Chapter # 9

NAVIGATING TECHNOSTRESS: THE ROLE OF PERSONAL AND ORGANIZATIONAL RESOURCES IN REGULATION OF DIGITAL STRAIN AND WELL-BEING

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ABSTRACT
This cross-sectional study aimed to utilize the Job Demands-Resources theory to examine whether inhibitors of technostress within organizations, computer self-efficacy and resilience can reduce employees' perception of digital strain and positively impact job-related well-being. Conversely, it investigated whether technostress creators exacerbate employees' perception of digital strain and negatively affect job-related well-being. The research sample comprised 183 employed individuals utilizing information technologies at work, including 87 men and 96 women aged between 21 and 63 years. Participants completed a series of self-assessment online questionnaires via social media platforms. The results indicated that resilience, support for digital literacy, and provision of technical support were predictors of positive job-related well-being. Conversely, techno-overload, techno-invasion, techno-complexity, and techno-uncertainty predicted negative job-related well-being. Notably, resilience was the sole predictor that attenuated the impact of techno-stressors on positive well-being. Digital strain was associated with techno-overload, techno-invasion, and techno-complexity, with computer self-efficacy being the only significant predictor mitigating the effects of techno-stressors on digital strain. Our findings thus have the potential to contribute to the creation of a better and healthier work environment, and they could be valuable for managers and organizations striving to address the challenges associated with digital transformation and modern technologies in the workplace.

Keywords: techno-stressors, technostress inhibitors, resilience, computer self-efficacy, digital strain, job related well-being.

1. INTRODUCTION

Despite the benefits that information technologies bring to its users, the modern working environment is becoming stressful for employees due to increasing digitalization and fast-changing modern technologies. The Job Demands-Resources (JD-R) model (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001) provides a framework for understanding how job demands, and job resources influence employees' work engagement (e.g., stress and burnout) and motivation for higher performance. Information and Communication Technologies (ICT) can function as both job demands and job resources. If ICT is considered a job demand, they have the potential to induce technostress and have adverse effects on employees' physical and psychological well-being. If organizations present and communicate ICT as tools to enhance employees' positions, they can also serve as job resources. In this function, ICT supports technical involvement, satisfaction, and performance, as well as improving the integration of work and private life (Pansini, Buonomo, De Vincenzi, Ferrara, & Benevene, 2023). Following the JD-R model, the aim of the study was to verify the assumption that technostress inhibitors in the organization

(technical support, computer literacy support, user involvement in development) acting as job resources, a high level of resilience, and computer self-efficacy (personal resources) reduce the perception of digital strain among employees and positively influence job related well-being, and technostress creators (techno-overload, techno-complexity, techno-invasion, techno-variability, techno-uncertainty) acting as job demands on the other hand increase employees' perception of technological strain and are in a negative relationship with job related well-being.

2. BACKGROUND

2.1. Techno-Stressors and Techno-Inhibitors at Work

Information technology has become a part of most people's daily lives over the past two decades, enabling them to be constantly interconnected. For employees, this implies the need to constantly adapt to changing work needs and demands; however, the increased use of digital technologies in the changing world of work can cause stress, leading to potentially negative reactions from individuals. Research has identified this specific form of stress as technostress (Ayyagari, Grover, & Purvis, 2011; Tarafdar, Tu, Ragu-Nathan, & Ragu-Nathan, 2011). This concept was first introduced by the clinical psychologist Craig Brod "as a modern disease of adaptation caused by an inability to cope with the new computer technologies in a healthy manner" (Brod, 1984, p. 16). Nowadays, technostress is understood as a multidimensional concept where the problem is both technology anxiety as well as the burden caused by information overload (Boonjing & Chanvarasuth, 2017). Researchers have presented five technology-related factors that cause technostress: *techno-overload, techno-invasion, techno-complexity, techno-insecurity,* and *techno-uncertainty* (Ragu-Nathan, Tarafdar, Ragu-Nathan, & Tu, 2008; Tarafdar, Tu, & Ragu-Nathan, 2010). *Techno-overload* refers to situations that force employees to work faster and longer as they simultaneously process different streams of information. This results in increased workload, time pressure, and, most importantly, communication and information overload, where individuals are exposed to more information than they can effectively handle and use. *Techno-invasion* describes an invasive effect on employees' personal lives, blurring the boundaries between work and personal life; as a result, employees feel like they are in a continuous online connection with work. *Techno-complexity* means that staff cannot cope with the complexity of new technology. The technical capabilities and terminology associated with ICT have become more complex; new applications can take months to learn, and manuals can be complicated. The perceived complexity of using ICT to perform work is believed to increase the workload. As the rapid development of ICT drives a revolution in replacing human labor with machines, employees may feel threatened by the loss of their jobs due to new ICT or by their replacement by more experienced job seekers with better ICT skills. This is referred to as *techno-insecurity*. Constant changes in hardware and software, the work situation can become very precarious for some employees and is referred to *techno-uncertainty*. Recent research documented mainly the negative effects of technostress on the work performance, productivity and mental health of employees (Atanasoff & Venable, 2017; Srivastava, Chandra, & Shirish, 2015).

Techno-inhibitors are resources that can reduce technostress and improve employee productivity and performance, and well-being (Charkhabi, 2018; Korunka, Hoonakker, & Carayon, 2008). According to Ragu-Nathan et al. (2008) techno-inhibitors in organizational context include *literacy facilitation, technical support provision and involvement facilitatio*n. *Literacy facilitation* is defined as a mechanism for sharing

ICT-related knowledge within an organization through professional training or documentation. *Technical support* provision is linked to specific support for ICT end-users in solving technology-related problems. *Involvement facilitation* is defined as informing the individual about the reasons for introducing new technologies and involving him/her in this process.

2.2. Computer Self-Efficacy, Resilience and Technostress

Self-efficacy is defined as an individual's belief in their ability to achieve goals and manage environments that affect their lives and is a crucial proximal determinant of behavior (Bandura, 1989). Hence, computer self-efficacy refers to individuals' beliefs about their ability to successfully use computers to solve tasks and manage situations (Marakas, Yi, & Johnson, 1998). Individuals with greater confidence in their digital skills tend to experience lower levels of anxiety when using digital technologies. Individuals with strong digital self-efficacy are also more persistent and skilled in using digital technologies. Low self-efficacy, on the other hand, is linked to stress and professional burnout. Individuals with low self-efficacy may feel powerless and hopeless regarding their ability to effectively cope with the challenges and demands of their work. This can lead to stress and reduced performance, even among highly skilled individuals (Heslin & Klehe, 2006). Moreover, according to Yener, Arslan, and Kilinç (2021), technological self-efficacy has a moderating role between technostress and burnout, suggesting that those who believe in their ability to navigate technology can buffer the negative effects of stress related to technological demands. When individuals are confronted with demanding situations that can induce stress, it is crucial for them to have skills that allow them to control their emotional reactions and adapt to increasing pressure. This ability to adapt, also known as "adaptive functioning," can lead to positive outcomes even in negative circumstances. Additionally, computer self-efficacy is presumed to influence an individual's willingness to acquire new ICT skills and can either facilitate or hinder the acquisition of effective skills when interacting with digital systems.

In an increasingly dynamic business environment, the concept of resilience is fundamental to understanding how employees successfully cope with challenges (Hartmann, Weiss, Newman, & Hoegl, 2020). The American Psychological Association (2023) defines resilience as "the process and outcome of successfully adapting to challenging or stressful life experiences, particularly through mental, emotional, and behavioral flexibility and adaptation to external and internal demands." Resilience can be understood as individuals' ability to positively adapt to stressful environments, demonstrate strength, perseverance, and the ability to recover from difficulties (Linnenluecke, 2017). Resilient individuals are generally better able to withstand difficulties and failures (Shin, Taylor, & Seo, 2012), perhaps because they use positive emotions to effectively recover from stressful situations (Baek, Lee, Joo, Lee, & Choi, 2010). Research (Burns & Anstey, 2010) also demonstrated that cognitive constructs such as resilience and self-efficacy are more strongly related to positive affect than negative affect. According to Shin et al. (2012), personal resources such as resilience can help individuals better cope with problems by providing them with energy or protecting them from dysfunctional mental states that induce stressors. It is assumed that resilience, when linked with positive affectivity, has a favorable impact on indicators of mental health (e.g., Hu, Zhang, & Wang, 2015) and plays a crucial role in fostering both job satisfaction and work engagement (Ibrahim, & Hussein, 2024).

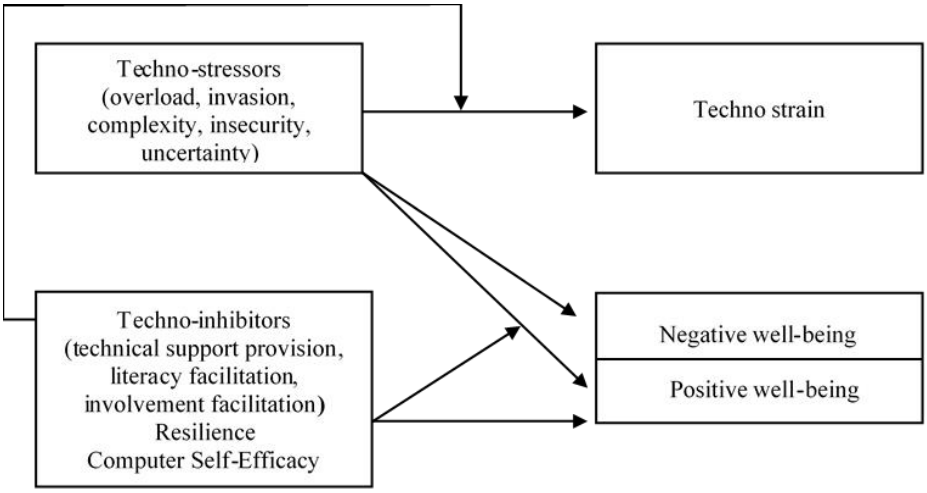
2.3. Positive and Negative Emotions at Work

Positive affect refers to the extent to which individuals experience emotions such as enthusiasm, excitement, determination, or mental alertness. On the other hand, negative affect relates to moods such as anger, fear, or feelings of guilt. When people experience low positive affect, they may feel sadness and lack of energy, while low negative affect can be described as a state of calmness and equilibrium. Numerous reviews and meta-analyses have shown that happy employees tend to exhibit positive behaviors within the organizational citizenship (Mousa, Massoud, & Ayoubi, 2020), have a higher intention to stay with their employer, display less counterproductive work behaviors (Harrison, Newman, & Roth, 2006), and deliver increased individual work performance, thereby enhancing organizational performance. The current prevalence of information and communication technologies enables individuals to receive work-related messages non-stop, providing them with greater control and flexibility over their work schedule. However, technologies also have downsides. These include issues such as increased technological complexity, frequent changes, technical problems, increased work demands, blurring boundaries between work and home, and creating a sense of constant connection to work. This constant connectivity hinders necessary mental detachment and recovery from work responsibilities (Pfaffinger, Reif, & Spieß, 2022). The concept of "digital well-being" has begun to emerge in the current literature. Vanden (2021) defines digital well-being as a construct that expresses a delicate balance between the advantages and disadvantages people experience in relation to continuous connectivity. This experiential state includes both affective and cognitive evaluations of how digital connectedness is integrated into one's daily life. Individuals achieve digital well-being when they experience high levels of controlled pleasure and functional support while simultaneously minimizing loss of control and deterioration in functionality. It also provides insights into measures that can be taken to support the development of healthier habits regarding the use of mobile media, whether through the implementation of interventions focused on digital well-being or otherwise (Vanden, 2021).

2.4. Objectives of the Study

The aim of the study, following the Job Demands-Resources Theory (Demerouti et al., 2001), is to verify: a) the relationships between techno-stressors, digital strain, and job affective well-being; b) the relationships between stress inhibitors and job affective well-being; c) the assumption that technostress creators (techno-overload, techno-complexity, techno-invasion, techno-variability, techno-uncertainty) increase employees' perception of digital strain and are negatively associated with job well-being, d) the assumption that organizational inhibitors (technical support, computer literacy support, user involvement in development), personal resources (high levels of resilience, and computer self-efficacy) reduce the perception of digital strain and positively impact job related well-being. The hypothetical research model is depicted in Figure 1.

Figure 1.
Model of the study.



3. METHODS

3.1. Participants and Procedure

The research sample consisted of 183 employed individuals using information technologies at work, including 87 men and 96 women, aged between 21 and 63 years. 70% respondents reported having completed a university degree, 29% a high school diploma and 1% indicated "other". Most respondents worked in IT and technology (48), followed by educators (29), and those in administration, economics, and accounting (23). Participants completed a series of self-assessment questionnaires (Techno-Strain, Technostress Creators and Technostress Inhibitors, Resilience Scale, Job Affective Well-Being Scale, Computer Self-Efficacy) administered online via social media platforms.

3.2. Measures

We used the Technostress Creators and Technostress Inhibitors Scale (Ragu-Nathan et al., 2008) to measure facilitators and inhibitors of technological stress. The first inventory, Technostress Creators, consists of 23 items divided into five subscales: Techno-overload (5 items, $\alpha = 0.82$; in our study $\alpha = 0.76$), Techno-invasion (4 items, $\alpha = 0.80$; in our study $\alpha = 0.81$), Techno-complexity (5 items, $\alpha = 0.77$; in our study $\alpha = 0.86$; e.g., "*I need a long time to understand and use new technologies*"), Techno-uncertainty (5 items, $\alpha = 0.78$; in our study $\alpha = 0.79$), and Techno-insecurity (4 items, $\alpha = 0.83$; in our study $\alpha = 0.83$). The second inventory, Technostress Inhibitors, contains 13 items divided into three subscales: Literacy facilitation (5 items, $\alpha = 0.85$; in our study $\alpha = 0.84$; e.g., "*Our organization provides end-user training before the introduction of new technologies*"), Technical support provision (4 items, $\alpha = 0.86$; in our study $\alpha = 0.89$), and Involvement facilitation (4 items, $\alpha = 0.87$; in our study $\alpha = 0.80$). Respondents rated items from both inventories on a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree).

To assess the level of individual resilience as a positive personality trait that enhances individual adaptation, we used the Slovak short version (14-item) of the Resilience Scale (Hajdúk, Mesárošová, & Heretik, 2015). Example item: "*I usually manage one way or another*" (α = 0.84; in our study α = 0.89). The items were rated on a 7-point scale (1 - strongly disagree, 7 - strongly agree).

To evaluate perceived work strain due to the use of ICT, we used a 4-item Techno strain scale (Ayyagari et al., 2011). Example item: "*Activities that require the use of technology exhaust me*". The items were measured on a 7-point Likert scale, ranging from "never" (1) to "always" (7). The reliability of these items is given in the original work as α = 0.97, our obtained value is α = 0.85.

We measured positive and negative affect among respondents using a shortened version (12 items) of the Job Affective Well-Being Scale (JAWS) (Schaufeli & van Rhenen, 2006). Example item: *"My job made me feel at ease", "My job made me feel angry"*. The respondents answered on a five-point scale from "never" (1) to "very often/always" (5). Internal consistency in our study was α = 0.838 for positive affect and α = 0.852 for negative affect.

Computer self-efficacy was measured using a 12-item Computer Self-Efficacy Measure (Howard, 2014). Example item: *"It is easy for me to accomplish my computers goals*". Participants responded on a 5-point scale (1 - strongly disagree, 5 - strongly agree). Cronbach's α in the original work was 0.95, in our research α = 0.93.

4. RESULTS

The data were analyzed using the statistical software JASP. Correlation and linear regression analyses were employed to test the hypotheses. The correlation results (Table 1) demonstrate that regarding digital strain, there is a statistically significant negative relationship with self-efficacy ($r = -0.363$, $p < .001$) and significant positive relationships with techno-overload ($r = 0.360$, $p < .001$), techno-invasion ($r = 0.252$, $p < .001$), and techno-complexity ($r = 0.350$, $p < .001$). Positive affect significantly and positively correlated with resilience ($r = 0.329$, $p < .001$), computer self-efficacy ($r = 0.146$, $p = 0.048$), computer literacy support ($r = 0.224$, $p = 0.002$), user involvement ($r = 0.207$, $p = 0.005$), and negatively with techno-overload ($r = -0.249$, $p < .001$), techno-invasion ($r = -0.164$, $p = 0.026$), techno-complexity ($r = -0.190$, $p = 0.010$), and techno-uncertainty ($r = -0.250$, $p < .001$). Statistically significant negative relationships existed between negative affect and resilience ($r = -0.336$, $p < .001$), computer self-efficacy ($r = -0.254$, $p = 0.048$), computer literacy support ($r = -0.168$, $p = 0.023$), user involvement ($r = -0.184$, $p = 0.012$), and positive relationships were found between techno-overload ($r = 0.379$, $p < .001$), techno-invasion ($r = 0.392$, $p = 0.026$), techno-complexity ($r = 0.436$, $p = 0.010$), and techno-uncertainty ($r = 0.288$, $p < .001$).

Table 1.
Correlations for all variables.

	Digital strain		Positive affect		Negative affect	
Variables	rho	p	rho	p	rho	p
Resilience	-0.127	0.086	0.329	< .001***	-0.336	< .001***
Comp self-efficacy	-0.363	< .001***	0.146	0.048*	-0.254	< .001***
Literacy facilitation	-0.016	0.832	0.224	0.002**	-0.168	0.023*
Technical support	0.083	0.263	0.038	0.613	-0.006	0.941
Involvement facilit.	-0.019	0.794	0.207	0.005**	-0.184	0.012*
Techno-overload	0.360	< .001***	-0.249	< .001***	0.379	< .001***
Techno-invasion	0.252	< .001***	-0.164	0.026*	0.392	< .001***
Techno-complexity	0.350	< .001***	-0.190	0.010**	0.436	< .001***
Techno-uncertainty	0.104	0.159	-0.250	< .001***	0.288	< .001***
Techno-insecurity	0.093	0.212	-0.008	0.910	0.034	0.649

*rho = Spearman's rho, * p < .05, ** p < .01, *** p < .001*

The results of multiple linear regression showed that techno-stressors explain 27.2% of the variance in negative affect ($R2 = 0.272$, $p < .001$); statistical significance was demonstrated by predictors of techno-overload (β=0.200, SE=0.089, p=0.027), techno-invasion (β=0.209, SE=0.086, p=0.016), techno-complexity (β=0.268, SE=0.079, p= < .001), techno-insecurity (β=-0.196, SE=0.081, p=0.017). For the dependent variable of positive affect, in relation to personal inhibitors, statistical significance was found with the predictor resilience (β=0.121, SE=0.027, $p < .001$), from organizational inhibitors, statistical significance was found for predictors of computer literacy support (β=0.0246 SE=0.094, p=0.010), and technical support (β=-0.193, SE=0.096, p=0.046), ($R2 = 0.205$, $p < .001$). Resilience proved to be significant as a protective individual factor, which was hypothesized to mitigate the effect of techno-stressors on job-related well-being (β=0.097, SE=0.028, $p < .001$). Techno-overload (β=0.266, SE=0.110, p=0.017) and techno-complexity (β=0.284, SE=0.096, p=0.004) predicted the experience of digital strain. Computer self-efficacy, as a significant personal resource, mitigated the effect of techno-stressors on digital strain (β=-0.188, SE=0.045, $p < .001$).

5. DISCUSSION AND CONCLUSION

Studies suggest that organizational and personal inhibitors can be helpful in managing the demands associated with technostress (Bakker & Demerouti, 2007), and can also have a positive effect on the well-being of workers (Ragu-Nathan et al., 2008; Kushlev & Dunn, 2015). The results of our study partially confirmed these assumptions. In line with the above, we confirmed that technostress sources - higher techno-overload, complexity, invasion, uncertainty - were associated with higher digital strain, lower positive, and higher negative well-being. Participants reporting higher scores on the resilience scale experienced higher levels of positive affect. This finding aligns with research by Mguni, Bacon, and Brown (2011), who found that well-being and resilience are closely related, and concluded that each individual's quality of life over time will depend on a certain mental resilience. Organizational inhibitors (computer literacy support, technical support) and personal inhibitors (resilience) contributed to positive job-related well-being, with resilience as a personal resource mitigating the negative effects of techno-stressors on positive well-being.

Similarly, researchers Yong, Ghulam, Anam and Ibrahim (2022) demonstrated that technostress inhibitors, such as providing technical support and computer literacy, significantly and positively influenced employees' well-being. The experience of digital strain was predicted by techno-overload, techno-invasion, and techno-complexity, and the personal resource computer self-efficacy mitigated the effect of techno-stressors on digital strain. Organizational inhibitors in our study did not show statistical significance in relation to digital strain. Other factors or variables that we did not test in the study may play a more significant role. Some studies, for example, suggest that factors such as technology reliability (Ayyagari et al., 2011), innovation support (Tarafdar et al., 2011), or technology usefulness (Lee, 2016) can help reduce the level of technostress.

In the study, we identified specific factors that negatively affect employee well-being, providing insights for designing measures to minimize these risks. We also highlighted factors that have the potential to alleviate the experience of digital strain and the impact of techno-stressors. Our findings thus have the potential to contribute to the creation of a better and healthier work environment, optimization of technological solutions, and increased satisfaction and performance of employees. These insights can be valuable for managers and organizations striving to address the challenges associated with digital transformation and modern technologies in the workplace. Implementing measures to support resilience, providing technical support, and improving computer literacy can help employees better manage technostress and achieve better job well-being. These steps could lead to improved productivity, reduced absenteeism, and overall employee satisfaction, positively impacting organizational performance.

The sample consisted of a high proportion of university-educated (70%) and younger respondents (ages 21-30), limiting the generalizability of the findings. Additionally, some participants found certain questions outdated or unclear, highlighting the need for clearer question design in future research.

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