations to assess programs and offer support to help individuals in organizations develop their CSE. Furthermore, the findings underscore the need for organizations to tailor their organizational aspects based on individual characteristics and situations, rather than adopting generic approaches, to successfully implement digital strategies.

Limitations and future research

Certain constraints in this study warrant consideration. The study focuses on two specific organizational aspects, PTI and ICTD, but there may be other modifiable factors that either enhance or mitigate CSE. We intentionally limited our approach to demonstrate that moderators from different theoretical directions are capable of mitigating technostress depending on the category. This list could be expanded by future research, or take a more critical direction, exploring what factors might further exacerbate stress. Future research should explore different variables at the organizational level that might affect the relationship between technostress creators and CSE.

Further research should also consider additional moderators, such as emotional resilience or work engagement, to see how they might influence these technostress dimensions (Pirkkalainen et al., 2019). Moreover, future studies should take into account diverse characteristics, industry-specific factors, and work contexts to better explore the origins of employee stress. Identifying organizational characteristics that help individuals cope with technostress creators across different dimensions would be valuable for further research.

Conclusion

The results of this study highlight the inhibitory effects of organizational aspects, specifically PTI and ICTD, on various technostress creators, which in turn are negatively related to self-efficacy. Techno-insecurity, and techno-uncertainty are psychosocial stressors that target the emotional and social aspects of technology use, thus demonstrating an inhibitory effect on these technostress creators due to digital dependence. Techno-complexity, techno-invasion, and techno-overload focus more on the functional or practical challenges arising from the complexity and volume of information, establishing an inhibitory effect on these technostress creators due to task interdependence.

These findings emphasize also the importance for organizations to customize their organizational aspects, taking into account the level of digitization and the extent of task interdependencies, based on individual characteristics and situations rather than adopting generic approaches, in order to successfully implement IS strategies. Furthermore, this study theoretically contributes to technostress research by uncovering significant interactions between the different technostress creators and organizational aspects. This highlights the need for future research that considers the individual dimensions and not only technostress as an overall construct (Borle et al., 2021; Nastjuk et al., 2023).

Declarations

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Availability of Data and materials

The data that support the findings of this study can be requested directly from the authors but are not publicly available.

Code Availability

The computer program results are shared through the tables in the manuscript.

Competing Interest

Alicja Techmanska: Conceptualization, Formal Analysis, Data Curation, Writing - Original Draft, Writing - Review & Editing, Visualization, Project Administration
Elisabeth Ortner: Conceptualization, Methodology, Writing - Original Draft Resources, Writing - Review & Editing
Christoph Stöckmann: Conceptualization, Methodology, Writing - Original Draft, Writing - Review & Editing, Supervision

Authors' Contributions

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